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**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29569**

**CLINICAL AND FUNCTIONAL OUTCOME OF TOTAL KNEE ARTHROPLASTY (TKA) WITH OR WITHOUT PATELLAR RESURFACING – ASIAN PERSPECTIVE**

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National University Hospital, Singapore (SINGAPORE)

**BACKGROUND AND PURPOSE:** Patellar resurfacing in total knee arthroplasty remains controversial. Present literature regarding the clinical outcomes of patellar resurfacing in TKA in Asian population is limited. Hence, the objective of our study was to assess the clinical and functional outcome after primary non-resurfaced and resurfaced TKA in Asian population and to compare with the western population. **METHODS:** We retrospectively analyzed the results of 155 non-resurfaced and 105 resurfaced TKA operated during December 2008 to December 2009 in our institute. Knee Society score / WOMAC / SF-36 and functional outcomes were measured both preoperative and postoperative follow up period. **RESULTS:** Both groups were comparable in terms of mean age (nonresurfaced) 66.15 and 65.81 (resurfaced) and Preop (Mean scores nonresurfaced – SF-36: 29.75/49.46 Knee score 43.78, 34.84 & WOMAC - 55.79) and (Mean scores resurfaced – SF-36: 30.1/ 48.85, Knee score 43.43 35.81 & WOMAC – 56.15). Postoperative knee and function scores showed significant improvements in both groups; however there were no significant difference between the groups, except for the rate of anterior knee pain. Complication rates like DVT, superficial infection were similar in both the groups. **CONCLUSION:** The results of our study indicate that resurfacing of the patella has no clinical effect on pain and function after a TKA; however the rates of anterior knee pain and stair climbing were better in the resurfaced group. The results of our study are comparable to western population.

**Date: 2011-09-08**  
**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28940**

**OCCURENCE OF DVT IN PATIENTS WITH PATELLA FRACTURES**

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Patella fractures are relatively rare in orthopaedic trauma, representing 1% of all fractures. Although there is ample literature regarding the prevention of venous thrombotic events (VTE) associated with lower extremity trauma, the vast majority of these patients have sustained long bone fractures. There is no clear deliniation of how the VTE risk in patients with isolated patella fractures should be managed. Methods: We describe three patients who underwent surgical treatment of patella fractures at our institution over the last two years, and who developed either deep vein thrombosis (DVT) or pulmonary embolus (PE) after hospital discharge. Results: One patient sustained a fatal PE 7 days after surgical treatment of a closed patella fracture. Autopsy later revealed bilateral DVTs, segmental pulmonary emboli, and a saddle embolus. The second patient developed a proximal DVT following surgical fixation of an isolated closed patella fracture. The DVT was treated successfully over the course of the next 6 months with anticoagulation methods. The third patient presented with a fatal PE 12 days after undergoing surgical fixation of an open patella fracture. During the treatment course of these three patients, a variety of accepted prophylactic measures were employed by the different treating surgeons. Discussion and Conclusion: We recommend that treating surgeons assess thoroughly patient risks for developing VTE. Surgeons should consider initiating and documenting prophylactic measures both for surgically treated patella fractures and patients who may be immobilized for the non-operative treatment of closed patella fractures. Further studies should assess the incidence of the VTE associated with patella fractures, treated either operatively or non-operatively, with aim of providing more consistent strategies for the prevention of VTE in this patient population.

**Date: 2011-09-08**  
**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 30144**

**PATELLAR RESURFACING VERSUS NON-RESURFACING IN STAGED REVISION OF THE INFECTED TOTAL KNEE ARTHROPLASTY**

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Background: The aim of this study was to investigate outcomes of surgical management with unresurfaced patella in the 2nd staged infected TKA. Methods: The study included 49 knees of 48 patients with 2nd staged septic revision TKA from January, 2007 to June, 2008. We divided these patients into the patellar resurfacing group(Group A) which had 22 patients (23 knees) and patellar retention group(Group B) had 26 patients (26 knees) and compared the clinical results. We evaluated these two groups using the KSS score, WOMAC score and anterior knee pain rating scale. Recurrence of infection rate was also investigated. Results: Mean Preoperative KSS score, Knee function score and WOMAC score were 43.07, 34.81 and 41.04 in Group A and 45.25, 38.75 and 44.45 in Group B, respectively. The value of those outcomes after reimplantation was significantly improved into 66.12, 54.58 and 70.46 in Group A and 69.4, 61 and 77.8 in Group B, respectively. There were no statistically significant differences between the two groups. 3 knees had recurrent infection. These infections occurred in a patient who received patella resurfacing and no cases of infection occurred in retention group. Conclusions: The unresurfaced patella did not increase the risk of recurrence in the 2nd staged infected revision arthroplasty and did not show significant clinical differences from resurfaced patella. The results of our study showed that preservation of original patellar bone can be considered as an alternative option for effective patellar managements in staged septic revision TKA.

**Date: 2011-09-08**  
**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29870**

**COMPARING THE MID-VASTUS AND MEDIAL PARAPATELLAR APPROACHES IN TOTAL KNEE ARTHROPLASTY: A META-ANALYSIS**

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Background: Proponents of a mid-vastus (MV) approach for primary total knee arthroplasties (TKA) stress its importance in preserving function of the extensor mechanism with earlier rehabilitation postoperatively. We conducted a meta-analysis of RCTs comparing the standard medial parapatellar (PP) and mid-vastus (MV) approaches in primary TKA to substantiate the validity and relevance of this contention. Methods: The study was conducted according to the guidelines described in the Cochrane handbook for systematic reviews. Results: We included 14 studies involving 1177 patients with mean age of 69.5±2 for the MV and 68.9±2.8 for the PP groups. Using a MV approach led to significant improvement in flexion (mean difference (MD) 9.90, 95% confidence interval (CI) 7.94 to 11.86, P<0.000001) and visual analogue scale scores (MD -1.72 95%CI -2.08 to -1.36, P<0.00001) in the first week postoperatively, significant reduction in days to straight leg raise (MD -2.02, 95% CI -3.72 to -0.31, P=0.02) and number of lateral releases (risk difference -0.09 95%CI -0.17 to -0.01, P=0.02) with no increase in complication rates. MV approach lengthened duration of surgery by MD of 8.48 minutes (95%CI 0.52 to 16.44, P=0.04). Conclusion: We conclude that the MV approach offers superior range of movement and pain control over the standard PP approach in the immediate postoperative period after TKA with no increase in complication rates.

**Date: 2011-09-08**  
**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28305**

**PATELLOFEMORAL HEMICAP RESURFACING ARTHROPLASTY:  
LITERATURE REVIEW AND CLINICAL RESULTS**

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Introduction: Majority of localised cartilage defects affect the over 40 year olds with articular cartilage defects identified in 50% of routine knee arthroscopies. These middle aged patients are neither fit for biological repair methods with traditional resurfacing. This remains a serious problem for every orthopaedic surgeon. Different biomechanical studies have shown that untreated defects have lead to progressive degenerative changes and increased contact pressures. Minimally invasive anatomic resurfacing device HemiCAP (Arthrosurface Inc., Franklin, MA, USA) prosthesis is an alternative for focal chondral defects. Methods and Patients: All patients who had received HemiCAP were identified from our theatre records. Clinical data was collected from patient electronic notes. Telephone based patient survey was carried out to determine patients satisfaction of the procedure and longterm physical outcome. Functional outcome was assessed using Oxford knee scores. Results: The study population were all aged less than 50 years (n7). Indication for HemiCAP was pain having failed conservative management. Majority of the patients had intact collaterals and cruciate ligaments on pre-operative arthroscopy. Minimal blood loss was reported during surgery. Early mobilisation was recorded in 100% of the cases. 42% required further surgery because of ongoing pain. Subgroup analysis of persistence of knee and arthroscopic findings of meniscus, collaterals and cruciates tear showed although statically insignificant, an increased recurrence rates leading to failure. Only one patient reported nil relief from knee pain following HemiCAP insertion. Conclusion: Our early clinical study provides evidence that HemiCAP is a promising solution to isolated articular cartilage defect in young patients. There is however, paucity of data on clinical outcomes of this device. However, perhaps this should be avoided if there is arthroscopic damage to other knee ligaments because of increased failure rates.

**Date: 2011-09-08**  
**Session: Knee - Patella**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28013**

**COMPUTER ASSISTED PRIMARY TOTAL KNEE ARTHROPLASTY BETWEEN OBESE AND NON OBESE PATIENTS: IS NAVIGATION THE ANSWER TO KNEE ARTHROPLASTY IN OBESITY?**

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**Aim:** Total Knee Arthroplasty (TKA) in obese patients has been under rigorous scrutiny due concerns of less satisfying results and increased risk of perioperative complications in this cohort. We conducted a prospective study to observe functional scores between obese and non obese patients at two years after computer assisted TKA. Average stay, time for wound to be dry and perioperative complications were also compared. **Material and Methods:** A prospective study was conducted between February 2007 and February 2008 involving 50 patients. Two different groups of 25 each were made on the basis of Body mass Index (BMI less or more than 30). Oxford and Knee society scores were obtained at two years to observe difference in functional scores between these groups. **Results:** Both non obese (Gp1) and obese patients (Gp2) had significant improvement in their preoperative Knee Society Score (KSS), Functional Knee Society Scores (FKSS) and Revised Oxford Knee Scores (ROKS) ( $p < 0.001$ ). Obese group scored better than non obese group in all the three knee scores. Improvement in KSS, FKSS and ROKS scores in Gp1 when compared with Gp2 was statistically not significant with p-value of 0.63, 0.32 and 0.42 respectively. **Conclusions:** Navigated TKA in obese patients in present study had slightly better functional scores at two years. Obese patients should preferably have navigated TKA to help precise component placement with appropriate soft tissue balancing which is difficult to achieve with conventional non navigated surgery.

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**Session: Knee - Patella**  
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**Room: Meeting Hall IV**

**Abstract no.: 27501**

**DOES AN EXPERIENCED KNEE SURGEON BENEFIT FROM THE USE OF A NAVIGATION SYSTEM IN TKA?**

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Objective: The aim of the study was to evaluate whether a well trained knee arthroplasty surgeon would benefit from years of clinical experience with navigation in terms of alignment accuracy. Material: Three consecutive series of 75 TKA's per group of one single surgeon were compared with respect to component alignment. One group (A) was recruited from the time prior to introduction of navigation technology, the two other groups dated from a period eight years later. Group B included manual cases whereas group C included navigation. Alignment was evaluated radiographically at first review. Results: The groups were comparable with each other. Alignment of the mechanical leg axis was significantly better in group B compared with group A ( $p < 0.01$ ) and significantly superior in group C with respect to group B ( $p < 0.01$ ). When the very good cases of each group [mech. axis ( $0 \pm 3^\circ$ ), single femoral and tibial axes ( $90 \pm 2^\circ$ )] were compared the differences were significant as well ( $p < 0.05$ ). Conclusions: Axis alignment is superior when navigation was used. The results of the historical series are comparable with those of the literature at that time. The significant difference between groups A and B indicates that an experienced knee surgeon may derive considerable benefit from the use of a navigation system with respect to his manual skills in total knee arthroplasty. The intraop. data made available by a navigation system are doubtlessly more exact in comparison to conventional instrumentation sets, thus contributing to a learning effect.

**Date: 2011-09-08**  
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**Abstract no.: 28095**

**ISOLATED LATERAL LIGAMENT LAXITY IN PRIMARY TOTAL KNEE ARTHROPLASTY: COHORT STUDY OF STEMMED VERSUS UNSTEMMED IMPLANTS**

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**Introduction:** The role of stemmed implants in the setting of isolated lateral laxity in primary total knee arthroplasty is unclear. We present a cohort study to assess the effect of unstemmed, constrained TKA for isolated lateral laxity. **Methods:** 1745 primary TKA performed by the senior surgeon were reviewed. 39 knees in 33 patients with isolated lateral laxity managed with unstemmed components were compared to matched stemmed controls (37 knees in 28 patients). Lateral instability was defined intra-operatively based on >7mm gap in mid-flexion/ full extension/ figure-of-four with well-positioned components. Primary outcome measures were clinical failure for aseptic loosening (with need for revision as the endpoint) and any radiographic signs of loosening. **Results:** Average follow-up was 43 months for the unstemmed group (UG) and 25 months for the stemmed group (SG). UG and SG were matched for age, gender, BMI, arthritis etiology, and comorbidities. The incidence of isolated lateral ligament laxity in this cohort was 4%. There was no difference in clinical outcomes between cohorts. There was no evidence of radiographic loosening; no revisions were performed for aseptic loosening in either group. **Conclusion:** A post/constraint can be used without stems to compensate for isolated lateral laxity. There is no significant increased risk of loosening with increased constraint, as lateral instability is primarily a swing-phase phenomenon. The goal is limiting varus thrust with improved gait kinematics and patient comfort. Further biomechanical testing and long-term clinical results are needed.

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**Abstract no.: 29902**

**GAP CHANGES AFTER POPLITEUS TENDON RESECTION DURING TOTAL KNEE ARTHROPLASTY (TKA): A CADAVERIC STUDY IN THAI FEMALE KNEES**

Saran TANTAVISUT, Aree TANAVALLEE, Srihatach NGARMUKOS, Vajara WILAIRATANA, Pongsak YUKTANANDANA, Yongsak WANGROONGSUB  
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We evaluated the effect of isolated complete resection of the popliteus tendon during TKA on the flexion and extension gaps. In addition, we measured the distance of femoral attachment of popliteus tendon in relation to femoral condyles. Standard TKA was performed in 14 Thai female cadavers. Before the step of bone cuts, the distance from the most distal femoral attachment of popliteus tendon to the distal lateral femoral condyle (DFa-DLFC distance) and the distance from the most posterior femoral attachment of popliteus tendon to the posterior lateral femoral condyle (PFa-PLFC distance) were measured. After all bone cuts were done, the flexion and extension gaps were measured under 98 Newtons tension in the conditions of intact popliteus tendon and complete tendon resection respectively. The mean DFa-DLFC distance was 8.9 mm (range, 6.4 - 10.5 mm) and the mean PFa-PLFC distance was 11.5 mm (range, 9.5 - 14.0 mm). We found that 35.7% of cadavers had DFa-DLFC distances less than 9 mm. After resection of the popliteus tendon, the gap significantly increased in both knee flexion and extension. However, the increase values were less than 2 mm. The routine of 9-mm distal femoral bone cut tends to cause popliteus tendon injury during TKA in small knee that lead to statistically significant increase of knee flexion and extension gaps in medial and lateral sides. However, the value of difference was less than 2 mm which does not have clinical significance.

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**Session: Knee - Balancing**  
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**Abstract no.: 28462**

**POSTERIOR STABILISED IMPLANTS IN PRIMARY TOTAL KNEE REPLACEMENT**

Pierre-Paul CASTELEYN<sup>1</sup>, Dirk GANZER<sup>2</sup>, Robert KRAUSE<sup>3</sup>, Hans BAYER-HELMMS<sup>4</sup>

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Introduction: The purpose of this consecutive multicentre prospective case series study was to evaluate the short term clinical, functional, and radiological outcome of a posterior stabilised primary total knee arthroplasty (balanSys® PS, Mathys Ltd Bettlach, Bettlach, Switzerland). Methods: 266 (254 monolateral, 6 bilateral) consecutive patients (m/w=1:2; mean age 70.0 yrs; range 44-87 yrs) were treated for osteoarthritis. The follow-up consisted of clinical as well as radiological evaluations, preoperatively, and at 6 weeks, 6 months, 1 and 2 years postoperative. Results: Follow-up information is until now available for 205 cases. 183 cases reached a follow-up time of at least 24 months. The Knee Society Score increased from preoperatively 108.7 to 172.6 points. The mean VAS for pain (0-10) decreased from 7.4 preoperatively to 1.2. The mean VAS for satisfaction increased from 3.5 preoperatively to 8.9. Most striking with this design was the rapid recovery of the patients : - KSS, preoperative : 109, 3m :147, 6m : 166, 12 m: 172 - Knee score, preoperative : 58, 3m : 80, 6m : 87, 12 m: 89 - VAS pain, preoperative : 7.4, 3m : 2.8, 6m : 1.9, 12 m: 1.4 - VAS satisfaction, preoperative : 3.5, 3m : 7.3, 6m : 8.1, 12m: 8.5 Statistical analysis used the Wilcoxon 2 sided test and the Chi-square-test. As major complications we had to revise two patients for instability due to malalignment, and 1 for loosening. 13 patients showed postoperative stiffness. Conclusion: This type of posterior stabilised total knee prosthesis shows promising radiological and clinical short term results, with a rapid recovery and with an acceptable rate of adverse events. In our series patients without patella replacement show a significantly better function score than patients with a replaced patella, although this needs further analysis.

**Date: 2011-09-08**  
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**Abstract no.: 29120**

**LONG-TERM RESULTS OF A ROTATING-PLATFORM POSTERIOR STABILIZED TKR DESIGN**

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Introduction: Although volumetric wear reduction has been demonstrated in knee simulator studies (ref), there is no long-term in vivo evidence supporting wear reduction and durability with uni-directional rotating platform PS design. This is the first long-term report of this implant, a prospective study investigating clinical and radiographic survivorship with 10 years follow-up. Material and Methods: Between January 2000 to March 2001, 118 consecutive patients (141 knees) received cemented RP TKRs. All patients were followed prospectively using clinical and radiographic criteria as defined by the Knee Society. At minimum nine years follow-up 20 patients were deceased, 11 were lost to follow-up and two refused to participate in the study, leaving 85 patients (100 knees) for final analysis. Results: Good to excellent results were achieved in 95% of patients. There were no cases of malalignment, spinout, aseptic loosening or osteolysis. The mean ROM improved from  $111.2 \pm 15.2$  to  $119 \pm 3.8$ . The mean WOMAC score was  $30 \pm 14$ , KSS scores improved from an average of 48 to 96. Anterior knee pain was present in 15% of cases. The incidence of asymptomatic crepitation and painful crepitation requiring scar excision was 10% and 4% respectively. During this period we had one case of infection and one revision for fracture. Kaplan-Meier survivorship at 10 years for mechanical failure and failure for all failures was 100% and 95.7% respectively. Discussion and Conclusion: Ten-year follow-up of RP-PS design demonstrates excellent clinical and radiographic results with no failures for mechanical reasons.

**Date: 2011-09-08**  
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**Abstract no.: 28518**

**REVISION KNEE PROSTHESES FOR DIFFICULT PRIMARY TOTAL KNEE REPLACEMENT: INDICATIONS AND OUTCOME**

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Introduction: Revision knee prostheses can compensate for deficient medial and lateral collateral ligaments and deficient bone stock of the proximal tibia and distal femur. These revision prostheses can be used in difficult primary total knee replacement TKR. Material and methods: We have employed revision knee prostheses in twenty seven primary TKR in twenty three patients with average age of 56 years (range 53 to 68). Four patients had bilateral knee replacements. The underlying etiologies for knee arthritis in this series were rheumatoid arthritis (11 knees), advanced osteoarthritis with varus deformity > 25° in (11 knees) and complicated intra-articular fractures (5 knees). The NexGen LCCK revision system was used in all cases (Zimmer, USA). Tibial augments were used in 21 cases; stems were used in all tibial trays and 22 femoral components. The WOMAC and Oxford knee function scores were used for prospective assessment of these patients. Results: At average 23 months follow up (range 12-46 months) all patients except one were satisfied with the outcome. Significant improvement of the WOMAC and Oxford scores were recorded (P< 0.05). The arc of movement has improved from (15-74 degrees) pre to (0-95 degrees) post. One patient had repeated instability of her prosthesis and remained in a knee immobilizer. Conclusion: Revision implants can be used as a salvage solution for difficult primary TKR. Functional improvement in knee function is comparable to primary non-constrained prostheses. The effect of using a prosthesis that is constrained to varus and valgus on the long term survival of these implants remains to be seen.

**Date: 2011-09-08**  
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**Time: 16:30 - 18:00**  
**Room: Meeting Hall IV**

**Abstract no.: 29139**

**HOW RELIABLE IS FIXED VALGUS DISTAL FEMORAL RESECTION IN PRIMARY TOTAL KNEE ARTHROPLASTY?**

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Introduction: To restore the lower limb mechanical axis in total knee arthroplasty (TKA) the distal femoral valgus resection angle should be equivalent to the angle between the femoral anatomical (intramedullary) and mechanical axes (FAM angle). Most conventional TKA instrumentation guidelines recommend a fixed distal femoral valgus resection angle of either 5° or 6°. Aims: To determine the distribution of the FAM angle in patients undergoing primary TKA and analyse with respect to the pre-operative varus or valgus alignment. Methods: The study consisted of 20 consecutive patients undergoing 25 primary TKA. All patients had preoperative CT scanograms of both lower limbs. The FAM angle and the mechanical femoral tibial angle were measured in both lower limbs in all cases. Results: The mean age was 61.7 years. Twelve of the 40 limbs had varus > 10°. The coronal plane deformity ranged from 22° varus to 11° valgus. The FAM angle was between 5° and 9°, with a median of 6°. The FAM angle was 6° in 45% of cases, 5° in 15%, 7° in 25% and > 7° in 15%. There was a statistically significant difference in mean FAM angle between the two groups (Varus > 10° and varus < 10°/ valgus). Discussion: These data suggest that the recommended fixed 5° or 6° distal femoral valgus resection angle is not reliable in TKA for varus > 10° and may require adjustment.

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**Room: Meeting Hall IV**

**Abstract no.: 30188**

**CONDYLAR DIFFERENTIAL IN PLANNED TIBIAL CUTS IN TOTAL KNEE REPLACEMENT**

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Tibial cut is a vital and crucial step in ensuring adequate and appropriate proximal tibial resection, which is essential for mechanical orientation and axis in total knee replacement. Tibial cut must be individually reliable, reproducible, consistent and an accurate predictor of individual anatomical measurements. Conventional tibial cuts of tibia with fixed measurements can not account for individual variations. While computer navigated total knee replacement serves as a medium to achieve this objective, the technology is not universally applicable for differing reasons. Therefore we evolved the concept and technique of Condylar Differential in planned tibial cuts in conventional total knee replacement, which accounts for individual variations and reflects the individual mechanical orientation and alignment. First a vertical line is drawn on digital or plain weightbearing anteroposterior radiograph for mechanical axis of tibia. Then horizontal lines are drawn across the lowest reproducible points of medial and lateral tibial condyles perpendicular to the mechanical axis of tibia. The distance between these two horizontal lines represents the Condylar Differential. Condylar Differential, adjusted to the nearest millimeter, is maintained in executing the tibial cuts, if necessary successive cuts. We applied this technique in 37 consecutive total knee replacements since August 2009 and found that it is simple, consistent, and effective and individualises the tibial cut for optimal templating of tibia. We encountered no problems, adopting this technique. Condylar Differential contributes to optimal individualized tibial cut in conventional total knee replacement and is a useful alternative to computer navigated option in this respect.

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**Abstract no.: 29504**

**HINDFOOT ALIGNMENT VARIATION BEFORE AND AFTER TOTAL KNEE ARTHROPLASTY – RESULTS OF A PILOT STUDY**

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Introduction: Limb alignment to balance the weight transmission across the knee joint is essential part of total knee replacement surgery. Conventionally the hip-knee-ankle (HKA) axis is considered for correction; however the weight transmission to the ground also involves the joints distal to ankle. Heel alignment will thus play an important part in weight transmission. Genu varum deformities in osteoarthritis are associated with heel valgus deformity and we hypothesize that this deformity persists even after correction of the knee deformity after TKR. Material and methods: patients with primary knee osteoarthritis genuvarus deformity  $>10^{\circ}$  but  $<30^{\circ}$  were included in the study. Preoperative and three months post operative scanogram and Cosby's ankle radiographs are taken. The HKA and the tibio-calcaneal angles were measured and compared using paired t test. Preoperative genu varum was also correlated with preoperative tibio-calcaneal angle using Pearson's correlation Results: mean HKA improved from a preoperative value of  $16.53^{\circ}$  (valgus) to  $1.36^{\circ}$  (valgus). The tibio-calcaneal angle slightly increased postoperative from  $13.16^{\circ}$  (valgus) to  $14^{\circ}$  thus the knee alignment returned to normal HKA, however the heel valgus did not change at three months post surgery. This will further lateralize the weight transmission axis. Conclusion: This is a small sample, short follow up pilot study; however it does indicate that the heel valgus deformities may persist after total knee replacement. This may be needed to be considered while preoperative planning, however a longer follow up will be required to assess the complication rates and clinical result.

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**Abstract no.: 27615**

**POSTOPERATIVE LATERAL LIGAMENTOUS LAXITY AFTER TKA IN THE VALGUS KNEE**

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**INSTRUCTION:** Maintaining good medial and lateral soft tissue balance in the valgus-deformed knee is considered one of the most important factors for successful total knee arthroplasty (TKA). However, this theory is based on the hypothesis that the balance remains unchanged after TKA. We therefore evaluated this hypothesis. **MATERIALS AND METHODS:** Thirty-seven knees (RA, n=33; OA, n=4) showing valgus deformity in 37 women were treated using TKA. Median valgus deformity was 15 degree. Lateral laxity was measured by stress radiograph immediately after TKA (IA), and at 3 months (3M), 6 months (6M), and 12 months (12M) after surgery. **RESULTS:** Mean valgus laxity was 5.0 degree at IA, 4.8 at 3M, 4.1 at 6M, and 4.2 at 12M. In cases showing valgus laxity 5 degree or more at IA, values were 6.9 degree, 6.2, 4.9, and 4.8, respectively. In cases with valgus laxity 3 degree or less at IA, values had increased with time, 2.4 degree, 2.9, 3.0, and 3.6, respectively. Mean varus laxity had changed as 5.5 degree, 4.1, 4.2, and 3.9, respectively. **DISCUSSION:** Keeping the ideal level of lateral balance in TKA is not always possible, particularly in knees showing severe deformity. These findings clarify that lateral soft tissue balance can be controlled automatically even cases in which balance is not ideal during surgery, if ideal alignment is acquired by TKA.

**Date: 2011-09-08**  
**Session: High Tibial Osteotomy**  
**Time: 10:30 - 12:00**  
**Room: Meeting Hall V**

**Abstract no.: 30361**

**MEDIAL OPEN-WEDGE HTO VS MEDIAL UKA**

Alex STAUBLI  
(SWITZERLAND)

Realignment HTO holds a central position within the therapeutic spectrum for early and medium-grade medial varus osteoarthritis: The group of patients for whom more than one of the above-mentioned procedures would be suitable, is quite large. Degree of osteoarthritis: The realignment osteotomy causes the main weight-bearing zones and the high pressure points to shift from the painful compartment of the joint to the opposite side, which is still intact. Thus, the results are more favorable for moderate osteoarthritis than for advanced unicompartmental osteoarthritis. Patellofemoral osteoarthritis: Many patients with unicompartmental osteoarthritis also show degenerative changes in the medial patellofemoral section of the knee joint. However, if clinically the pain on weight-bearing in the femoro-tibial section of the joint is the major concern, these retro-patellar changes should not be the determining factor to decide against a joint-preserving procedure. Ligament stability: In most cases, the combination of an unicompartmental osteoarthritis with significant knee instability can be treated successfully by a high tibial osteotomy. Varus deformity: In which case high tibial osteotomy [HTO], in which case sled prosthesis?: Regarding the indication for osteotomy or sled prosthesis one should keep in mind that the axial correction osteotomy is especially effective whenever a preexisting bony malalignment is to be corrected. Especially if the osteotomy is carried out at the site of deformity, the joint lines of the proximal and distal tibia are corrected, and thus knee and ankle joints are aligned almost horizontally. Age of the patient: In central Europe, age limits of 65 years for men and 55 years for women are generally advised for juxta-articular high tibial osteotomies. The multi-center follow-up study for high tibial osteotomies using the here shown TomoFix plate have demonstrated very good results even for patients older than 60 years.

**Date: 2011-09-08**  
**Session: High Tibial Osteotomy**  
**Time: 10:30 - 12:00**  
**Room: Meeting Hall V**

**Abstract no.: 30303**

**OPENING WEDGE TIBIAL OSTEOTOMY FOR LARGE VARUS DEFORMITY**

Philippe HERNIGOU, Alexandre POIGNARD, Charles Henri FLOUZAT  
LACHANINETTE  
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The results in fifty three knees that had been treated by proximal tibial opening wedge osteotomy for large varus deformity and osteoarthritis of the medial compartment were evaluated after a mean length of follow up of 10 years (range, eight to twelve years). We used a porous beta-tricalcium phosphate ( $\beta$ -TCP) wedge because it is resorbable and osteoinductive. All osteotomies were completely consolidated and complete osseointegration of the remnant of the  $\beta$ -TCP wedge took place. After ten years, forty (81 per cent) of the fifty three knees had an excellent or good result, and in thirteen knees there was recurrent pain for which six had an arthroplasty. Although the results deteriorated with time, time was not the only determinant of the result. Alignment, measured as the hip knee ankle angle on radiographs of the whole limb that were made with the patient bearing weight, was also a determinant of long term results. The best results were obtained in the knees that had a hip knee ankle angle of 183 to 186 degrees. In these knees, there was no pain and no progression of the arthrosis in either the medial or the lateral tibiofemoral compartment. Of the three knees that had an angle of more than 186 degrees, all five had progressive degenerative changes in the lateral compartment. In the undercorrected knees (an angle of less than 183 degrees), the results were less satisfactory, and there was a tendency toward recurrence of the varus deformity and progression of the arthritis of the medial compartment. Therefore, proximal tibial osteotomy is a very suitable operation even for patients who have gonarthrosis of the medial compartment and a large varus deformity.

**Date: 2011-09-08**  
**Session: Russian Symposium**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall V**

**Abstract no.: 30525**

**RECONSTRUCTION OF THE DYSPLASTIC HIP AT ADOLESCENTS**

Alexander BELETSKY, O.A. SOKOLOV  
(BELARUS)

Peculiarities of clinical and radiological conditions of displastic hip joints with account of surgical intervention influence on the degenerative-dystrophic process in the hip joint. To improve the quality of surgical aid to adolescents with displasia of the hip joint by substantiation, development and inculcation into practice of a complex system of modern reparative-restoration interventions on pelvic and femoral bones which provide reorientation of separate parts or the whole hip joint on three planes with restoration of its stability, normal correlations and congruence of articular surfaces. 222 patients at the age of 10-19 with displasia of the hip joint, 319 operations performed on pelvic and femoral bones. Classification of displasia in adolescents with 4 types and algorithm of treatment measures is suggested. Results of surgical treatment of displasia of the hip joint in adolescents by development and inculcation into practice of modern reparative-restoration interventions on pelvic and femoral bones are improved. There are suggested and inculcated into practice new ways and technologies of performing osteotomy-osteoclasia of the ischium and osteotomy of the pubis at triple pelvic osteotomy, bone-plastic reconstruction of the proximal part of the femur, posterior rotational and double lengthening osteotomy of the femur, reconstruction of the supra-acetabular area, plate for osteosynthesis of the greater trochanter.

**Date: 2011-09-08**  
**Session: Russian Symposium**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall V**

**Abstract no.: 30526**

**ARTHROSCOPY IN DIAGNOSTICS AND TREATMENT OF KNEE JOINT PATHOLOGY IN CHILDREN**

Mikhail GERASIMENKO, Alexander BELETSKY  
(BELARUS)

The purpose of this lecture - to describe modern concepts and local experience in performing the mini-invasive operative techniques in cases of rheumatic, orthopaedic and traumatologic pathology of the knee joint in children on the basis of Minsk Clinical Center of traumatology and orthopaedics of 6th city hospital of Minsk. From July, 2005 to May 2011 243 arthroscopic and semiarthroscopic operations were performed at 230 patients. Middle age of patients was 14,3 years (from 2 till 17 years). There were 115 girls and 115 boys among patients. 129 operations (53,1 %) were performed because of pathology of the right knee joint, the others 114 (46,9 %) because of pathology of the left knee joint. 151 from 230 patients (65,7 %) marked a trauma (household or sports) in the anamnesis which provoked the development of pathology. The basic types of a pathology demanding operative arthroscopic intervention were the followings: 1) recent and old damages of meniscuses (partial meniscectomy or organ-saving operation were performed), anterior crucial ligament and collateral ligaments (32,5 %), 2) chondral and osteochondral fractures of the patella, condyles of femur and tibia (18,1 %, attempt of refixation or removal of fragment), 3) synovitis of various genesis (18,1 %, target biopsy with following pathomorphological and immunohistochemical research), 4) chondromalacia of articulate surfaces of the patella, condyles of femur and tibia of various grades (9,1 %), 5) Koenig disease (8,7 %, different tactics in different stages), 6) congenital anomalies of meniscuses (6,2 %, modeling resection), 7) lateral patellar instability (5,8 %, lateral release was performed, in some cases supplemented with reefing of medial patellar retinaculum), etc. No serious postoperative complications among patients were observed. In absolute majority of cases (94,3 %) the positive effect from carrying out of arthroscopy was observed.

**Date: 2011-09-08**  
**Session: Russian Symposium**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall V**

**Abstract no.: 30292**

**NEW POSSIBILITIES OF USING TITANIUM ALLOYS IN  
ENDOPROSTHESIS OF LARGE JOINTS**

Nikolay ZAGORODNIY<sup>1</sup>, Alexander BALBERKIN<sup>1</sup>, Alexander ILYIN<sup>2</sup>

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Titanium alloys used in hip joint in a long time. However, to this day there are some limitations when applied to the node movement, with cement fixation implants and feet when using a titanium porous coating cups and legs. Russia has developed a new technology changes the structure of titanium alloys, which changes its physical and mechanical properties without breaking the biocompatibility with the human body. The name of this technology – termohidroguenium treatment of titanium alloys. In addition, the modified titanium alloy by vacuum plasma deposition of nitrogen ions is applied nitride ceramics, which provides similar results with an oxide ceramic. New technologies have been used successfully in clinics in Russia for 12 years. A new titanium alloy used in more than 4,000 hip replacement operations.

**Date: 2011-09-08**  
**Session: Russian Symposium**  
**Time: 14:00 - 15:30**  
**Room: Meeting Hall V**

**Abstract no.: 30301**

**DYNAMIC LSZ INSTRUMENTATION IN TREATMENT OF CHILDREN SCOLIOSIS**

Mukhammad SAMPIEV, Nikolay ZAGORODNIY, Alexander LAKA, Stepan BALASHOV, Artem LYAGIN  
Peoples' Friendship University of Moscow, MOSCOW (RUSSIA)

Study Design: Retrospective analysis of the clinical and radiological results of dynamic spine system of Laka, Sampiev, Zagorodniy (LSZ) in treatment of idiopathic scoliosis. Background Data: We invented and introduced into the clinical practice dynamic spine system – LSZ. This instrumentation can be applied to actively growing child's spine without fusion, and does not restrict the growth of the spine in the postoperative period. Objectives: Evaluate the effectiveness of dynamic system LSZ (Laka Sampiev Zagorodniy). Methods: We evaluated results of 500 patients with idiopathic scoliosis who were operated with LSZ instrumentation between 2005 and 2009 with a minimum 24-month follow-up period. The patients' age ranged from 8 to 12 years (mean 11,4 years). Evaluation of the results of correction was performed according to the radiologic studies in the early and late postoperative periods. Results: The mean initial thoracic curve was 56° (35-113°). The mean value of instrumented vertebrae was 9,6. The average frontal correction of the main curve was 76,5%. Normalization of thoracic kyphosis was noted in 78% of patients (mean 41°, range 25 ° -38°). Mean correction of apical vertebra rotation was 37,57%. The surgery time was 60-80 min, range of blood loss 200-300 ml. There were no means of external immobilization in the postoperative period. There were no significant changes in results of correction at 2-year follow up. The mean increasing of height was 5,3 cm. There were not detected neurological and vascular complications in any case. Conclusions: LSZ instrumentation can be successfully applied in conditions of active growing of the spine in the case of early detected scoliosis when the using of stabile systems is difficult. This technique allows achieving high correction of scoliotic deformity and keeping it in the postoperative period.

**Date: 2011-09-08**  
**Session: Spine - Special Topics**  
**Time: 14:00 - 15:30**  
**Room: Panorama Hall**

**Abstract no.: 29952**

**IN-VIVO DEMONSTRATION OF SPONTANEOUS APICAL VERTEBRAL DEROTATION IN THORACIC ADOLESCENT IDIOPATHIC SCOLIOSIS**

Keith Dip-Kei LUK, Wai Yuen CHEUNG, Kmc CHEUNG, Yat Wa WONG, Dino SAMARTZIS

The University of Hong Kong (HONG KONG)

**Introduction:** Adolescent idiopathic scoliosis (AIS) is a three-dimensional coupling deformity. Various studies have reported vertebral rotational effects with different implant constructs and surgical techniques for AIS. However, none of them has considered the spontaneous coupling effect on vertebral de-rotation produced by correction of coronal deformity. **Method:** Twenty-five AIS patients with Lenke type 1 with Cobb angles greater than 45° who underwent posterior spinal fusion with instrumentation without direct apical de-rotation were prospectively assessed. Cobb angles (CA) and apical vertebral rotations (AVR) in standing, supine and fulcrum bending positions preoperatively, and in supine position postoperatively, were assessed on x-rays and CT scans. **Results:** The study entailed 80% females and 20% males (mean age, 15.5 years). The mean preoperative CA (AVR) in standing, supine and fulcrum bending positions were 56 (24), 41 (18), and 20 (10) degrees, respectively. The differences were statistically significant ( $p < 0.05$ ). The mean postoperative CA (AVR) was 15 (8) degrees. The mean difference in AVR between fulcrum bending and post-operation was 2 degrees ( $p = 0.06$ ). The postoperative supine AVR was significantly positively correlated with postoperative CA ( $r = 0.82$ ), and negatively correlated with change in curve magnitude ( $r = -0.49$ ), correction rate ( $r = -0.83$ ) and fulcrum bending correction index ( $r = -0.45$ ) ( $p < 0.05$ ). **Conclusions:** Spontaneous apical de-rotation occurred concomitantly with correction of the coronal deformity. The amount of spontaneous AVR correction can be predicted with fulcrum bending radiographs. Such spontaneous de-rotation should be considered when assessing the effects with different implants and surgical strategies.

**Date: 2011-09-08**  
**Session: Spine - Special Topics**  
**Time: 14:00 - 15:30**  
**Room: Panorama Hall**

**Abstract no.: 27236**

**DISTAL ADDING-ON PHENOMENON IN LENKE 1A SCOLIOSIS: RISK FACTOR IDENTIFICATION AND TREATMENT STRATEGY COMPARISON**

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Summary: Distal adding-on is often accompanied by unsatisfactory clinical outcomes and high risk of reoperation. However, very few studies have focused on distal adding-on and its attendant risk factors and optimal treatment strategies remain controversial. Aims: To identify risk factors for the presence of distal adding-on in Lenke 1A scoliosis and compare different treatment strategies. Methods: Wilcoxon rank-sum test, Fisher's exact test and Spearman's correlation test were used to identify the risk factors for adding-on. A multiple logistic regression model was built to identify independent predictive factor(s). Five methods for determining lowest instrumented vertebra (LIV) were compared in both the Adding-on group and No adding-on group. Results: Out of 278 patients reviewed, 45 met the inclusion criteria. Multiple logistic regression results indicated that preoperative LIV+1 deviation from CSVL was an independent predictive factor. Among the five methods, choosing EV as LIV was nearly unable to prevent distal adding-on; choosing EV+1 as LIV resulted in fusing many more segments than necessary; only choosing DV as LIV showed satisfactory outcome from both perspectives. Conclusion: In Lenke 1A type scoliosis, the selection of LIV is highly correlated with the presence of adding-on; incidence increases dramatically when the preoperative LIV+1 deviation from CSVL is more than 10 mm. Choosing DV (the first vertebra in cephalad direction from sacrum with deviation from CSVL of more than 10 mm) as LIV may provide the best outcome as it not only prevents adding-on but also conserves more lumbar motion.

**Date: 2011-09-08**

**Session: Spine - Special Topics**

**Time: 14:00 - 15:30**

**Room: Panorama Hall**

**Abstract no.: 29382**

**CORRELATION OF ADULT SPINAL SAGITTAL IMBALANCE AND LIFE QUALITY ASSESSED WITH SF-36**

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Objective: To evaluate the correlation of spinal sagittal imbalance and life quality. Methods: Radiographic analysis of 48 consecutive symptomatic patients (Males 12, Female 36,  $66.2 \pm 8.5$  yrs) with spinal sagittal imbalance was performed using posteroanterior and lateral standing radiographs. Measurements included C7PL, thoracic kyphosis (TK), thoracolumbar kyphosis (TLK), lumbar lordosis (LL), pelvic tilt (PT), Pelvic incidence (PI), sacral slope (SS) and lumber-sacral joint angle (LSA). Life quality was assessed with SF-36 questionnaire. Pearson correlation was performed to analysis the correlation. Results: C7PL had significant correlation with Physical Functioning and General Health. PI had significant correlation with Bodily Pain, Vitality, Social Functioning and Role Emotional. TK had significant correlation with Physical Functioning ( $r = -0.292$ ,  $P < 0.05$ ), General Health ( $r = -0.389$ ,  $P < 0.01$ ). LL had significant correlation with Physical Functioning ( $r = 0.428$ ,  $P < 0.01$ ), General Health ( $r = 0.340$ ,  $P < 0.05$ ) and Vitality ( $r = 0.373$ ,  $P < 0.01$ ). PT had significant correlation with Vitality ( $r = -0.385$ ,  $P < 0.01$ ) and Social Functioning ( $r = -0.417$ ,  $P < 0.05$ ). No significant correlation was shown between TLK, SS, LSA and the SF-36 categories. Conclusion: C7PL, TK, LL, PI and PT are significant parameters correlate to life quality. PI is the most important one that affects bodily pain. TK, LL and C7PL are the main parameters affect general health. PI, PT and LL affect vitality most. Correcting these parameters when treating sagittal imbalance is important to gain better life quality.

**Date: 2011-09-08**

**Session: Spine - Special Topics**

**Time: 14:00 - 15:30**

**Room: Panorama Hall**

**Abstract no.: 27475**

**TRANSARTICULAR SCREW FIXATION FOR ATLANTOAXIAL INSTABILITY – MODIFIED MAGERL'S TECHNIQUE IN 38 PATIENTS**

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<sup>3</sup>PGIMER, Chandigarh, Chandigarh (INDIA)

Magerl's technique of transarticular screw fixation is the gold standard for treatment of symptomatic atlantoaxial instability. Traditionally this technique combines placement of transarticular screws and posterior wiring construct. The aim of this study is to evaluate clinical and radiological outcomes in subjects of atlantoaxial instability who were operated using transarticular screws and iliac crest bone graft, without the use of sublaminar wiring. We evaluated retrospectively 38 subjects who were operated using transarticular screw fixation. The subjects were followed up for pain, fusion rates, neurological status and radiographic outcomes. Instability in 34 subjects was secondary to trauma, in 3 due to rheumatoid arthritis and 1 had tuberculosis. Neurological deficit was present in 17 subjects. Most common presenting symptom was neck pain, present in 35 of the 38 subjects. Postoperatively residual neck and occipital pain was present in 8 subjects. Neurological deficit persisted in only 7 subjects. Vertebral artery injury was seen in 3 subjects. None of these subjects had any sign of neurological deficit or vertebral insufficiency. Three cases had nonunion. At the latest follow up, subjectively, 24 subjects had good result, 6 had fair and 8 had bad result. On objective grading, 24 had good result, 11 had fair and 3 had bad result. The mean follow up duration was 41 months. Thus, transarticular screw fixation is an excellent technique for fusion of the atlantoaxial complex. Omitting the posterior wiring construct achieves equally good fusion rates and avoids the complications of sublaminar wire passage.

**Date: 2011-09-08**  
**Session: Spine - Special Topics**  
**Time: 14:00 - 15:30**  
**Room: Panorama Hall**

**Abstract no.: 29660**

**IS SPINAL DYSRAPHISM A PROBLEM IN CASES OF CONGENITAL KYPHOSIS AND KYPHOSCOLIOSIS?**

Shalin MAHESHWARI, Ashok JOHARI, Ratna JOHARI, Amit NEMADE,  
Maulin SHAH  
Children's Orthopedic Centre, Mumbai (INDIA)

Association of congenital scoliosis with spinal dysraphism is well established in literature. However, this lacks clinical studies depicting relation of types of congenital kyphosis and spinal dysraphism. The objective of this retrospective study is to find out actual incidence of dysraphism in different types of congenital kyphosis and vertebral anomalies. Sixty five cases of congenital kyphosis or kyphoscoliosis were encountered between June-2001 and September 2010. Cases of post MMC kyphosis and syndromic kyphosis were excluded. The study included fifty cases, whose MRI of spine were available. Clinical data, X-rays and MRI of these patients were evaluated to find out types of kyphosis, types of vertebral anomalies, abnormal neurological findings and abnormal findings on MRI. : Failure of formation (Type-I) was the most common vertebral abnormality (60%). Abnormal neurological examination was present in 12% of cases. Intraspinal abnormalities on MRI were found in 33.33% of congenital kyphosis which increases to 39.62% in congenital kyphoscoliosis, making it an average of 37.33% in all types of cases. Diastematomyelia was the commonest intraspinal anomaly. Average angle of kyphosis at presentation with positive MRI finding was 54.42°. Patients with failure of segmentation (Type-II) had highest association with intraspinal abnormality. Recommendations/ Conclusions: Presence of abnormal neurological examination is a poor indicator of spinal dysraphism. Disparity in incidence of abnormal neurology (18%) and positive MRI (32%) indicates that MRI is essential tool to diagnose spinal dysraphism. Authors recommend MRI spine for all cases of congenital kyphosis because of its frequent association with spinal dysraphism.

**Date: 2011-09-08**  
**Session: Spine - Special Topics**  
**Time: 14:00 - 15:30**  
**Room: Panorama Hall**

**Abstract no.: 27817**

**SIMULTANEOUSLY ANTERIOR DECOMPRESSION AND POSTERIOR INSTRUMENTATION BY SINGLE EXTRA PLEURAL RETROPERITONEAL APPROACH IN THORACOLUMBAR LESIONS**

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We evaluated the morbidity of extrapleural retroperitoneal approach to perform anterior decompression and posterior instrumentation simultaneously by single "T" incision in thoracolumbar junction for spinal trauma (n=23) and tuberculosis (n= 25). All underwent single stage anterior decompression, fusion and posterior instrumentation via extrapleural retroperitoneal approach by single 'T' incision. Mean duration of surgery and mean intra-operative blood loss in traumatic group and tubercular spine was 269 minutes and 918 ml and 208 min and 1100ml respectively. The means preoperative kyphus angle improved from 23.30 to 9.3 immediately after surgery in traumatic group and 550 to 230 in tubercular spine which deteriorated by 2.50 at final follow up in both group. One patient developed deep wound infection which was treated by debridement and removal of hardware. Wound dehiscence occurred in only 2 cases. None of the patient in both groups required intensive unit care. Simultaneous exposures of both posterior and anterior column for posterior instrumentation and anterior decompression can be performed in single stage by extra pleural retroperitoneal approach by 'T' incision safely in thoracolumbar spinal lesions and is an easy alternative in with reduced morbidity as chest and abdominal cavities are not violated, ICU care not required and diaphragm not cut.

**Date: 2011-09-08**  
**Session: Spine - Special Topics**  
**Time: 14:00 - 15:30**  
**Room: Panorama Hall**

**Abstract no.: 29933**

**ASSESSMENT OF FIBER TRACT INTEGRITY IN SPINAL CORD BY DIFFUSION TENSOR IMAGING EVALUATION OF DTI DATAMETRICS AND TRACTOGRAPHY OF NORMAL SPINAL CORD, ACUTE AND CHRONIC SPINAL CORD INJURIES**

**S. RAJASEKARAN, Rishi M. KANNA, Ajoy P. SHETTY**  
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Routine magnetic resonance imaging (MRI) sequences have limited value for predicting functional outcomes in spinal cord injury (SCI). The role of Diffusion Tensor – Magnetic Resonance Imaging (DT-MRI) to quantify the extent and severity of nerve fibre tract damage in cervical spinal cord pathologies was assessed. In the first phase of the study, the protocols were standardized using freshly acquired spinal cord specimens of calves and one cadaver. In the second phase, healthy human volunteers were evaluated to form a standard database to compare with patients having cervical spinal cord pathology. In the third phase, DTI was done in ten cervical spondylotic myelopathy patients and three acute SCI. Fractional Anisotropy (FA) and Apparent Diffusion Coefficient (ADC) values were found to be more reliably corresponding to the physiological status of the cord. In acute SCI, the mean FA values were significantly decreased and ADC values increased at the site of cord injury. In cervical spondylosis, the FA values showed a decreasing trend with increasing compression. ADC values showed a corresponding increase as the compression increased. The changes in FA & ADC values were not limited to the areas of compression and the values were found to be altered over the entire area of spinal cord in patients with severe compression. Our study has documented the usefulness of both tractography and DTI datametrics. It encourages more concentrated effort in documenting the values and identifying characteristic changes specific to pathological conditions.

**Date: 2011-09-08**

**Session: Spine - Special Topics**

**Time: 14:00 - 15:30**

**Room: Panorama Hall**

**Abstract no.: 29817**

**ASSOCIATION BETWEEN THE POLYMORPHISM OF VDR GENE AND DEGENERATIVE DISC DISEASE OF THE LUMBAR SPINE IN A CHINESE HAN POPULATION**

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Background Degenerative disc disease (DDD) of the lumbar spine is very common diseases involving genetic and environmental factors. Till now, the association between Vitamin D receptor (VDR) gene polymorphic phenotype and lumbar DDD is still not clear. To evaluate the potential influence of VDR gene polymorphisms on lumbar DDD, a case-control study was conducted on the Han population. Methods Eight known single-nucleotide polymorphisms (SNPs) of VDR gene were genotyped among 118 patients and 112 healthy controls on a Chinese Han population by VeraCode GoldenGate Genotyping Assay SNPstream technology. The 8 markers with minor allele frequency above 5% were analyzed by the allelic and genotypic association analysis, the genotype-phenotype association analysis, and the haplotype analysis. Results Between lumbar DDD cases and controls, there were no significant differences of the allele frequency analysis, genotypic frequency analysis and haplotype analysis of all the 8 markers (all  $P > 0.05$ ). In the unconditional logistic regression analysis, no SNPs showed significant in Codominant, Dominant and, Recessive, Overdominant or Log-additive model (all  $P > 0.05$ ). Conclusion: These results suggest that polymorphisms of the studied SNPs of VDR gene may not associate with lumbar DDD in a Chinese Han population.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 28422**

**NEGLECTED TRAUMATIC DISLOCATION OF THE SUBAXIAL CERVICAL SPINE**

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The optimal method for the management of neglected traumatic bifacetral dislocation of the subaxial cervical spine has not been established. We treated five patients in whom the mean delay between injury and presentation was four months (1 to 5). There were three dislocations at the C5-6 level and one each at C4-5 and C3-4. The mean age of the patients was 48.2 years (27 to 60). Each patient presented with neck pain and restricted movement of the cervical spine. Three of the four had a myelopathy. We carried out a two-stage procedure under the same anaesthetic. First, a posterior softtissue release and partial facetectomy were undertaken. This allowed partial reduction of the dislocation which was then supplemented by interspinous wiring and corticocancellous graft. Next, through an anterior approach, discectomy, tricortical bone grafting and anterior cervical plating were carried out. All the patients achieved a nearly anatomical reduction and sagittal alignment. The mean follow-up was 2.6 years (1 to 4). The myelopathy settled completely in the three patients who had a pre-operative neurological deficit. There were no graft dislodgement or graftrelated problems. Bony fusion occurred in all patients and a satisfactory reduction was maintained. The posteroanterior procedure for neglected traumatic bifacetral dislocation of the subaxial cervical spine is a good method of achieving sagittal alignment with less risk of iatrogenic neurological injury, a reduced operating time, decreased blood loss, and a shorter hospital stay compared with other procedures.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 28544**

**PROBLEMS IN DIAGNOSING CERVICAL SPINE INJURY, SPINAL CORD INJURY, OR BOTH AND RELATED MEASURES: A STUDY OF 9468 CASES OF CERVICAL SPINE TRAUMA**

Hiroki YOSHIMATSU<sup>1</sup>, Kenji YOSHIDA<sup>2</sup>, Hisashi YAMASHITA<sup>2</sup>, Kimiaki SATO<sup>1</sup>, Kensei NAGATA<sup>1</sup>

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Various problems are encountered in the process of diagnosing cases of cervical spine injury, spinal cord injury, or both. In this study, we surveyed cases of cervical spine trauma to study measures for ensuring that cervical spine injury, spinal cord injury, or both are not overlooked. We conducted a survey of 9468 cases of cervical spine trauma that visited the emergency outpatient unit of our hospital. Among the 9468 cases of cervical spine trauma, we observed disturbance of consciousness, alcohol consumption, and distracting pain in another region in 12%, 5%, and 15% of the cases, respectively. Moreover, cervical spine injury, spinal cord injury, or both were observed in 196 cases (2.1%). In 48 cases diagnosed with cervical spine injury, spinal cord injury, or both at a later date, the proportion of cases with severe head injury, extremity-pelvic fracture, multiple injuries and distracting pain in another region was significantly high, and the start of treatment was delayed in 14 cases. Considering the current conditions of emergency medical care and the particularities of emergency outpatient care, it was believed that it is necessary to increase awareness regarding easy-to-miss cases and provide thorough guidance for young doctors-in-training and perform cervical spine fixation in cases in which these conditions cannot be completely ruled out. Moreover, it was believed that it is important to establish the habit of performing examinations and radiographic interpretation using consistent standards while keeping in mind the possibility of easy-to-miss cases.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 29746**

**SURGICAL TREATMENT OF LOWER CERVICAL COLUMN TRAUMATIC FRACTURES**

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Objective: To evaluate the surgical management in Lower Cervical Column Fractures with structural affectation of the vertebra and spinal cord. Analysis: The acute traumatic injuries of the lower cervical spine and the spinal cord are cause of serious disability, morbidity and mortality due to an increase of complex accidents, resulting structural alterations in raquis, between a the zone of C3-T1 with wide mobility, susceptible to injury of the three columns (Denis), leading to a slight damage of spinal tissue, incomplete or complete, being an important factor to obtain the complete initial diagnosis and establish the early surgical treatment to decrease the magnitude of the immediate and posterior complications. Meeting objectives of neural liberation and spinal restructuring when the organic state of the patient allows it. Materials and Methods: Retrospective study of 230 patients with surgical treatment of lower cervical spine fractures and neurological injury, from January 2000 thru June 2010, using mechanistic classification of Allen and Ferguson, and the classification of ASIA for neurologic injury. Conclusions: The surgical treatment demostates advantages to diminish complications. The total neurological injury represents a high percentage of organic complications diminishing the capacity of rehabilitation. There's a high rate of mortality. The anterior approach with reduction and fixation with plate turned out to be the most used and represents the best technique. The neural liberation and early spinal restructuring determine benefits allowing neurological recovery.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 27310**

**ELECTRONEUROSTIMULATION CAPABILITIES IN VICTIMS OF VERTEBRAL CEREBRO-SPINAL INJURIES**

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The objective of the work consists in the demonstration of the capability of epidural electrostimulation in complex treatment of victims of vertebral cerebro-spinal trauma in acute and follow-up periods of spinal cord wound dystrophy. In the work the analysis of the results of treatment of 356 victims of vertebral cerebro-spinal trauma aged from 16 up to 71 years is represented. Among them 293 arrived in the acute and early period of the trauma, and 63 - in the follow-up period of spinal cord wound dystrophy. The assessment of neurologic disorders was studied according to the scale ASIA/IMSOP. In 101 (28,4 %) patients rough neurologic disorders were observed - group " AB ". 87 (24,4 %) patients formed group "C". The last patients were included into group "D" - 168 (47,2 %) persons. Besides necessary surgical interventions epidural electrodes were implanted in 121 patients with acute trauma and in 63 - with its consequences above and below the level of the spinal cord lesion for electrostimulation conduction. As the result of the conducted electropulse influence on the spinal cord in the acute period of the trauma we succeeded in achieving positive outcomes in 80,9 % of victims, and that is 11,7 % better, than in the comparison group. That allowed us to restore lost functions of the spinal cord more completely in more than the half of the patients with consequences of vertebral cerebro-spinal trauma.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 29983**

**PEDICLE SCREW FIXATION FOR UNSTABLE THORACIC SPINE FRACTURES: CLINICAL AND RADIOLOGICAL EVALUATION OF 120 CASES**

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Background and purpose: The stabilization of unstable thoracolumbar (TL) fractures with pedicle screws (PS) have been well documented in the literature, but the evidence of PS application for unstable thoracic spine (TS) fractures is still lacking. In this retrospective cohort study, we analyzed our clinical and radiological data of unstable TS fractures treated with PS fixation. Materials and Methods: After entering a certain diagnosis and surgery code to the hospital registry system, 120 prospective patients were recruited for the time period of January 2002 to October 2010. 66 patients (19 Female, 47 Male) met our inclusion criteria as unstable fractures between Th1-TH11. Th12 fractures were excluded due to its anatomical consideration as a part of TL region. Patient journals, operation notes and radiological examinations were investigated. Outpatient visits were obtained after 3 months, 1 and 2 years. Results: The mean age was 39.3±4.3. In total, 477 PSs were administrated with 89.4% allo or auto-graft bone application. Mean operation time was 131.3±10.9 minutes. There were no intraoperative vascular or neural complications. Only 1 (1.5%) patient had an implant removal surgery after 5 months due to screw engagement to disc space. The mean segmental kyphosis angle was 21.2°±1.7 preoperatively, 14.6°±1.89 (p< 0.05) postoperatively and 22.9°±1.6 at 2 years. Conclusion: In the hands of an experienced institution, PS fixation is a safe and effective method for to correct and prevent further kyphotic deformity after traumatic unstable TS fractures.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 29405**

**ANTERIOR COLUMN RECONSTRUCTION IN BURST FRACTURES OF THORACO-LUMBAR REGION: RATIONALE AND INDICATIONS**

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Introduction: Burst fractures typically occur in young population and account for 64%-81% of thoracolumbar fractures. They are associated with acute neurological deficit in 48%-77% of cases & delayed onset deficit in 2%-21% of cases. Spinal fixation without anterior column fixation in early 1990 resulted in hardware failure (up to 10-15%) and significant loss of correction. Load sharing classification recognized the need for anterior column reconstruction in these fractures. The rationale for this is that the ongoing neural compression may recover better with effective decompression. Study: The prospective study was carried out from Jan 2007 to December 2008. Twenty four patients (two column involvement in 17, three in 7) with an average age of 30-35 years were operated. These patient were followed up clinically, functionally (Donald J. Prolo's scale) & radiologically by CT&MRI. Fusion was assessed using criteria of Kevin et al. Results: The deformity correction on average was 70% and there was only loss of 4° correction on 2 year follow up. Ninety two percent achieved fusion and 46% improved neurologically to Frankel's Grade D-E. Fifty four percent achieved complete and modified rehabilitation. Conclusion: Anterior column reconstruction in burst fractures with significant communitation as shown by load sharing classification, results in maintenance of correction, decrease in hardware failure, earlier rehabilitation and good fusion rates.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 28418**

**SIMULTANEOUS ANTERIOR DECOMPRESSION AND POSTERIOR INSTRUMENTATION BY EXTRAPLEURAL RETROPERITONEAL APPROACH FOR THORACOLUMBAR LESIONS – A SERIES OF 52 CASES**

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Transthoracic, transdiaphragmatic approach for thoracolumbar (TL) junction has significant morbidity, as it violates thoracic cavity; requires cutting of diaphragm and a separate approach for posterior instrumentation. We evaluated clinical outcome and morbidity of extrapleural retroperitoneal approach to perform anterior decompression and posterior instrumentation by single "T" incision in TL lesions (trauma and tuberculosis). 50 patients, mean age 29.1 years of tuberculosis (n= 26) and trauma (n=24) underwent anterior decompression and posterior instrumentation by extrapleural retroperitoneal approach by using "T" incision in right lateral position. The anterior exposure of VB was performed anterior to the transverse process and anterior decompression and posterior shortening and Hartshill instrumentation was performed simultaneously in TB cases. Posterior pedicle screw fixation was done in prone position in trauma cases first, later turned right lateral for anterior decompression by same "T" incision. Mean surgery time in trauma cases was 269 minutes with intraoperative blood loss 918 ml. Preoperative mean ASIA motor, pinprick and light touch improved from 63.3 to 74.4, 86 to 94.4 and 86 to 96 at 6 month followup respectively. Preoperative anterior vertebral height loss improved from 44.7% to 17.5% and kyphosis from 23.30 to 11.50 at final followup. One patient developed deep wound infection and flap necrosis. The operating time in TB was 220 minutes with intraoperative blood loss 1100 ml. Preoperative kyphosis was corrected from 550 to 230. Nine of 11 with paraplegia showed excellent neural recovery. No patients required intensive unit care. Wound dehiscence occurred in 2 malnourished cases. Simultaneous posterior instrumentation and anterior decompression and fusion with or without posterior column shortening for kyphosis correction can be performed by extrapleural retroperitoneal approach by 'T' incision in TL lesions and decompression with reduced morbidity.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 28507**

**INITIAL PERCUTANEOUS SPINAL INSTRUMENTATION IN  
POLYTRAUMATIZED PATIENTS, THE CONCEPT OF DAMAGE CONTROL  
SPINAL SURGERY**

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Introduction: Spinal fractures are frequently encountered in polytraumatized patient. Timing of surgery in such patients is controversial. Early intervention is relatively not safe due to the surgery-added stress and inflammatory response, while late surgery has the risk of limited preoperative mobilization associated with more morbidity. The use of percutaneous spinal instrumentation minimizes surgery-related inflammatory response and stress; that allows early intervention in polytraumatized patients. Methods: Between Dec. 2006 and Dec. 2008, 20 polytraumatized patients were operated upon using initial percutaneous instrumentation and a second stage late intervention in cases where it was indicated (14 patients). The second stage was anterior thoracoscopic decompression and fusion (including corpectomy in 6 cases). Polytrauma was defined as patients having Injury Severity Score  $\geq 16$ . After early resuscitation and life support measures, posterior spinal instrumentation was conducted. Results: Twenty patients were operated (14 males, 6 females), age ranged from 18 to 65 (mean = 32.5). Associated injuries included head injuries (11 patients), chest trauma (13 patients), abdominal trauma (6 patients), fracture pelvis (2 patients), fractures in the extremities (10 patients), or soft tissue injury (4 patients). Our study included 11 cases with fractures in the thoracolumbar junction, 5 in the thoracic region and 4 in the lumbar region. The average ICU stay postoperatively was 7days; average hospital stay was 21.4 days. One patient died one day postoperatively (ISS was 52). At one year follow up we had fusion in 13 cases, 1 case did not show definite fusion although did not had metal failure or clinical symptoms. No complications related to secondary added trauma in form of multiple organ failure or systemic infections. Conclusion: Initial spinal instrumentation using percutaneous systems in polytraumatized patients showed good early outcomes.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 29527**

**MRI PATTERN OF VERTEBRAL FRACTURES DUE TO OSTEOPOROSIS, INFECTION AND MALIGNANT TUMORS**

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No previous studies discussed the significance of the MRI pattern of vertebral collapse in differentiation between vertebral compression fractures due to malignancy, osteoporosis and infections. MRI was used in evaluation of 152 atraumatic vertebral compression fractures in 80 patients: 85 malignant, 34 osteoporotic and 33 infective. Central collapse of the fractured vertebral body was the commonest pattern in malignant fractures (57 vertebrae, 67 %), followed by uniform collapse (21 vertebrae, 24.7 %), then anterior wedging (5 vertebrae, 5.9%) and lastly posterior wedging (2 vertebrae, 2.4 %). In osteoporotic fractures, anterior wedging was the commonest pattern (18 vertebrae, 53 %), followed by central collapse (11 vertebrae, 32.3 %), then uniform collapse (4 vertebrae, 11.8 %), and lastly posterior wedging (1 vertebra, 2.9 %). In vertebral compression fractures due to spinal infection, anterior wedging was the commonest pattern (20 vertebrae, 60.6 %), followed by uniform collapse (12 vertebrae, 36.4 %), while only one vertebra (3 %) was centrally collapsed. Central collapse of the vertebral body is highly suggestive of malignant compression fracture while anterior vertebral wedging is highly suggestive of a benign compression fracture.

**Date: 2011-09-08**  
**Session: Spine - Fractures**  
**Time: 16:30 - 18:00**  
**Room: Panorama Hall**

**Abstract no.: 28299**

**CRESCENT FRACTURE DISLOCATION OF THE SACROILIAC JOINT:  
USE OF ILIOSACRAL SCREWS**

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Introduction: Crescent fracture dislocations are a well-recognized subset of pelvic ring injuries which result from a lateral compression force. They are characterized by disruption of the sacroiliac joint and extend proximally as a fracture of the posterior iliac wing. They are classically fixed using open reduction and plating. We hypothesized that iliosacral screws can provide stable fixation in Day type II and III types. Methods: A clinical study was conducted with the aim of assessing the clinical results and functional scores of 43 patients, 34 males and 9 females, age range 16 to 64 years who sustained 44 Lateral compressions pelvic fractures operated between April 2000 and June 2010 (one patient sustained bilateral fractures). X-rays and CT pelvis were used for all patients. We used a classification by Day et al 2007 with three distinct types of crescent. Percutaneous iliosacral screws (IS) were used in 22 fractures, plates in 22 fractures and we added LCII (lateral compression screws) in 2 cases. Results: Average Follow up period was 53 months (Range 4 – 126 months). 2 patients died and 1 patient lost to follow up. The clinical results were good in all cases, healing rate was 100%. The average Majeed functional score was 82.4 in 40 patients. Discussion & Conclusion: Percutaneous IS screw fixation is a good option for types II and III crescent fractures, with fewer complications than the plate option, while plating should be used for type I crescent fracture.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 29370**

**ISMISS SESSION – PRESIDENTS OPENING ADDRESS**

Hansjoerg LEU

Bethania Spine Base, Zurich (SWITZERLAND)

Since legal registration in 1989 by the founding members Hijikata/Jp, Kambin/US and Schreiber/CH, the International Society for Minimal Invasive Spinal Surgery (ISMISS / [www.ismiss.com](http://www.ismiss.com) affiliated to SICOT as special branch) aims to foster minimal invasive technologies and seeks for exchange of controlled information and methodical instruction in the evolving field of this type of spinal surgery. Beside its uprise in Europe and US, since the nineties a rapid growth was to observe in Asia. Interested groups and active surgeons brought up new techniques and reported their experiences to periodically organized meetings under the auspices of ISMISS. The goal remains to allow first hand information on new techniques, their concepts with well defined indications and results. As in other evolving fields of surgery, minimal invasive operative techniques challenge today former golden standards and deserve our critical evaluation and responsibility for well defined indications, anatomically sound instrumentation and respective documented clinical practice. So all over the world several established courses are now periodically organized under the auspices of ISMISS under such commitment. Beside technical and operative aspects also clinical analysis of indications, relevant learning-curves and follow-up criteria deserve our interest in worldwide economically restricted conditions and an evident need for outcome quality control. So also a need became evident for ISMISS to define and publish (see under [www.issmiss.com](http://www.issmiss.com)) common sense definitions and guidelines, helping so all active partners in the field of minimal invasive spinal surgery to orient themselves in the rapid evolution of this field.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 28914**

**ENDOSCOPY IN DDD: FACTS SINCE 1982 AND STATE OF THE ART**

Hansjoerg LEU

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In 1979, based on Japanese uniportal microtubular percutaneous technique of closed percutaneous nucleotomy, the minimal invasive intradiscal endoscopic decompression was introduced. Additional biportal endoscopy was engaged so in 1982 for visual monitoring of intervertebral tissue elaboration. Beside decompressive indications, in 1987/88, in combination with percutaneous external pedicular fixation, endoscopy controlled interbody fusion was introduced. Experiments with modified urologic workingscopes designed for cystoscopic applications demonstrated in 1990, that endoscopic applications are possible also in non-preformed anatomical spaces when some hyperpressive irrigation was used for local atraumatic tissue spacing. So we introduced coaxial foraminoscopy for the first time in February 1991 for the treatment of a foraminal sequestered herniation. Since then the technology with improved endoscopic tools and irrigation systems as well as high-frequency coagulation under irrigation became almost standardized for this specific range of indication. After a steep learning curve today the optimal indications and contraindications are clearly defined with all forms of extra-, intra- and medioforaminal herniations. Our first clinical series of 240 standardized cases brought successful primary results in 185 cases, including the steep learning curve. Hereby in the foraminal applications, the results trend to "black or white": either the sequester is removed or not. Relatively freshly sequestered fragments without local scar-adhesions are easier to remove. Detailed knowledge of foraminal anatomy is mandatory. Hospital stay could be reduced to 2 to 3 days; out-patient care is possible nowadays as well. In 1997, endoscopic cervical discectomy was conceived by Fontanella in Italy. In 2002 pioneering authors as Ruetten in Germany brought up the interlaminar microtubular endoscopic lumbar decompression, what definitely extended the range of this minimal endoscopic approach also to more mediolateral forms of lumbar disc herniation. So the available complementary endoscopic techniques today challenge definitely in well trained hands the conventional golden standards as the classic microdiscectomy.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 28681**

**LATERAL AND FAR LATERAL HERNIAS (FORAMINAL AND EXTRAFORAMINAL) CURRENT ASPECTS NEW TRENDS ACCORDING TO A PARTICULAR SERIES OF 64 FULL-ENDOSCOPIC DISCECTOMIES**

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Aim: to show new aspects of foraminal hernias according to a retrospective study of our patients files who were operated on with the full-endoscopic technique in our practice. Inclusion criteria: cruralgias (for the L4-L5 level or above) or sciatica L5 (for the L5-S1 level) with a corresponding imaging of lateral hernia; at least 3 months of medical treatment. Levels of 64 lateral hernias operated on with full endoscopy: mostly the two last disks. Sex ratio (31/33). Localization on the axial plane: 8 foraminal and paramedian hernias, 34 foraminal, 9 foraminal and extraforaminal, 13 extraforaminal. Localization on the sagittal plane: ascending 10mm: 4 times (1 foraminal, 2 extraforaminal, 1 retrocorporeal), descending: 1. The operation protocol was local anesthesia with sedation, in prone or lateral position, C arm and endoscopic control. Reoperations are frequent for at 14% and for DDD at 9.3%. When we compare the results with 306 paramedian hernias operated on with the full endoscopic technique during the last 8 years by one of us, we can see that the pain is a little higher at the beginning and a little lower after two years. The age for paramedian hernias was 46.11 versus 49.45 for foraminal hernias. There were many more multi-level operations for paramedian 30% versus 6% for lateral hernias. After a period of good results of three to sixty months, reoperations are more frequent for lateral hernias than for paramedian hernias. Conversely, multilevel hernias are more frequent in paramedian hernias than in lateral hernias.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 29200**

**NEW GRID POSITIONING SYSTEM (GPS) GUIDANCE FOR ENDOSCOPIC TRANSFORAMINAL MICRODECOMPRESSIVE LUMBAR DISC SURGERY IN THE MORBID OBESE PATIENT**

John CHIU

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Introduction: Morbid obesity is characterized by an individual having a body mass index (BMI) of 40 or higher. The morbidly obese patient poses many unusual surgical/anatomical challenges during endoscopic minimally invasive spine surgery (MISS), especially to target the lesion with precision and accuracy through a surgical portal of entry. The problem that faces the surgeon performing MISS is that it is done with limited surgical exposure and visualization of the surgical field. Methods: In response a logical and simple Grid Positioning System (GPS) was developed to provide a precise surgical trajectory/approach for the disc lesion to undergo decompression. GPS involves 3D geometric triangulation of 3 different planes guided by fluoroscopy for introduction of surgical instruments along a geometric line toward the lesion without compromising healthy anatomical structures. This system facilitates MISS, especially in the morbidly obese. 156 morbidly obese surgical patients with 254 intractable symptomatic herniated lumbar discs underwent endoscopic MISS, guided by GPS. Results: Overall result 90% patients with good to excellent results. Fair results 6.4% patients, average satisfaction score is 93%. Conclusion: Applying the concept of Grid Positioning System (GPS) to MISS can help the surgeon to facilitate the MISS process by quickly identifying the surgical portal of entry to the disc without compromising vital anatomical or neural structures and accomplish needed spinal microdecompression, especially in medically high-risk patients including the morbidly obese and even those with prior surgeries. It can be very effective in surgical treatment of degenerative spine and herniated lumbar discs condition.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 29329**

**MINIMAL INVASIVE SURGICAL TREATMENT OF COMPRESSION SYNDROMES IN PATIENTS WITH UNCOVERTEBRAL ARTHROSIS**

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Pain syndrome in cervical spine is very often caused by uncovertebral joint arthrosis. Materials and Methods: 59 patients with uncovertebral arthrosis were treated in Sytenko Institute of Spine and Joints Pathology with the symptoms of spinal nerve and arteria vertebralis channels compression. All patients were divided into two groups in order to conduct parallel comparison: group A-47 patients with the spinal nerve channel stenosis, group B-12 patients with the arteria vertebralis channel stenosis. The diagnostics of the preoperative period included the clinical, X-Ray computer tomography and angiographic investigations. All have done operations were united into groups: groups A-transforaminal epidural steroid injection of rentgenological control or C-arm (47 patients); groups B – stabilizing operations – 8 patients and decompressive – stabilizing operations – 4 patients. Results and discussion: An excellent results of transforaminal epidural steroid injection of control or C-arm(groups A) were observed in 32 patients, good – 11 patients, satisfactory – 4 patients. Reccurent surgical treatment – 4 patients. An excellent results of surgical treatment in group B were observed in 4 patients, good – 6 patients, satisfactory – 2 patients. Conclusions: So different kinds of surgical treatment, such as decompressive – stabilizing operations in patients with the arteria vertebralis channel stenosis and transforaminal epidural steroid injection in patients with spinal nerve channel stenosis are the most effective methods of treatment.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 29204**

**ENDOSCOPIC ANTERIOR CERVICAL DISCECTOMY/FORAMINOPLASTY WITH INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING (IOM)**

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Introduction: To demonstrate outpatient anterior endoscopic microdecompressive cervical discectomy and foraminal decompression (foraminoplasty), by utilizing GPS (grid positional system), can treat herniated cervical discs and cervical foraminal stenosis efficaciously and successfully. Materials and Methods: Since 1995, 2066 patients (3730 Discs), who failed at least 12 weeks of conservative care were treated. Levels were C2 to C7, inclusive. All patients demonstrated unilateral radicular pain of a specific dermatome, single level or multiple levels, confirmed with EMG/NCV. MRI or CT scans demonstrated the herniated cervical disc. The surgical technique of anterior endoscopic microdecompressive cervical discectomy foraminal decompression (foraminoplasty) and laser thermodiskoplasty (non-ablative lower Holmium laser energy for disc shrinkage and tightening) are described. The surgical approach guided and facilitated with GPS is explained. Results: For single level, 94% had good to excellent symptomatic relief and spinal motion preservation. 6% of patients had some persistent neck and upper extremity residual but diminished pain associated with parasthesia, after surgery. Average time to return to work was ten to fourteen days. There were no intraoperative complications. Postoperatively, one with transient Horner's syndrome and one transient hoarseness voice were noted. Conclusion: Anterior endoscopic microdecompressive cervical discectomy and foraminal decompression with mechanical decompression and lower level non-ablative Holmium laser for disc shrinking and tightening effect (laser thermodiskoplasty) with GPS has proven to be safe, less traumatic, easier, and efficacious with significant economic savings. It preserves spinal motion. It is an effective alternative or replacement for conventional open cervical spinal surgery for discectomy.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 29250**

**MUST YOU IMMEDIATELY MAKE A FUSION ON A FORAMINAL HERNIA?**

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**Aim:** to discuss the necessity of making a fusion for a foraminal hernia. **Material and methods:** we studied a series of sixty-four foraminal hernias operated on by the same author during the last twenty-two years (7.2% out of all of the discal hernias). The patients that have been operated since 2002 were given a visual analogic scale and OSWESTRY before the operation, one, three, six, twelve months and two years later. The imaging was standing x-ray, CT scan, MRI. The inclusion criterion was a radiculalgia corresponding to the hernia's position. The hernia was occupying more than half of the foramen. **Results:** the sex ratio was 31/33. Mean age was 49.45 older than the patients who were operated for paramedian hernia (46.11). The percentage of reoperations on 306 patients using discectomy for paramedian hernias was 3% versus 14% in the case of 64 patients with foraminal hernias. The percentage of reoperations by fusion was 9.3% for foraminal hernias and only 2.6% for paramedian hernias with an interval of twenty-three months in average. **Discussion:** older patients are more liable to have foraminal hernias which need to be operated by fusion. A unilateral discal narrowing is most probably the factor which is the witness of an advanced degenerative discopathy. **Conclusion:** when we discuss therapeutical indications with patients, we must take account of the probability of reoperation will be higher if we choose a simple discectomy than if we choose a fusion.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 27537**

**MINIMALLY INVASIVE TRANSFORAMINAL INTERBODY FUSION FOR DEGENERATIVE LUMBAR DISORDERS**

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The main goal of minimally invasive lumbar fusion is to reduce the approach-related morbidity including back muscle injuries and extensive soft tissue dissection. In this decade, percutaneous pedicle screwing techniques have developed to minimize the soft tissue damage that is necessary to expose the anatomic landmarks for screw insertion in the conventional procedures. On the other hands, transforaminal lumbar interbody fusion (TLIF) approach has the advantage reducing the risk of neural damage because of the lateral entry point. This lateral entry point to the disc also makes revision surgery easier and safe. From 2005, 160 patients with degenerative lumbar disorders (spondylolisthesis, lumbar canal stenosis, degenerative scoliosis, lumbar disc herniation) have been treated by minimally invasive TLIF (MIS-TLIF) through 22 or 26mm tubular retractor with percutaneous pedicle screwing. The mean postoperative follow-up period was 39.4 months. The fusion was performed on 1 level in 120 cases, 2 levels in 33 cases, 3 levels in 5 cases and 4levels in 2 cases. Operative time, blood loss, preoperative and postoperative JOA scores and postoperative pain scale were compared with the conventional PLIF. The back muscle damage was evaluated by STIR image of postoperative MRI and also compared between MIS-TLIF and conventional PLIF. Operative time and JOA scores were not different between MIS-TLIF and conventional PLIF. Blood loss and postoperative pain and the back muscle damage were evidently less in MIS-TLIF. These results suggested that MIS-TLIF can decrease iatrogenic soft tissue injury and approach-related morbidity.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 30242**

**OUR EXPERIENCE OF MINIMALLY INVASIVE SPINAL TECHNIQUES IN TREATMENT OF DIFFERENT SPINAL DISORDERS**

Marcel VETRILE

(RUSSIA)

67 patients with different spinal disorders were treated using mini-invasive spinal techniques. All patients depending on diagnosis were divided in 3 groups. The first group: 31 patients with spondylitis. In 9 cases pathological process was localized in thoracic spine, in these cases we use thoracoscopic technique to make debridement of affected vertebral segment and local application of hydroxyapatite with antibiotic. In 30 cases spondylitis was in lumbar spine. In these cases we use fluoroscopic guided percutaneous debridement of pathological site using original tubular retractors and instrumentation, finishing with the same – local introducing in formed after debridement cavity hydroxyapatite with antibiotic. The second group – 7 patients 11-13 y.o. with juvenile scoliosis (30-50° Cobb angle right-site thoracic curve). We use thoracoscopic technique to perform first step of surgery – discectomy at 4-5 levels at the top of the curve on convex side. This method leads to decrease of deformity progression. The second step of surgical treatment in these patients was minimally invasive instrumental dorsal correction. The final deformity correction and fusion was performed in these cases after the finishing of vertebral growth period. The third group – 29 patients with degenerative changes in lumbar spine, with root compression symptoms and degenerative spondylolisthesis. To perform root decompression, posterior instrumentation and TLIF we use special expandable tubular retractors and instrumentation for percutaneous screw placement. These minimally invasive surgical techniques allow achieving good clinical results with minimal surgical trauma of soft tissues. This moment is especially relevant in obese patients.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 30315**

**WHAT WE HAVE TO KNOW TO SAFELY PERFORM LUMBAR TRANSFORAMINAL PERCUTANEOUS PROCEDURES**

Pil Sun CHOI

Orthopedic Institute of University of São Paulo, São Paulo (BRAZIL)

Recently with the increment of lumbar transforaminal percutaneous procedures there were increasing necessity to better understand the exact anatomy of the foramen zone more known as “triangular safe zone”, and the relationship between the vertebral pedicle that is the most important radiologic landmark in lumbar transforaminal percutaneous procedures and the adjacent neural structures (thecal sac and nerve roots). We did two theses in Orthopedic Institute of Medicine School of University of São Paulo. The first one was done in 2000 and the second one in 2002. Based on these two theses, we concluded that the “triangular safe zone” admits progressively larger external diameter working cannula from L2-L3 to L5-S1 and the height (medial limit) was formed by the lateral border of the thecal sac, not corresponding to the medial pedicular border; the base (inferior limit), by superior endplate of the inferior vertebra; and the hypotenuse (lateral limit) by the spinal nerve. The size of lumbar vertebral pedicle increases from L2 to L5 in both longitudinal and transversal diameter. The transversal diameter of the pedicle is smaller than the longitudinal. The lumbar vertebral pedicle has close relationship with the root that emerges below it and the most distal portion of the pedicle is adjacent to the root and its medial border is adjacent to the dura-mater. Since 2000 we’ve done lumbar transforaminal percutaneous procedures and we could realize that the procedures are relatively safe after learning the anatomy of the foraminal zone, but, the good clinical outcomes depended on the proper indication, availability of the equipment and adequate hospital facilities.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques I**

**Time: 10:30 - 12:00**

**Room: Terrace I**

**Abstract no.: 28641**

**AUTOMATED PERCUTANEOUS LUMBAR DISCECTOMY VS  
ENDOSCOPIC DISCECTOMY; LONG-TERM RESULTS**

Tolgay SATANA<sup>1</sup>, Murat ERGUVEN<sup>2</sup>, Mehmet ALTUG<sup>3</sup>, Kamil BARLAS<sup>2</sup>, Ali FINCAN<sup>2</sup>

<sup>1</sup>Jinemed Hospital, Istanbul (TURKEY), <sup>2</sup>Avukat Cengiz Gokcek Government Hospital, Gaziantep (TURKEY), <sup>3</sup>Atasam Hospital, Samsun (TURKEY)

**Purpose:** To evaluate the longterm results of automated percutaneous lumbar discectomy vs endoscopic discectomy **Method:** Patients with lumbar disc disease (n=114) underwent automated percutaneous lumbar discectomy (APLD) between years 2004-2006. The ninety-four patients who have regular follow-ups were included in the study. Success was defined as performance of daily activities without backpain. Re-operation at peroperative or postoperative period was accepted as failure. Kaplan- Meier survival statistical analyses was done. Patient satisfaction and pain reassessed by Oswestry disability index (ODI) and Visual Pain scales. Intervertebral disc space, disc degeneration (Mobic) re-assessed by X-ray and MRI findings in the last follow-up, at year 2010. **Results:** The mean follow-up time was 42 months. The patients who had an open surgery immediate after APLD (n=14) and patients who had endoscopic discectomy (n=8) peroperatively at APLD were accepted as failure. According to ODI, pain scales and radiological findings, 22 patients accepted as failure at 4 years follow-up. **Conclusion:** APLD relieved the pain by decompressing the high intradiscal pressure but it can lead the inefficient intervertebral suspension and facet joint wear. It is strongly possible that this mechanical failure can be responsible for long term failures. We concluded that vertebral functional unit should be evaluated instead of possible loosening tension effect of disc. If needed, the APLD surgery might be combined with interspinous or pedicular distraction devices.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 30247**

**ADVANCED MINIMALLY INVASIVE SPINE SURGERY (MISS) IN KOREA  
WITH PERSONAL ACHIEVEMENT**

Sang-Ho LEE

Wooridul Spine Hospital, (SOUTH KOREA)

With the advent of modern surgical techniques, the use of MISS techniques for the treatment of spinal affections has experienced an exponential growth over the past few years. Percutaneous endoscopic cervical discectomy using a WSH working channel scope provides an effective alternative for the treatment of noncontained cervical disc herniation using high quality of optics, and a side-firing laser. Minimally invasive transcorporeal decompression is an emerging technique for multisegmental cervical spondylotic radiculopathy; it provides an adequate anterior decompression of the spinal cord through a limited bony resection while preserving motion and instability. Percutaneous endoscopic thoracic discectomy provides more direct route to the lesion with less morbidity so that it can be applied to treatment of soft thoracic disc herniation. Percutaneous endoscopic lumbar annuloplasty is targeted for posterior decompression and posterior annuloplasty to treat LBP due to internal disc disruption or degenerative disc disease with mild protruded disc. Percutaneous endoscopic lumbar discectomy with a 6.5 mm working channel endoscope is performed for large sized extruded migrated or ruptured lumbar disc herniation. Interspinous Locker® Fixation (ILF) after microdecompression is a less invasive, non-fusion technique in the management of unstable spinal stenosis. Percutaneous lumbar interspinous spacer is a new technology that stabilizes spine in a similar effect as ILF. These minimally invasive image-guide procedures under the aid of endoscope appear very promising. We expect the range of applications of these MISS procedures to expand for the management of complex spinal pathologies.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29325**

**MONOCLONAL ANTIBODY TUMOR NECROSIS FACTOR (TNF) IN THE TREATMENT OF DISC HERNIATION**

Vasiliy SHIMON, Volodymyr RADCHENKO, Inga FEDOTOVA

Sytenko Institute of Spine and Joint Pathology, Kharkov (UKRAINE)

Introduction: Recently, different authors obtained encouraging results about Monoclonal antibody against tumor necrosis factor in patients with disc herniation. Therefore, we initiate the study to confirm the efficacy of infusion of infliximab for treatment of cervical disc herniation. Patients and Methods: 7 patients with severe and moderate unilateral radicular pain were observed. Each patient has MRI-confirmed cervical disc herniation. Exclusion criteria included: tuberculosis, serious infections. The patients received single dose of 3 mg/kg intravenous infliximab infusion. We used MRI of cervical spine in 1 week, and in 12 weeks after treatment. Results: The significant hand pain reduction was observed in two patients (VAS: from 9 to 3,5). In three patients were observed satisfactory treatment results (VAS: from 9 to 6). Two patients had inadequate treatment results and required spine surgery. No adverse effects we observed. Conclusions: Based on our results in 71,42% patients were observed hand pain reduction (at the average: VAS point ), perifocal inflammation decreasing, which was confirmed with C-reactive proteines level.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29323**

**REPAIR OF INTERVERTEBRAL DISC IN MINIMAL INVASIVE SPINE SURGERY**

Vladimir RADCHENKO<sup>1</sup>, Olga KOSTITZKY<sup>2</sup>

<sup>1</sup>Sytenko Institute of Spine and Joint Pathology, Kharkov (UKRAINE), <sup>2</sup>Region Hospital of Ivano-Frankivsk, Ivano-Frankivsk (UKRAINE)

Introduction: Cells and tissue engineering were developed in the experiment and used in the clinical practice for treatment of patients with degenerative diseases of spine. However, a chain of questions exist concerning with optimal choice of cell transplants and features of transplantation into intrvertebral discs (IVD). Goal: To study repair of IVD in the condition of using of cultured cells of annulus fibrosus at experimental and clinical conditions. Materials and methods: Experimental investigation included receipt of annulus fibrosus cells from IVD of tail of rats (3 and 12 months of age), their cultivation and following transplantation into defects of IVD of lumbar spine (L3-L4) with or without dynamic neutralization. Defects in IVD of control animals were empty. Results were analyzed with polarization histochemistry, TEM, morphometry. Cells obtained from IVD of lumbar spine of patients with degenerative diseases of spine after surgery. Cultured cells during 14 days were injected into area of stabilization of spine segment by dynamic implant. Results were evaluated with X-ray and MRI. Results: Transplantation of cultured cells of annulus fibrosus into IVD of young rats delays destructive process and promotes repair. Transplantation of cultured cells obtained from IVD of mature animals into IVD of young recipients suspends destructive process but repair is delayed. High of disc was greater at using cells of young animals. Using of cultured cells for patient's treatment allows getting positive results. Conclusion: Optimal variant for improvement of repair of IVD was combination of biological (transplantation of cultured cells) with biomechanical (dynamic neutralization) methods.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29202**

**BIOLOGIC VERTEBRAL AUGMENTATION AND RECONSTRUCTION  
WITH MORCELIZED BONE GRAFT**

John CHIU

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This presentation is to discuss the percutaneous outpatient vertebral augmentation (VA) and reconstruction with a polyethylene intravertebral mesh (OptiMesh® Spineology, Inc., Stillwater, MN, USA) and biologic morcelized bone graft, the surgical indications, operating technique, case illustrations and clinical outcome. In the past vertebroplasty and kyphoplasty have provided excellent pain relief for vertebral compression fracture (VCF), but with a high incidence of complication; i.e., leakage of Polymethylmethacrylate (PMMA) into spinal canal or vasculature, cardiopulmonary complication, and adjacent vertebral fracture. This percutaneous VA system, is designed, developed, and used for VCF treatment without above complications, and is a true biologic vertebral reconstruction. An OptiMesh® consists of, multi-strand polyester mesh or sac to be packed with specially ground bone chips or morcelized bone chips inside the mesh device to create a hyperdense graft pack for restoring height resulting in pain relief. This minimally invasive outpatient percutaneous OptiMesh® VA provides an efficacious and controlled delivery mechanism to stabilize and treat painful osteoporotic, traumatic and neoplastic VCF. In addition it can easily be used as an excellent intravertebral spacer and for intravertebral spinal fusion/fixation.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29882**

**PERCUTANEOUS KYPHOPLASTY: SUN YAT-SEN UNIVERSITY 10-YEAR EXPERIENCES**

Zhaomin ZHENG, Taiping WANG, Hui LIU

Department of Spine Surgery, the First Affiliated, Guangzhou (CHINA)

From 2000 to 2010, we have treated over 250 cases with more than 400 vertebrae, including osteoporotic compression fractures, traumatic fractures and vertebral tumors with Percutaneous Kyphoplasty (PKP). Indication of PKP: The main indication of PKP is osteoporotic compression fractures and vertebral tumors with severe back pain. Advantage of PKP vs. PVP PKP has lower cement leakage rate than PVP in our patients. Balloon expansion provides a low pressure cavity inside the compressed vertebral body, which allows more sticky cement injection with lower pressure. Mechanical augmentation vs. Hydraulic Augmentation: Augmentation is mostly done by hydraulic pressure and mechanical pressure, which are represented by Balloon system and sky system, respectively. Unipedicular approach vs. Bipedicular approach: In our experience, unipedicular approach with expanded abduction angle of punctation is able to cross the midline of vertebral body and provide symmetrical cement distribution in more than 90% of our cases. Cement volumes of injection: In our experience, less than 3 ml cement in thoraces and 5 ml in lumbar are enough to receive satisfied pain relief and vertebral body height restore. Substitutes of bone filler materials: In our experience, PMMA has more stable chemical and physical characters and is easier for injection. It is the first choice for old patients and patients with spinal tumors. Control of cement leakage: In our experience, using a novo Vessel-X bone void filling container system, the cement leakage rate is close to zero and the clinical efficacy is similar to traditional PKP.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29880**

**VERTEBRAL AUGMENTATION WITH A NOVEL BONE VOID FILLING CONTAINER SYSTEM: A BIOMECHANICAL STUDY**

Zhaomin ZHENG, Taiping WANG, Hui LIU

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Objective: To investigate the biomechanical properties and cement leakage control of Percutaneous Kyphoplasty (PKP) with a novel bone void filling container system. Methods: A novel bone void filling container system was designed for better cement leakage control of PKP. Two types of the container were tested in the current study, which were monolayer container and multilayer container. Twenty-eight thoracic or lumbar vertebral bodies' specimens from 4 fresh frozen spinal cadavers were randomly divided into 4 groups. After bone mineral density (BMD) was measured, simulated compressive fractures were experimentally created on each vertebra and initial biomechanical properties were acquired. Results: There was no significant difference in BMD, initial strength and stiffness in the four groups. The augmented strength increased significantly than initial. The augmented stiffness also increased significantly than the fractured level. However, it didn't reach the initial level. The augmented vertebral body height recovered and has no significant difference from initial level. No significant difference was found in strength, stiffness and height between each group after augmentation. The multilayer container expanded in the vertebral body well and was able to contain most of the injected cement within a predominated area; however, the monolayer container just partially expanded and was unable to contain the injected cement within a predominated area. Conclusion: The novel bone filler container used in PKP is able to recover the fractured vertebrae mechanical properties and restore the vertebral body height. The multilayer container showed considerably less cement leakage and better cement placement in the vertebrae body.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29612**

**THE ADVISABILITY OF THE APPLICATION OF PERCUTANEOUS TRANSPEDICULAR SCREW FIXATION IN THE TREATMENT OF METASTASIS TO VERTEBRAL COLUMN BASED ON SELECTED CASES FROM THE MATERIAL OF ORTHOPAEDIC AND TRAUMATOLOGY WARD IN SZCZECIN**

Karol ROGAS, Michal KEDZIERSKI, Konrad DOBIECKI, Andrzej BOHATYREWICZ

Orthopaedics and Traumatology Department PUM, Szczecin (POLAND)

Minimal invasive surgery is a method that minimizes the interference with biological environment. Percutaneous fixation of vertebral column provides the possibility of decreasing complications rate as well as a solid fixation of chosen spine region. Therefore, this method is highly recommended for the elderly and for the cachectic patients with systemic cancer. In our ward the minimal invasive fixation has been used since 2010. Our observations are based on a group of 5 patients with metastasis to vertebral column. The average age in this group was 61. Percutaneous screws were implanted on 4 or 5 levels. We did not observe any perioperative complications, though early reoperation was needed because of paresthesia caused by screw insertion in the recess. No problems with the healing of the wounds have occurred. Visual Analog Pain Score was evaluated preoperatively, 6 and 12 weeks after the surgery. All five patients reported a significant pain reduction. In 1 case pain subsided. In three cases pain decreased to the level that the use of narcotic drugs was no longer needed. VAS showed significant ( $p > 0,05$ ) improvement comparing to preoperative value. All the patients survived the shortest period of observation of 4 months. The remission of symptoms continues, which has been considered as a desired effect of the treatment.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29805**

**VESSELPLASTY FOR THE TREATMENT OF OSTEOPOROTIC VERTEBRAL COMPRESSION FRACTURES**

Aloysius Bambang DARWONO

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Objective: Deramond (1984) introduced percutaneous non fusion technique to treat osteoporotic vertebral fractures. Many techniques are developed to restore the vertebral body height by using tools to create pressure inside the vertebra. The new technique uses a non stretchable PET container and injects cement inside the container then left as an implant body expander. The new SrHA cement is used in this technique. The purpose of this study is to review the theory, surgical techniques, and results of 5 years using this new technique. Methods: This new Vessel-X™ system is a percutaneous non fusion technique to allow the delivery of a non-stretchable Bone Filler Container (BFC) into the vertebral body, then inflated by injecting viscous BFMs, and left as an implant body expander. The optimum pressure need to lift the end plate is the pressure to counteract the resistance of surrounding bone. When the pressure is over the surrounding bone resistance, the BFMs start to penetrate the pores and interdigitate, thus stabilizing the BFC to the surrounding bone. Results: A total of 250 cases of VCFs that have been treated using this new technique included 29 cases using SrHA cement is reported. Conclusions: The Vesselplasty is a new technique to treat osteoporotic vertebral fractures using BFC system. This technique allows the stabilization and restoration of vertebral body height of VCFs, with the advantage in controlling the volume of the injected BFMs, also the pressure inside BFC, and preventing the leakage of BFMs.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29327**

**MINIMAL INVASIVE SURGICAL TREATMENT OF THE LATERAL RECESS STENOSIS**

Artem SKIDANOV, Volodymyr RADCHENKO

Sytenko Institute of Spine and Joint Pathology, Kharkov (UKRAINE)

Purpose of study: To improve the results of minimal invasive surgical treatment with the patients suffering from degenerative diseases of the lumbar spine on basis of more accurate determination of zone and size decompression of lateral recess stenosis. Methods used: As the material for the clinical research we used the examination data of 110 patients suffering from the lumbar spine degenerative diseases. All the patients have been clinically examined, including neurological examination, Oswestry disability index study; roentgenometrical study of regular and functional spondylograms, spiral computer and magnetic resonance imaging tomography of the lower lumbar spine. Classical methods of statistical data manipulation have been used for analysis. Summary of findings: Clinical, roentgenological, computer-tomographic, magnetic resonance tomographic signs have been studied, which allowed us to determine more accurately the zone and the size of decompression of nervous roots compression in the lateral section of the vertebral canal. The character of the arc-shaped process joints asymmetry which brings on the development of lateral degenerative stenosis has been revealed. Our research established the possible variants of the vertebral canal trefoil form and specific peculiarities of facet joints constitution leading to the development of the lateral recess stenosis. We studied the mechanisms of the disease's development with the help of mathematical modeling using the finite element method. The obtained data allows executing adequately the release of nervous roots by minimum size resection.

**Date: 2011-09-08**

**Session: ISMISS/SICOT: Minimally Invasive Spinal Techniques II**

**Time: 14:00 - 15:30**

**Room: Terrace I**

**Abstract no.: 29203**

**MINIMALLY INVASIVE SPINE SURGERY (MISS): A SURGEON'S PERSPECTIVE ON TECHNOLOGICAL CONVERGENCE AND DIGITAL OR CONTROL SYSTEM**

John CHIU

California Spine Institute, Thousand Oaks (UNITED STATES)

Introduction: Degenerated lumbar disc and spinal stenosis are common problems requiring decompressive lumbar surgery. Open spinal discectomy is associated with significant morbidity, long-term convalescence, prolonged general anesthesia and wide dissection of tissues that can cause bleeding, scarring and eventual destabilization of spinal segments. The less traumatic endoscopic minimally invasive lumbar spine surgery is free from these potential complications. Methods: The endoscopic spine surgical procedure, its surgical indications and its operative techniques including tissue modulation technology (i.e. laser and radiofrequency application) are presented. It requires seamless connectivity to perform the surgical procedures, Surgical ePR Control System (SECS), SurgMatix®, a new integrated image-data based OR control system has been developed and utilized to facilitate this endoscopic MISS and creates organized control instead of organized chaos. Results: Among a series of 5336 MISS patients (10,255 discs) the surgical result for endoscopic MISS has been extremely gratifying for both the patient and the surgeon. There was no postoperative mortality, and morbidity of less than 1%. The potential risk and potential complications are presented. Endoscopic microdecompression can effectively decompress herniated discs and treat spinal stenosis with foraminoplasty. Conclusion: Endoscopic microdecompression can effectively decompress herniated discs and spinal stenosis with foraminoplasty for treatment of spinal stenosis. It also provides an excellent and effective access or platform for spine arthroplasty, spinal disk replacement, artificial disk, vertebralplasty, spinal fixation/fusion, disc re-growth technology and perhaps genome therapy. This minimally invasive, less traumatic, outpatient endoscopic MISS treatment leads to excellent results, faster recovery, and significant economic savings.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 28667**

**BONE DENSITY VARIATION ABOVE INTERSPINOUS INSTRUMENTATION**

José A. GUIMARAES CONSCIENCIA

(PORTUGAL)

Introduction: Interspinous (IS) spacers as been used for a long time but to our knowledge no one studied BMD (bone mineral density) variation above that type of instrumentation. Material and Methods: 20 patients with degenerative lumbar disease, soft lumbar stenosis and several inclusion criteria where assessed using ODI (oswestry disability index), EQ-5D (Euroquol group form), ZDS (Zung self rating depression scale), MSPQ (modified somatic perception questionnaire) and VAS at 3 time points pre surgery, one and two years after surgery. Spine bone mineral density (BMD) at adjacent instrumented levels was assessed 13 months in between using DEXA in a side evaluation. Specifically for BMD assessment we selected a physically active control group with no lumbar pathology and the same overall general features of our study group. We then perform the same measurements in both groups at the same time points. Statistic analysis using Friedman, Wilcoxon Matched-Pairs Signed-Ranks, T-Test and Mann-Whitney Tests was done considering significance level 0.05. Results In the study group there was a significant sustained improvement in ODI, EQ-5D and VAS ( $p < 0,001$ ) as well as in ZDS ( $p = 0,004$  and  $p = 0,006$ ), but no significant variation in MSPQ ( $p = 0,197$ ). As for BMD in study group there was a slight but not statistically significant increased in lateral spine measured values, however in control group we found a statistically significant decrease ( $p = 0,013$ ). Discussion: The study group improved significantly their clinical status after IS instrumentation and this might influence the obtained BMD value. On the other hand the always fit control group had a normal aging population expected BMD decrease value. Conclusion: IS spacers seem to be effective in clinically improving degenerative lumbar disease and soft lumbar stenosis patients and they also might benefit BMD values above instrumentation levels.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 28918**

**DID REPEAT MRI SCANNING AFFECT MANAGEMENT OF SURGICAL LEVEL DECOMPRESSION OF THE LUMBAR-SACRAL SPINE?**

Dushan THAVARAJAH, Mathew YOUSEF, Patrick MCKENNA, Robert MARSHALL

Royal Berkshire Hospital, Reading (UNITED KINGDOM)

Introduction: MRI imaging is carried out to identify levels of degenerative disc disease, and in some cases to identify a definite surgical target at which decompression should take place. We wanted to see if repeat MRI scans due to a prolonged time between the initial diagnostic MRI scan of the lumbar sacral spine, and the MRI scan immediately pre-operatively, due of the desire for a 'fresh' MRI scan pre-operatively, altered the level or type of procedure that they would have. Methods: This was a retrospective observational cohort study. Inclusion criteria- all patients with more than one MRI scan before their surgical procedure on the lumbar sacral spine, these were limited to patients that had either, discectomy, microdiscectomy, laminotomy decompression, laminectomy decompression and fusion, and posterior lumbar interbody fusion. Exclusion criteria: all patients with anterior approaches, all patients without decompression and all non lumbar sacral patients. Outcome measures were if there was a change between the two pre-operative MRI scans, which would have changed the operative level of decompression, added other levels of decompression or type of surgery than primarily decided. Results: 84 patients were identified with our inclusion criteria with two pre-operative MRI scans. The repeat MRI did not change the surgical target for all 84 patients ( $p < 0.05$ ). Conclusion: Repeat MRI scanning does not alter the surgical target level, and therefore does not change management. It can delay the initial primary procedure which can lead to progressive neurology, which may be irreversible and should be avoided unless the distribution of neurology has changed.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 27508**

**PROPERTIES OF SENSITIVITY AND MOTOR RESTORATION AFTER PERCUTANEOUS ENDOSCOPIC REMOVAL OF SPINAL DISC HERNIATION IN PATIENTS WITH LUMBAR OSTEOCHONDROSIS**

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Federal State Institution Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan (RUSSIA)

The goal of this work is to study properties of restoration of temperature and pain sensitivity in dermatomas of cauda equina roots, improvement of lower limb muscle function after percutaneous endoscopic removal of spinal disc herniation in patients with lumbar osteochondrosis. The study includes 35 patients managed by percutaneous endoscopy. Control group was managed by inter-laminectomy (58 patients). Temperature and pain sensitivity in dermatomas of cauda equina roots and lower limb muscle strength were measured before treatment, short-term and long-term after the surgery. Study of short-term results of temperature and pain sensitivity in dermatoma of the compressed root showed that pain sensitivity was 8% higher in patients treated by inter-laminectomy. Long-term results showed a reverse tendency. The number of patients with improvement of pain sensitivity was 23% larger in the percutaneous endoscopy group of patients. Motor analysis of strength of lower limb and indicator group of muscles of the compressed root showed that the number of patients with improvement was 13% higher after inter-laminectomy then after endoscopy. According to the long term result, the lower limb muscle strength differed from norm more in patients after endoscopy then in the control group. Thus, long term result of temperature and pain sensitivity recovery is higher after percutaneous endoscopic removal of spinal disc herniation then after inter-laminectomy. However, recovery of lower limb muscle function was lower then in the control group.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 29494**

**EXTENDED FENESTRATION SURGERY IN DEGENERATIVE LUMBAR CANAL STENOSIS**

Ashwani SINGH, Anil DHAL, Sumit SURAL

Mamc, New Delhi (INDIA)

Therapy for lumbar spinal canal stenosis remains difficult. Decompression by total laminectomy is the treatment of choice for central canal stenosis in the lumbar region. It is critical that sufficient bone is removed to free the nerve roots, but the extent of decompression should be as small as possible, in order to prevent postoperative instability. However, too limited a decompression can be accompanied by re-growth of bone that affects the long term results. Also total laminectomy at multiple levels may result in instability of the spine. So, extended fenestration has been described in Japanese literature as a solution to the limitations of laminectomy. AIM: To evaluate the clinical results of extended fenestration surgery in degenerative lumbar canal stenosis based on JOA score MATERIAL AND METHODS: 15 cases of degenerative lumbar canal stenosis were operated with extended fenestration surgery. Patients were selected on the basis of JOA score < 15. Pre op MRI was done in all the cases. Average age of the patients was 44.10 years. L4-L5 level was involved in 40% of cases and L5-S1 in 30% of cases while 30% had both L4L5 and L5S1 involved. RESULTS: All patients were evaluated at the end of 6 months. The Japanese Orthopaedic Association (JOA) score increased from 8.90 points before operation to 28.30 points at the time of the study on average. (p < 0.005 ). CONCLUSION: Extended fenestration surgery is a safe procedure. It does not cause spinal instability and can be performed without any sophisticated instruments.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 29835**

**DYNAMIC STABILISATION FOR GRADE I & II DEGENERATIVE LUMBAR SPONDYLOLISTHESIS WITH STENOSIS: EARLY CLINICAL RESULTS OF A NEW DYNAMIC STABILISATION SYSTEM**

Sandesh LAKKOL, Razvan TARANU, Chandra BHATIA, Manoj KRISHNA, Tai FRIESEM

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Introduction: We present our experience of 22 patients with low grade degenerative spondylolisthesis with stenosis (21 Grade I and 1 Grade II) who were treated using a new stabilization systems {Scient'x IsoBar TTL Dynamic Rod Stabilization and the Inlign™ Multi-Axial pedicle Screws (Disc Motion Technologies - DMT)}. Methodology: The pain intensity was evaluated using the Visual Analogue Score for back pain (VAS-BP) and leg pain (VAS-LP) and functional outcomes using Oswestry Disability Score (ODS). Overall improvement in general patient's health was assessed using the Bodily Pain (SF36-BP) component of the SF -36 questionnaires. Statistical analysis was completed using SPSS 16.0 statistical package (SPSS Inc, Chicago, IL). Results: There were 3 male and 19 female patients and average age at operation was 68.95 years (57-79 years). The average duration of follow up was 16.18 months (8-37 months). Decompression and instrumentation involved 1 level (7 cases), 2 levels (9 cases), 3 levels (1 case) and 4 levels (5 cases). The ODS improved from  $49.45 \pm 14.35$  pre-operatively to  $22.91 \pm 6.38$  post operatively ( $p < 0.001$ ). There was statistically significant improvement noted in VAS-BP ( $p < 0.001$ ), VAS-LP ( $p < 0.001$ ) and SF36-BP ( $p = 0.002$ ). Conclusion: The recent dynamic stabilisation systems were developed with an intention to stabilise the spondylolisthetic segment and preventing adjacent level degeneration. The study results clearly demonstrate that central decompression and dynamic stabilization using TTL/DMT system for degenerative lumbar spondylolisthesis is a safe, reliable method and offers good outcomes.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 30218**

**A NOVEL MINIMALLY INVASIVE APPROACH TO LUMBOSACRAL SPINE**

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Back pain is one of the commonest common musculoskeletal disorders with huge socio-economical implications, in our modern day living. Mechanical back pain contribute vast majority of cases with limited treatment option available. Spondylolisthesis is a recognizable cause of mechanical derangements at Lumbosacral level, provide satisfactory surgical treatment outcome. Traditionally open surgery is the main stay of treatment with in situ fusion. This is associated with significant Soft Tissue Trauma, Blood Loss, increased Operating Time, delay in post operative recovery & Wound Healing Problems. To overcome these issues we described a novel minimal invasive approach to Lumbosacral spine called percutaneous Paracoccygeal - Presacral Approach. In 15 patients we did CT Angiograms & MRI Lumbosacral Spine to define Axial, Coronal & Saggital safe zone, then performed the procedure in 03 Cadavers. We found that this procedure can be performed with precautions in patients to help reduce morbidity associated with open procedure.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 28913**

**CAUDAL EPIDURAL STEROID INJECTIONS FOR THE MANAGEMENT OF LOWER BACK PAIN AND SCIATICA: A REGIONAL SURVEY**

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Introduction: Low Back Pain affects seven out of 10 people at some time in their lives. Clinical trials have shown a variety of results relative to technique, drug doses, and frequency and timing of treatments and efficacy rate. Despite this caudal epidural steroid injection has become firmly established and is widely practiced in the management of sciatica. Despite being commonly used as one of the treatment modality of chronic back pain there is no clear guideline regarding technique, drug doses, frequency, timing of treatments and efficacy rate being quoted to patient for caudal Epidural Steroid injection. Aim: The aim of our study was to conduct a regional survey to illustrate the variation in performing caudal epidural injections. Material and Method: A questionnaire was sent to 33 consultants from south east of England who performs Caudal epidural steroid injections for pain relief. Results: We got the response from 28 consultants (Response rate 85%) There was considerable variation in the use of fluoroscope, use of anesthetic agent and steroid and efficacy rate quoted to the patients. Discussion and Conclusion: Despite the longevity of the practice of Caudal Epidural steroid injections for the management of back pain, there remain a number of unresolved issues. Our study reflects the variation in the actual procedure being undertaken and the medications used throughout the region. We conclude that there is substantial variation in epidural injections which may have substantial bearing on clinical outcomes. We hope that this study will raise awareness regarding lack of uniformity in conducting this procedure and that it may in the future lead to a clear guideline for these procedures.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 28189**

**THREE DIMENSIONAL COMPUTED TOMOGRAPHY (3D-CT) AND RADIOGRAPHS ASSESSMENT OF INTERBODY FUSION**

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Objective: To evaluate the clinical application of 3D CT and radiographs in assessment of interbody fusion after posterior lumbar intervertebral fusion. Methods: Forty three patients were treated with PLIF in single segment. The mean age was 47.2 years. The interbody fusion was performed by autograft in 26 cases and autograft plus PEEK cages in 17 cases. The preoperative diagnosis was isthmic spondylolisthesis in 21 cases, degenerative spondylolisthesis in 15 cases. Lumbar disc herniation associated with instability in 3 cases, revision after primary lumbar discectomy in 3 cases and far lateral disc herniation in 1 case. The interbody fusion levels were L3/4 in 6 cases, L4/5 in 17 cases and L5/S1 in 20 cases. Twentv-four patients underwent two-1level internal fixation, while 19 cases accepted three-1level fixa tion. The lateral static radiograph, flexion-extension radiographs and 3D—CT was performed at follow-up visit. The modified Brantigan grade was used to assess the fusion rate. The interbody stability was assessed by flexion-extension radiographs. Results: The mean follow-up was 18 months. The fusion rates in X-rays and 3D-CT were 64% and 40% respectively. The mean Brantigan grade in X-rays and 3D-CT were  $2.70\pm 1.10$  and  $2.19\pm 1.16$  respectively. The grade was significantly lower in 3D CT ( $P<0.05$ ). The Brantigan grades in 3D-CT were also significantly lower than those in X-ray between the groups of isthmus spondylolisthesis and degenerative spondylolisthesis, two-1level and three-1level intemal fixation, and autograft only and autograft plus PEEK cages. There were only 3 cases showing dynamic instability. The other cases (93%) had no instability according to dynamic X-rays, even those were confirmed of nonunion of the bone graft. Conclusion The lumbar 3D-CT is more accurate in assessment of interbody fusion. It is necessary to perform the 3D-CT before removal of intemal fixation.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 30072**

**LOW BACK PAIN: A COMPARISON OF PHYSICAL THERAPY AND SURGERY. WHAT DETERMINES FUNCTIONAL OUTCOME AT TWO YEARS? AN OBSERVATIONAL STUDY**

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The rise in disability due to back pain has been exponential with escalating medical and societal costs. The objective of this study was to determine the prognostic value of clinical factors on outcome in patients with low back pain examining the physical health scales of the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) in patients undergoing physical therapy and surgery for low back pain. A prospective cohort study with two-year follow-up was undertaken at a multidisciplinary back pain clinic employing physiotherapists, clinical psychologists and surgeons. Over a twelve-month period, 283 consecutive patients with simple low back pain were recruited. SF-36 physical functioning score improved by 10.7 points (95% confidence interval 8.36 to 12.95). Those with episodic rather than continuous pain were more likely to have recovered at six months (odds ratio 2.64 confidence interval 1.25 to 5.60). After adjustment for base-line differences, the chiropractic group had less severe symptoms than the surgery group at four weeks ( $P=0.02$ ), and there was a trend toward less severe symptoms in the physical-therapy group ( $P=0.06$ ). About 75 percent of the subjects in the therapy groups rated their care as very good or excellent, as compared with about 30 percent of the subjects in the surgery group ( $P<0.001$ ). The Role Limitations–Physical and Bodily Pain scales of the SF-36 appeared to lack sufficient reliability and scale width for clinical application. The physical therapy and surgery had similar effects. Whether the limited benefits of these treatments are worth the additional costs is open to question.

**Date: 2011-09-08**

**Session: Spine - Surgery of the Degenerative Lumbar Spine**

**Time: 16:30 - 18:00**

**Room: Terrace I**

**Abstract no.: 29876**

**GINKGOLIDE B PROMOTES PROLIFERATION AND FUNCTIONAL ACTIVITIES OF BONE MARROW-DERIVED ENDOTHELIAL PROGENITOR CELLS: INVOLVEMENT OF AKT/ENOS AND MAPK/P38 SIGNALING PATHWAYS**

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Objective: Bone marrow-derived, circulating endothelial progenitor cells (EPCs) contribute to angiogenesis in various diseases. There is strong evidence that reduced blood flow to the margins of the intervertebral disc (IVD) is associated with early onset and progressive degeneration. Pharmacological intervention to enhance the number and functions of EPCs could be a novel treatment for degenerative disc diseases. In this study, we investigated the effects of Ginkgolide B on proliferation and differentiation of EPCs, and the involved signaling pathway in vitro. Methods: EPCs proliferation, migration, adhesion and in vitro angiogenesis activity were assessed with WST-8 assay, transwell chamber assay, cell counting and in vitro angiogenesis kit, respectively. Apoptosis was detected with annexin V and propidium iodide staining. The protein expression of angiogenesis-related makers was detected by Western blot, and related gene expression was determined by real-time RT-PCR analysis. Results: Ginkgolide B treatment resulted in a promotion of proliferation and endothelial gene expression in EPCs in vitro. VEGF-induced migration response and the capability to incorporate into the vascular networks were markedly enhanced in Ginkgolide B-treated EPCs. Ginkgolide B protected EPCs from H<sub>2</sub>O<sub>2</sub>-induced cell death. Ginkgolide B induced the phosphorylation of eNOS, Akt and p38 which in turn promoted the cell proliferation and function. Conclusion: The present study demonstrates that Ginkgolide B, at a near medical applied dose, increases the number and functional activities of EPCs with involvement of Akt/eNOS and MAPK/p38 signal pathways. This should be a new promising approach for the treatment of degenerative disc diseases.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 28361**

**DEBRIDEMENT VERSUS LABRAL REPAIR IN FAI**

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Biomechanical and finite-element model analyses have shown that the acetabular labrum may contribute to hip joint stability, hip joint congruity, and function to distribute synovial fluid through a sealing function. In a sheep model, surgically induced labral tears were repaired with a single suture anchor, and all specimens were later found to heal by way of fibrovascular scar tissue to the capsule or underlying acetabular bone (or both) (PHILIPPON et al 2007). FAI has become a well-recognized disorder that is associated with chondrolabral disruption and progressive degeneration of the hip joint. There has been only one published study evaluating labral refixation versus debridement (ESPINOSA et al. 2006). This study was done with an open dislocation technique that is well described in the literature for management of FAI. There are limited data indicating good short-term results and no long-term follow-up after arthroscopic labral repair/refixation in humans. Recently published data by LARSON and GIVEANS (2009) found significantly better outcomes at 1 and 2 years in the refixation group when compared with the labral excision group. They also found an increase in radiographic degenerative changes over the study time period (up to 2 years) with labral excision compared with labral refixation. This was a consecutive series of patients, and it may be that improvements in the latter refixation group were the result of a combination of labral preservation and improved technique for managing this disorder over time. Although other variables could have influenced the outcomes, these preliminary results indicate that labral refixation resulted in better HHS outcomes and a greater percentage of good to excellent results compared with the results of labral debridement. The different knotting techniques of labral refixation will be demonstrated and the indications described.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 28196**

**OUTCOMES OF PLATE FIXATION IN PUBIC DIASTASIS: OUR EXPERIENCE WITH 19 PATIENTS AND REVIEW OF LITERATURE**

Vibhu KRISHNAN, Kamal BALI, Sameer AGGARWAL, Ramesh Kumar SEN, Sakthivel Rajan RAJARAM MANOHARAN

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Pubic diastasis, high energy antero-posterior compression (APC) injury, has been managed based on the Young and Burgess classification system. The fixation methods in APC II injury have been a subject of controversy with some authors proposing a need to address the partial breach of the posterior pelvic ring elements. The study included a total of 19 patients with pubic diastasis managed by us from May 2006 to December 2007. There was a single patient with type I APC injury who treated conservatively. Type II APC injuries (13 patients) were treated surgically with symphyseal plating using single anterior/superior plates or double perpendicularly placed plates. Type III injuries (5 patients) in addition underwent posterior fixation using plates or percutaneous sacro-iliac screws. The outcome was assessed clinically (Majeed score) and radiologically. The mean follow-up was for 2.9 years (6 months to 4.5 years). In the 13 patients with APC II injuries, the clinical scores were excellent in one (7.6%), good in 6 (46.15%), fair in 4 (30.76%) and poor in 2 (15.8%). Radiological scores were excellent in 2 (15.38%), good in 8 (61.53%), fair in 2 (15.38%) and poor in one patient (7.6%). Among the 5 patients with APC III injuries, there were 2 patients each with good (50%) and fair (50%) clinical scores while one patient was lost on long term follow up. The radiological outcomes were also similar. Complications included implant failure in 3 patients, postoperative infection in 2 patients, deep venous thrombosis in one patient, and bladder herniation in one of the patients with implant failure. The outcomes were similar between isolated anterior and combined symphyseal plating techniques in APC II injuries. Single anterior symphyseal plating along with posterior stabilisation provides a stable fixation in type III APC injuries.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 27336**

**OUTCOME OF SURGICAL MANAGEMENT OF UNSTABLE PELVIC FRACTURES**

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AIM OF STUDY – To evaluate the functional and radiological assessment of unstable pelvic fractures treated by internal fixation methods. DESIGN – Prospective clinical study  
MATERIALS AND METHODS – Twenty one patients with unstable pelvic fractures were treated surgically and analysed functionally and radiologically with an average follow up of 24.6 months (12-31 months) between January 2007 and December 2009. Sixteen out of twenty one patients sustained Tile's type C pelvic injury and the remaining were type B injuries. RTA was the commonest mode of injury accounting for 15 patients. All patients were assessed functionally using S.A Majeed scoring system and radiologically using Slaty and Karaharju grading. RESULTS – At the end of final follow up we had excellent and good results in 85.7% of patients both functionally and radiologically. The Excellent/Good outcome of type C pelvic fractures was 87.5% and type B pelvic fractures was 80%. Sacroiliac pain was present in 33.3%, superficial wound infection and implant loosening in 14.3%, sciatic nerve palsy in 9.5% and loss of reduction in 4.8% of patients. CONCLUSION – An active approach to the treatment of patients with unstable pelvic fracture is based on correct diagnosis, comprehensive multidisciplinary care, urgent primary stabilisation and early definitive fixation by internal osteosynthesis offers a prospect of survival and good functional outcome for the patient.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 28262**

**PATHOLOGY OF NEGLECTED FEMORAL NECK FRACTURE**

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Background: Neglected femoral neck fracture continues to a problem in developing countries. The changes which occur in the region of the fracture with passage of time have a bearing on the choice of line of treatment and its outcome. Clinical material: The study is based on 552 patients of femoral neck fracture treated by replacement arthroplasty. There were 351 male on 201 female patients with average age of 59 years (range 32-93 years). The duration of fracture was 1 day to 2 years. Recent skiagram was available for all 552, MRI/CT scan in 82 operative findings in 525. Gross study of excised femoral head 433. Histology of femoral head in 50, Histology of intact part of retinaculum in 30. Histology of ligamentum teres in 9. Observations: Skiagram shows Sclerosis of fracture margin in 12-18 weeks, Absorption of femoral neck in 12-18 weeks, AVN in 16 weeks. MRI/CT scan: Odema of femoral head was seen upto 3 weeks, sign of AVN after 12 weeks, increase in fracture gap after 3 weeks, cup or moon shaped proximal fragment after 24 weeks. Observation at operation: Dark coloured blood or blood stained synovial fluid seen during 1-2 weeks, yellow colour synovial fluid seen in 2-4 weeks. Gross examination of femoral head: Fracture surface cancellous upto 20 weeks, growth of synovial membrane on to the fracture surface in 18 cases after 20 weeks, AVN on cut surface after 12 weeks. Histology of femoral head: Necrotic bony trabeculae seen after 12 weeks. Retinaculum Contained blood vessels of 1-2 mm diameter in size. No appreciable proliferation of cells. There as no evidence of any attempt at union fibrous cartilaginous of bony seen any case. The only connection between the proximal and distal fragment was with unruptured part of the retinaculum.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 27381**

**THE USE OF ELLITTICA HEMIARTHROPLASTY FOR THE TREATMENT OF DISPLACED FEMORAL NECK FRACTURES IN PATIENTS OLDER THAN 60 YEARS**

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Elliptic head hemiarthroplasty was realized in 1972 to reproduce the anatomic femoral head shape. Many functional anatomy studies showed that this shape fills better the acetabulum during walking. We evaluated 79 patients with femoral neck fracture treated with Ellittica hemiarthroplasty, with 3.4 years of mean follow up. We obtained 24% excellent results, 73% good results with the modified Harris Hip Score and 84% of no radiological changes at the acetabulum. This hemiarthroplasty has good functional and radiological radiological results, with no luxations or revision surgery.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 29911**

**RESULTS OF MIS USING ADJUSTABLE SLIDING HIP SCREWS IN HIP FRACTURES**

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The MIS (minimum incision surgery) of hip fractures are usually difficult to decide the angle and correction of the lag screw position. The AS hip screws have been used since 1997 in Japan. These implants have angled adjustable plate from 125 to 145 degrees and are used for MIS within 3 cm incision. Patients and methods: 343 cases since Dec. 2004 to Dec. 2008 followed to bone union. Follow up was 3 month to 1 year. Average follow up 1.2 years. Those cases included 144 cases of MIS (2cm-3cm) and 199 cases of standard incision (10-15cm). For unstable type fractures implants had adjustable brim support and added augmentations into the fracture site using  $\beta$ -TCP. Results: There were no implants failures in 343 cases. There were no statistical differences between MIS groups and standard incision groups regarding operation time, hospital stay (days), cutting out, bone union and TAD (tip apex distance). Discussion: We recognized MIS using AS hip screw were same clinical results of standard incision surgery for hip fractures. There are learning curves about MIS, which are big problems, these kinds procedures. Our study performed by 10 surgeons included less than 2 years experienced. And the surgeons were selected randomize. The AS hip screw is possible to be used for successful MIS of hip fractures at the first time. In conclusions: The AS hip screws are considered the best implants for MIS of hip fractures.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 29738**

**RISK FACTORS FOR LAG SCREW CUT-OUT IN INTERTROCHANTERIC FRACTURES**

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Introduction: The purpose of the present study was to identify risk factors for lag-screw cut-out following osteosynthesis of intertrochanteric fractures. Materials and methods: The study was a retrospective case-control study using a sex and age matched control group. Fractures were classified according to Evans and OTA/AO classifications. Operative treatment was performed using dynamic hip-screw or cephalomedullary nailingsystem. All patients were followed at least 3-4 months postoperation. The following risk factors were assessed: Fracture-type, quality of reduction by blinded assessment using a visual analogue scale, tip-apex distance (TAD) according to Baumgaertner, lag-screw positioning and comorbidity. Results: 35 cases with lag-screw cut-out and 122 controls without cut-out were identified. 124 women and 33 men with a mean age of 84.9 and 82.3 years respectively. Cut-out were significantly more frequent in OTA/AO type 31-A3 fractures (odds ratio (OR) 4.13; 95% CI: 1.5; 11.36). Quality of reduction was significantly related to the risk of cut-out. The mean TAD was 26.5 mm in the case group and 21 mm in the control group. This difference was significant (Mann-Whitney test  $p=0,046$ ) Assessment of the lag-screw positioning showed that a central/central or central/inferior position was associated with a reduced risk for cut-out (OR 16.9; 95% CI 5.38; 53.09). None of the studied comorbidities were identified as a risk factor. Conclusion: This study showed that fracture-type, quality of reduction, TAD and lag-screw positioning were the most important risk factors for cut-out.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 29946**

**IPSILATERAL FRACTURES OF THE PROXIMAL FEMUR AND THE FEMORAL SHAFT**

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Between the years 1994 and 2008, 171 ipsilateral fractures were operatively treated in 169 patients with an average age of 56 years. The group comprised 108 men and 61 women. The fracture was fixed by the long Gamma nail in 18, by the long PFN in 147 and by the long PFH in 3 cases. In two patients a reconstruction nail was used on one side and a combination of DHS and condylar plate on the other. External fixation was used in a patient with severe burns. In one case the fracture was fixed by a Proximal Femoral LCP. Types of fractures were evaluated on the basis of the authors' own classification of 1998. In 68% of cases the injury was caused by high-energy trauma. The minimum follow-up period was 12 months. Of 129 fractures, 127 (98 %) healed within 12 months after the injury. In 125 cases treated with a reconstruction nail there were 13 complications (10 %) and in four patients treated by another method, complications occurred in three cases. Excellent results were achieved in 63 %, good in 29 %, fair in 6 %, poor in 2 %. Conclusion In case of fractures of the femoral shaft, in high-energy trauma particularly, it is necessary to check the patient for a potential proximal femur fracture. There is no generally accepted classification. There is no consensus concerning the treatment. The group was treated almost exclusively with the reconstruction nail. In 2 % we used another method of internal fixation.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 27713**

**SELDYNAMISABLE INTERNAL FIXATOR (SIF) ONE NEW AND MINIMALLY INVASIVE METHOD IN FEMORAL FRACTURES TREATMENT**

Milorad MITKOVIC, Desimir MLADENOVIC, Sasa MILENKOVIC, Ivan MICIC, Milan MITKOVIC

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Dynamisation is recognized condition which encourages bone union. Because of that many doctors routinely remove one screw from interlocking nail, two months after primary operation to provide axial dynamisation. Dynamisation is happened in about 15-25%, according to the literature, but we still can not predict which patient or fracture will need dynamisation. The aim of this study is to present one new selfdynamisable implant and method for internal fixation of different femoral fractures. Material and Method: Between 2000 to 2008, 849 patients with 871 fractures receiving selfdynamisable internal fixator developed by Mitkovic, for proximal, diaphyseal and distal femur fractures were included in the study. Results: The average operative time was 44 minutes (23-119), average fluoroscopy time was 12 seconds (6-92) while average blood loss of 90 milliliters (60 to 250 milliliters) when minimally invasive technique used. None of the patients developed complications during the intraoperative period. Healing time was 3.9 months (3-9). Healing was achieved in 99.1%. Superficial infection developed after 7 fixations (0.9%) while deep infection developed in 4 patients (0.5%). The screw breaking occurred 6-18 weeks after 19 fixations (2.6%). Cut out phenomenon happened in 24 cases. Spontaneous axial dynamisation was observed in seventy-one patient (23.8%), 5 millimeters on average (2 to 12 millimeters). Conclusion: SIF is one effective method for the treatment of femoral fractures. This method is particularly valuable for treatment of comminuted fractures with regard to minimally invasive surgery. Key Words: Femur, Fracture, Selfdynamisable Internal Fixator, Dynamisation, Minimally invasive surgery.

**Date: 2011-09-08**

**Session: Trauma - Pelvis & Proximal Femur**

**Time: 08:00 - 09:30**

**Room: Club A**

**Abstract no.: 28269**

**MINIMALLY INVASIVE PLATE OSTEOSYNTHESIS (MIPO) FOR FIXATION OF FEMORAL FRACTURES**

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Introduction: Indirect reduction and MIPO technique is a well established procedure in the treatment of femoral fractures. The objective of the study is to evaluate the clinical, radiographic as well as the complications of MIPO technique in fixation of femoral fractures. Methods: A prospective study was done for fixation of femoral fractures using MIPO technique. The study included 50 patients with 32 males (64%) and 18 females (36%). The mean age was 31 years range (16–71 years). 42 cases were closed injuries (84 %) while 8 cases (16 %) were open injuries. 30 cases (60 %) were isolated injuries while 20 (40%) cases were associated with other injuries. The mean follow up period was 13 months (8 – 24 months). Results: Satisfactory fracture reduction, clinical and radiographic outcome has been achieved in most cases. Average healing time was 16 weeks (range 12 – 40 weeks). Complications included 3 cases of malalignment (all were within acceptable range), 3 cases of delayed union, 2 cases of deep infection, 1 implant failure, and 1 periprosthetic fracture. Discussion and conclusion: MIPO technique is a useful and effective technique for fixation of femoral fractures. In our series, the technique achieved satisfactory clinical and radiographic results with no major complications related to the technique.

**Date: 2011-09-08**  
**Session: Cartilage Repair**  
**Time: 10:30 - 12:00**  
**Room: Club A**

**Abstract no.: 30368**

**HYALOGRAFT AND BIOMIMETIC CONSTRUCTS AND NEW SCIENCE**

Elezaveta KON, Giuseppe FILARDO, Alessandro DI MARTINO, Silvio PATELLA, Berardo DI MATTEO, Francesco PERDISA, Giulio ALTADONNA, Federica BALBONI, Maurilio MARCACCI  
(ITALY)

Cartilage reparative treatments are mostly directed to the recruitment of bone marrow cells to obtain potential cartilage precursors and allow to form only a fibrous-cartilaginous tissue; the bioengineered approach aims to regenerate the damaged tissue and restore a biologically and biomechanically valid articular surface. The clinical use of autologous chondrocyte transplantation reported encouraging clinical results, especially in the femoral condyle, that have to be weighed against the number of problems that can be observed with the standard ACI methods, such as surgical complexity and biological problem related to the cell culture. To address these problems the so-called second generation ACI technique was developed. Essentially, the concept is based on the use of biodegradable polymers as temporary scaffolds for the in vitro growth of living cells and their subsequent transplantation onto the defect site. The clinical application of this tissue engineered approach is well documented, even though the results are still controversial. In case of OCD or osteochondral lesions a more complex surgical procedure is required because of the two different tissues involved, characterized by different intrinsic healing capacity. To repair the whole osteochondral unit, several authors have already highlighted the need for biphasic scaffolds. We performed a clinical trial on a recently developed composite scaffold which mimics the biochemical and biophysical properties of the different layers of native osteochondral structures and induces "in situ" cartilage regeneration. However, these biomimetic cell-free "intelligent" constructs are still under investigation and only few of these have been introduced into the clinical practice.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 28563**

**THE CLINICAL LOCATION OF TUNNELS AFTER ANATOMIC DOUBLE-BUNDLE ANTERIOR CRUCIATE LIGAMENT (ACL) RECONSTRUCTION ANALYZED BY THREE-DIMENSIONAL COMPUTED TOMOGRAPHY (CT)**

Kenji TOKUNAGA<sup>1</sup>, Masashi KIMURA<sup>1</sup>, Yasukazu KOBAYASHI<sup>1</sup>, Nadim ASLAM<sup>2</sup>, Rad ZDERO<sup>3</sup>

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Background: Recently some cadaver studies have improved the accuracy of the insertions in anatomic double-bundle anterior cruciate ligament reconstruction. Our aim was to assess the position of anteromedial (AM) and posterolateral (PL) tunnels after actual anatomical double-bundle ligament reconstructions using three-dimensional computed tomography (CT). Methods: CT scans of 54 patients were performed and three-dimensional models were created. Tibial tunnel positions were measured in anterior-to-posterior and medial-to-lateral directions on the tibial plateau. The femoral tunnel central apertures of the medial wall on the lateral femoral condyle were measured using the anatomical coordinate axes method (ACAM) and the quadrant method. Results: On the tibial side, the centers of AM and PL tunnels were located  $37.6\pm 6.0\%$  and  $53.2\pm 5.2\%$ , respectively, from the anterior ridge of the tibial plateau, and  $47.4\pm 2.4\%$  and  $49.8\pm 2.4\%$ , respectively, from the medial edge. On the femoral side, with the ACAM, in the posterior-to-anterior direction the AM and PL tunnels were located  $33.6\pm 9.4\%$  and  $20.2\pm 4.8\%$ , respectively, and in the proximal-to-distal direction they were  $22.7\pm 8.3\%$  and  $54.4\pm 11.6\%$ , respectively. With the quadrant method, AM and PL tunnels were measured at  $24.6\pm 11.2\%$ , and  $52.2\pm 7.7\%$ , respectively, from the femoral roof, and  $23.0\pm 5.0\%$  and  $31.7\pm 6.1\%$ , respectively, from the proximal condylar edge. Conclusion: Compared with previous cadaver data, our femoral AM tunnel locations were anteriorly placed.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 30184**

**DOUBLE BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING EZLOC FEMORAL FIXATION DEVICE**

Takafumi HIRANAKA, Yuichi HIDA, Harunobu UEMOTO, Minoru DOITA, Yutaro KANDA, Yuichi KURODA, Mitsuo TSUJI  
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Double bundle anterior cruciate ligament reconstruction (DBACL) has now been popular. Despite a relatively difficult and complex procedure, virtually Endobutton is the only device for graft fixation at the femur. EZLoc is an alternative device for DBACL. It has superior mechanical strength and rigid fixation against the lateral femoral cortex with lever arm. In this paper, we will present a technical tricks and pitfalls of DBACL with EZLoc femoral fixation device. We have used EZLoc in 19 patients who underwent DBACL in our institution. Average operation time is 130min including menisectomy or meniscus repair. There was one case the lever arm opened in the femur bone tunnel. In this case, EZLoc did not move and leave within the bone but no joint laxity was observed. In two cases, the lever arm opened in the joint cavity and re-insertion of the passing pin was necessary. There were two cases, in which EZLoc was pulled out entire length and pushing back was required. No breakage or migration of the hardware was observed. Clinical results were excellent and no laxity was found in any case. We recommend EZLoc femoral fixation device for DBACL as far as the graft and device are passed through the tunnel smoothly.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 29252**

**TUNNEL POSITIONS AND GRAFT SIZE IN ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTIONS PREDICT PROBABILITY OF GRAFT IMPINGEMENT**

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Introduction: There is a recent trend in lateralizing the femoral tunnel clock position and anteriorizing the tibial tunnel position during ACL reconstruction. However, it is not known whether this will lead to an increased chance of impingement. Method: The effect of changing the tunnel position on impingement was studied in a virtual reality model using commercially available software. CT knees were performed in 4 patients. Four femoral tunnel points (12, 11, 10 and 9 o'clock) and 12 tibial tunnel points (30%, 40%, 50% and 60% points along the midline, 5 mm medial and 5 mm lateral) were selected. Potential impingement of the graft was examined with a graft diameter ranging from 6 mm – 10 mm for each paired ACL tunnel position. Result: A total of 960 virtual ACL reconstructions were studied. Potential impingement was noted in 69.9%. Lowering the femoral clock position, anteriorizing the tibial tunnel and increasing graft size were all associated with impingement ( $P < 0.001$ ). The odds ratios (OR) of impingement with 9 and 10 o'clock femoral tunnel when compared with 11 o'clock were 2 and 1.4 respectively. The OR of impingement at 40% tibial position was 2.6 when compared with 50% position. A graft at or bigger than 9 mm in diameter was associated with impingement at all tunnel position (OR = 2.3). Conclusion: Excessive lateralization of femoral tunnel clock position and anteriorization of tibial tunnel position should be cautioned during ACL reconstruction.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 27055**

**ANTEROMEDIAL BUNDLE INFLUENCES INTERNAL TIBIAL ROTATION MORE THAN POSTEROLATERAL BUNDLE – A CADAVER STUDY**

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Introduction: ACL consists of the anteromedial (AM) and the posterolateral (PL) bundle. The purpose of this study is to evaluate the influence of both bundles on anterior-posterior translation (APT) and internal (IR) and external (ER) rotation. Methods: Knee stability was measured on 48 fresh cadaver knees using navigation system at 30°, 60°, 90°, and 120° of flexion. APT, IR, and ER were recorded in the intact condition, in the AM-deficient, PL-deficient, and in the ACL-deficient conditions. KT-1000 was used to evaluate APT. Rotation measurements were done with the rollimeter (2,5 Nm). Results: At 30° of flexion: In the intact knee APT was 6,3 mm on average. After AM cut APT increased to 9,1 mm and after PL cut APT increased to 6,4 mm. After AM and PL cuts mean APT was 10,2 mm. In the intact knee IR was 11,1° on average. After AM cut IR increased to 13,9° and after PL cut IR increased to 13,1°. After AM and PL cuts mean IR was 15,7°. In the intact knee ER was 10,1° on average. After AM cut ER increased to 12,6° and after PL cut ER increased to 10,6°. After AM and PL cuts mean ER was 12,9°. At 60°, 90°, and 120° of flexion similar values were measured without statistically significant difference; all values gradually decreased with increased flexion. Conclusion: We cannot agree with many other authors that PL controls IR more than AM.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 30210**

**A MATHEMATICAL MODEL OF THE OPTIMAL TIBIAL TUNNEL POSITION FOR DOUBLE BUNDLE RECONSTRUCTION OF THE ANTERIOR CRUCIATE LIGAMENT**

Takafumi HIRANAKA, Yuichi HIDA, Harunobu UEMOTO, Minoru DOITA, Yuichi KURODA, Yutaro KANDA, Mitsuo TSUJI  
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Independent tibial as well as femoral bone tunnels should be created in double-bundle anterior cruciate ligament reconstruction (DBACLR). However, the tunnel position is impacted by the size and inclination of the bone tunnels. The purpose of the current study was to evaluate the biophysical relationship between the tibial bone tunnels in various diameters and inclinations. Using actual bone tunnel diameter of anteromedial (AM) and posterolateral (PL) bundles, tunnel inclination and deviation angles, we calculated the wire interval (WI), which is the distance between the centers of the tunnel outlet for the AM and PL bundles, and whole anteroposterior diameter (WAPD), which is the distance between the anterior border of the AM outlet and the posterior border of the PL outlet, when two millimeters of bone septum is preserved between two outlets. The WI and WAPD were approximately 9-12 mm and approximately 18-21 mm, respectively. We found that if the actual diameters, inclination angles, and deviation angles of AM and PL tunnels are 8mm, 6mm, 45 degrees, 55 degrees, 30 degrees and 60degrees, respectively, WAPD and WI will be 20.6mm and 11.3 mm, respectively, and therefore the graft can be implanted within the original footprint in most cases.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 30125**

**LACKING RE-INNervation OF THE RUPTURED ACL-GRAFT  
– A CAUSE OF GRAFT-FAILURE?**

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**INTRODUCTION:** Rupture of the ACL after reconstructive surgery is multifactorial. Surgical technique such as tunnel mal-positioning, graft preparation and tensioning, or material failure are possible causes. Metabolic factors are discussed, however only re-vascularization partially understood. Re-innervation of the graft has been found in animal models, and ACL-hamstring arc to be re-established in humans. However, re-innervation as a potential cause of ACL re-tear has never been analysed. **METHODS:** 17 patients (28.8 +/- 8.2 years) and 20 knees, at least 5.6 years (range 0.3 to 16.3) after primary ACL reconstruction, were included. Several biopsies were taken 43.8 days (range 8 to 101) after re-tear from the proximal, the mid and the distal portion of the failed graft. Immunohisto-chemical analysis (HE and S-100) were performed to assess for nervous tissue in the graft. **RESULTS:** nerve fibres were inexistent in 17 grafts, 3 grafts showed only little signs of re-innervation. The three patients with re-innervation of their torn graft suffered high-energy contact injury. No significant difference was found for time between primary surgery and re-rupture, graft choice, and time between re-rupture and biopsy with regard to re-innervation. **DISCUSSION:** only patients with high energy contact injury of their ACL graft showed re-innervation. In all other patients, no nervous tissue could be detected. Hence, lacking re-innervation of the ACL-graft may contribute to increased risk of re-tear due to missing sensory feed-back mechanism such as the acl-hamstring arc. Future studies will have to show, whether this factor may be influenced by either surgery or rehabilitation methods.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament I**

**Time: 14:00 - 15:30**

**Room: Club A**

**Abstract no.: 28584**

**COMPARISON OF 3 DIFFERENT FEMORAL FIXATION (APERFIX, TRANSFIX, ENDOBUTTON) FOR ACL RECONSTRUCTION. A PROSPECTIVE RANDOMISED CLINICAL TRIAL STUDY**

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**Purpose:** Aim of the present study was to compare three different femoral fixation (Aperfix, transfix, endobutton) in anterior cruciate ligament (ACL) reconstruction. **Methods:** 120 patients randomly divided in 3 groups with different femoral fixation. All patients checked before and 6 months after surgery with KT-1000 & Lyscholm score. **Results:** there was no clear difference between the three fixation groups in term of time of surgery. In the endobutton group lyscholm score rose from  $63.21 \pm 18.59$  to  $90.22 \pm 9.47$  in the Aperfix group from  $65.72 \pm 18.74$  to  $96.22 \pm 5.35$  and in transfix group from  $69.21 \pm 17.45$  to  $90.64 \pm 9.47$  in the endobutton group 6 failures and in the transfix group 4 cases and in the Aperfix group only one failure occurred. Anterior tibial translation in the endobutton group was  $3.96 \pm 1.58$ , for the transfix group  $4.28 \pm 1.48$  and in the Aperfix group  $4.03 \pm 1.79$ . **Conclusion:** lyscholm score analysis proved a better result for the Aperfix group compared with the transfix group and both prove better than the endobutton. From the other aspects there were no exact differences.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 28870**

**UNTREATED DEEP CARTILAGE LESIONS ASSOCIATED WITH ACL INJURY: RESULTS AT 10 AND 15 YEARS FOLLOW-UP**

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Introduction: Chondral lesions are often documented at the time of ACL reconstruction. They are usually asymptomatic. Little is known if current treatment methods change the natural history of such lesions if left untreated. Our study was aimed to determine what effect, deep cartilage lesions found during ACL reconstruction would have on clinical outcome if left untreated. Materials and Methods: From 1991 to 1995, 586 ACL reconstructions were performed, and 51 of them in patients with a concomitant single focal chondral lesion of Outerbridge grade 3 and 4. The mean defect size was 2.5 cm<sup>2</sup> (range, 0.5 to 4.0 cm<sup>2</sup>). The control group (ACL injury only) was matched for sex, age, operation time with the study group. Outcomes were reported at 10 and 15 years follow-up using IKDC criteria, Lysholm Score and Tegner activity scale. Results: 42 were evaluated at 10 years follow-up and 36 at 15 years follow-up. At 10 years follow-up according to Lysholm, Tegner and IKDC objective scores no statistical differences were noted between the groups. The mean total IKDC subjective score was significantly lower in the defect group comparing to the control group (mean, 79.6 points versus 83.7;  $p = 0.031$ ). At 15 years follow-up there were no statistical differences according to Lysholm, Tegner and either objective or subjective IKDC scores. Conclusions: Deep cartilage lesions found during ACL reconstruction, left with no treatment, do not appear to affect clinical outcome at 10 and 15 years follow-up.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 29854**

**MAGNETIC RESONANCE IMAGING DOCUMENTS INCREASED INCIDENCE OF MENISCAL TEARS IN THE ANTERIOR CRUCIATE LIGAMENT DEFICIENT KNEE**

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**BACKGROUND:** Previous studies had shown increased incidence of meniscal tears in the anterior cruciate ligament (ACL) deficient knee. Meniscal tear could occur during the primary knee injury when the ACL was ruptured or secondary to the instability of the ACL deficient knee. Sensitivity of MRI findings is 95% for the medial meniscus MM and 90% for the lateral meniscus LM. **HYPOTHESIS:** Normal menisci in the ACL deficient knee are in increasing risk for tear as the ACL reconstruction is delayed. **METHODS:** We retrospectively reviewed 177 ACL deficient knees that underwent MRI evaluation in the preoperative period. According to MRI, only knees with normal MM or LM were included in our study. Both menisci were arthroscopically evaluated during the surgery for ACL reconstruction. **RESULTS:** Respectively, from 128 and 97 knees with normal LM and MM in MRI, 51 and 12 had tears in arthroscopy. The period between MRI and ACL reconstruction was significantly longer in the knees with meniscal tear comparing to knees with normal ones in arthroscopy, LM group ( $p=0.021$ ,  $t = -2.368$ ) and MM group ( $p=0.012$ ,  $t = -2.562$ ). When ACL reconstruction was performed within 90, 90 to 180 or more than 180 days after MRI evaluation, respectively 29%, 44% and 59% had lateral meniscal tear, and 7%, 11% and 25% had medial meniscal tear. **CONCLUSION:** Normal medial or lateral meniscus in ACL deficient knee is in increased risk for tear when the surgery for ACL reconstruction is delayed.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 28513**

**ANATOMIC SINGLE BUNDLE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION USING TWO CROSS PINS: CADAVERIC STUDY**

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Background: Anatomic single bundle Anterior Cruciate Ligament (ACL) reconstruction performed through the medial portal has been widely accepted by arthroscopic surgeons. The research question: can cross pins (Rigid-Fix MITEK, J&J) be used safely for graft fixation on the femoral side through the medial portal? Methods: Ten cadaveric femora were tested in this study. The natural footprints of the anteromedial and posterolateral ACL bundles were identified. Eight mm wide and thirty mm long sockets were reamed in the center of the anatomic ACL footprints. Rigid-Fix guide for soft tissue graft was used to prepare pin sites through the femoral tunnels and two sleeves were left in position. Two inclinations for the guide and sleeves were tested using the posterior femoral condyles as reference line. The first inclination (A) creates an angle of 15° closed laterally and the second (B) creates an angle of 15° closed medially. The sleeves' positions were correlated to the lateral epicondyle and the femoral articular cartilage. Results: The inclination (A) placed the pins through the femoral tunnels and their full lengths were located within the lateral femoral condyle. Pins inserted with inclination (B) were found to penetrate the back of the distal femur behind posterior joint capsule attachment. Conclusion: Cross-pins (Rigid-Fix) that is originally designed for trans-tibial ACL reconstruction can only be used for anatomic single bundle ACL reconstruction through the medial portal when surgeons are informed about its correct inclination. Wrong orientation of the guide can put the neurovascular structures posterior knee at risk.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 26920**

**MEDIAL PATELLO-FEMORAL LIGAMENT RECONSTRUCTION: IS A CLINICAL METHOD OF IDENTIFYING THE ISOMETRIC FEMORAL ATTACHMENT RELIABLE? A CLINICAL AND RADIOLOGICAL STUDY**

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Introduction: As intra-operative fluoroscopic identification of isometric MPFL attachment to femur can be imprecise and laborious in surgical setting, we used clinical criteria to identify the isometric point and then studied post-operative radiographs to find out whether it was achieved and compared it with functional outcome. Materials and Methods: Sixteen patients underwent 17 MPFL reconstructions using autologous semi-tendinosis tendon graft. Clinical judgement was used to identify optimal point for femoral attachment of the MPFL without fluoroscopy control. Post-operative radiographs at 2 weeks were analysed to confirm whether an isometric point for reconstructed MPFL was achieved by dividing the distal femur into 4 quadrants by 2 lines on the lateral radiograph. Telephonic interview was conducted to assess functional scores using the Kujala score at a mean follow-up of 13 months. Results: In only 4 of 17 cases, femoral point of attachment lay in radiographically isometric (antero-proximal) quadrant. In 8 of 17 knees, point of MPFL attachment lay in antero-distal quadrant. However, there was improvement in functional score in 14 of 16 patients, with none reporting recurrence of patellar instability. The position of reconstructed MPFL did not correlate with functional score. Conclusion: Over-reliance on clinical method alone for identification of optimal point for MPFL attachment without an intra-operative radiograph leads to radiographically non-isometric positioning in majority of cases. In clinical setting, however, this does not correlate with adverse functional outcome, although intra-operative fluoroscopy may improve the anatomical isometry, and we therefore suggest use of qualitative clinical method to achieve optimal positioning.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 29714**

**ARTHROSCOPIC NEEDLE-KNIFE SURGICAL DEVICE (ANKSD)**

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Background: It is common, safer and precise arthroscopic technique to use a needle before a cutting knife help targeting the correct entry point. It avoids damaging healthy structures. Painfully arthroscopic entry points is an undesired complication, difficult to avoid and treatment, although it is a minor complication, it is a bad result, affecting the patient's quality of life. It is time for a development of a surgical instrument. Objective: Is the Arthroscopic Needle-Knife Surgical Device Ecofriendly safe and effective? Method: 50 knees were arthroscopically operated by using the ANKSD. On the lateral portal the ANKSD's technique were used and for the medial portal, standard knife was used. All the portals healed well. There were no cases of painful scars in both portals so far. Discussion: With the ANKSD method it is possible to precise more the entry portals, avoid soft tissue damage and avoid cutaneous nerve damage. As it is two instruments in one, time and cost are saving by this method. Conclusion: ANKSD's method is safe, cost effective and efficient.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 28705**

**THE IMPORTANCE OF INDEPENDENT MEASUREMENT OF WIDTH AND LENGTH OF LATERAL MENISCUS DURING PREOPERATIVE SIZING FOR MENISCAL ALLOGRAFT TRANSPLANTATION**

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**Purpose:** Although accurate sizing of the meniscal allograft is crucial during meniscal transplantation, the accuracy of meniscal measurement methods is still in debate. This study evaluated relationship between the width and length of lateral meniscus. These anatomic dimensions were also evaluated in the context of the patient's height, weight, gender and body mass index (BMI). **Methods:** Ninety one samples of fresh lateral meniscus were obtained during total knee arthroplasty. The sample was obtained carefully without injuring the meniscus itself and the bony attachment sites. For each lateral meniscus, the anatomic dimensions (width; LMW and length; LML) were recorded. The height, weight, gender and BMI were also recorded. The Pearson correlation, multivariate and linear regression analysis were applied for each variable. The accuracy was defined as those measures that fell within 10% of the original size. A p value  $\leq 0.05$  was considered significant. **Results:** The mean LMW was 30.7mm (SD=3.5) and 27.0mm (SD=2.6) for males and females, respectively. The mean LML was 33.7mm (SD=4.3) and 30.8mm (SD=2.6) for males and females, respectively. Thirty nine samples (42.5%) showed LMW measurements within a 10% difference of LML, whereas 50 samples (55%) showed an LMW greater than a 10% difference of LML. Although there were correlations between LML with LMW in males and correlations between weight, LMW with LML in females, the accuracy for the derived linear regression formulas was 3, 9 and 12% respectively. **Conclusion:** The length cannot be predicted accurately from the width of the lateral meniscus. The height, weight, gender and BMI failed to estimate the dimensions of the lateral meniscus. Therefore, it is essential to measure the width and length separately and match it with the allograft with other size measuring methods.

**Date: 2011-09-08**

**Session: Sports Traumatology - Anterior Cruciate Ligament II**

**Time: 16:30 - 18:00**

**Room: Club A**

**Abstract no.: 28588**

**SURGICAL SYNOVECTOMY COMBINED 90Y SYNOVECTOMY  
RECURRENT KNEE SYNOVITIS**

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Radiosynoviorthesis is one of many therapeutic methods for recurrent joint effusions. Retrospectively evaluated surgical synovectomy combined 90Y synovectomy recurrent knee synovitis. Surgical combined RS procedure was used 31 (34 knees) patients. All cases were associated knee joint. One patient (both of knee) had schizophrenia was excluded the study. Remain 30 patients (32 knees, 23 men F and 7 women) were join the study with a mean age of 32 years (range 14–70). After six weeks for the surgical procedures (open or arthroscopic synovectomy) Y90 intraarticular injection was applied. All cases the diagnosis was confirmed arthroscopic biopsy. The most common pathologies were chronic non specific synovitis (15 patients), pigmented villonodular synovitis (7 patients), villonodulary synovitis (5 patients), and lipoma arborescens (5 patients). The mean follow up period 4,15 (1,5-10, 5 years) years. The assessment of the outcome of treatment was based on self-reporting of with a knee effusion, Visual Analogue Scale (VAS). Resting and nocturnal pain also were considered, together and results also were recorded as good, very good, excellent, or nil, as a satisfactory outcome. Average knee effusion, VAS resting, VAS nocturnal, VAS during activity before and after RS combined surgery were 6.65/1.56, 6.18/0.96, 8.0,/2.59, 2.78/0.375 respectively. Satisfactory outcome was excellent 13 (40.6 %), very good 10 (31.2%), good 5 (15.6%) and nil 4 (12.5%). This study shows that radiation synovectomy is a safe and effective therapeutic option in knee recurrent synovitis.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29747**

**GLUCOSAMINE-SULFATE ON FRACTURE HEALING**

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Background: We hypothesized that glucosamine could be used as a therapeutic agent for the treatment of intraarticular fractures to favour cartilage healing. But the affect of glucosamine on fracture healing has not been investigated yet. The aim of this study is to determine whether glucosamine-sulfate has any effects on bone-healing. Methods: A unilateral fracture was created in the tibia of sixty-one female rats. Rats were given no drug or 230mg/kg glucosamine-sulfate daily. Fractures were analyzed at first, second and fourth weeks after creation of fracture. Quantitative measurement for new bone formation and osteoblast lining were determined histologically. Semiquantitative score for fracture healing was used for histomorphometric analyses. Bridging bone formation was assessed radiographically. Results: New bone formation and osteoblast lining were significantly higher in glucosamine-treated group at week 1. Surrounding connective tissue was more cellular, vascular, and the newly formed bone trabecules were in bigger amount in glucosamine-treated group, comparing to control group at week 1 and 4. But radiologically, the control group had better scores than that of the glucosamine-treated group at week 4. Conclusion: These data demonstrate that daily glucosamine sulfate administration accelerate early phase of fracture repair in the mouse tibia, with increased new bone formation and osteoblast lining histologically, but radiologic bone union is not favoured on radiographs.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 28827**

**CARTILAGE REGENERATION: THE PHENOTYPE OF CHONDROCYTES IN TGF- $\beta$ 1 MODIFIED BOVINE ACHILLES TENDON COLLAGEN SPONGE**

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**INTRODUCTION:** A new source of collagen from bovine Achilles tendon was utilized as scaffold material for hyaline-like cartilage tissue regeneration. We hypothesized that recombinant human transforming growth factor- $\beta$ 1 (TGF- $\beta$ 1) bonded collagen type I scaffold could keep phenotypes of chondrocytes for longer culture time. **MATERIALS AND METHODS:** The bovine Achilles tendon collagen was dissolved and replaced into a diameter 12 mm mold, and then bovine Achilles tendon collagen sponge (BATCS) was harvested. BATCS was put into 250 ng/ml of TGF- $\beta$ 1 solution. The chondrocytes were isolated from the articular cartilage of New Zealand White Rabbit. Chondrocytes were cultured and seeded into every BATCS and BATCS-TGF sponge. The cell sponges were cultured for 1, 7 and 14 days in vitro. Then the morphology, proliferation, total collagen, histology and gene expression of chondrocytes in two collagen sponges were determined to demonstrate the cell phenotypes. **RESULTS AND DISCUSSION:** According to the results of DNA content, the similar proliferation of BATCS and BATCS-TGF with time was observed. The higher total collagen in BATCS-TGF than BATC at 14 day was found ( $P < 0.05$ ). The higher gene expression of collagen type II, aggrecan and Sox9 in BATCS-TGF than those in BATCS were determined at 7 day. More proteoglycan deposited in BATCS-TGF than BATCS at 14 day was observed. We demonstrated that BATCS modified by TGF- $\beta$ 1 can maintain phenotype of chondrocytes in vitro. It can feasibly offer new a biomaterial for cartilage regeneration.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29209**

**INTERLEUKIN-1 BETA GENE POLYMORPHISM ASSOCIATED WITH RADIOGRAPHIC KNEE OSTEOARTHRITIS IN CHINESE**

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Recently, the involvement of genetic factors for severe osteoarthritis (OA) has been widely reported. However, a lack of biomarkers that identify patients at risk complicates development of disease-modifying OA drugs. The purpose of this study was to identify polymorphisms at particular risk of osteoarthritis of the knee Chinese people. 481 participants were recruited. All control subjects were over 60 years. Severity of knee OA was evaluated by radiography. Cases (n = 300) were defined if Kellgren & Lawrence grade was 3-4, and controls (n = 181) were those in grade 0-1. Genotyping of these individuals were carried out by Sequenom. Interleukin-1 beta (IL1B) polymorphism was found to be associated with radiographic OA (ROA). Two SNPs (rs1143627 and rs16944) in high linkage disequilibrium (LD) upstream of the IL1B gene were found to be associated with ROA (Chi-square P-values = 0.009294 and 0.01012 respectively). Odds ratio (OR) for A allele of rs1143627 was 1.866, 95% confidence interval (95%CI) 0.2411 - 2.994. OR for G allele of rs16944 was 1.841, 95% CI 1.153 - 2.939. P-values for haplotype test for the SNPs were similar to single SNP test (0.009221), reflecting the high LD between the SNPs. Our results confirm the association of two SNPs in IL1B with ROA. An allele of rs1143627 and G allele of rs16944 were found to have significantly higher allele frequency in ROA cases than controls. The results indicate there is a possible role for IL1B played in the etiology of ROA.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29442**

**PROSPECTS OF USE OF PREPARATIONS ON THE BASIS OF BLOOD SERUM AS SYNOVIAL MEDIUM FOR MEDICAL CORRECTION TRIBOLOGY JOINTS**

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Study of the friction processes in joints of living organisms is of great scientific and practical interest. The most essential experimental results in the domain of arthrology have been obtained with the use of pendulum tribometers. The application of natural articular members as a bearing unit of the pendulum is the best prerequisite for simulation and investigation of the mechanisms of friction and wear of joints. Materials and methods: Natural synovial fluid is injected into an animal joint partitioned beforehand; the pendulum is set in motion and the area of deflection of the pendulum on each side of equilibrium is determined; two adjacent areas are compared and the difference between them is used to determine the friction coefficient in the joint. Then the synovial fluid is removed and replaced with the studied lubricant and measurement procedure is repeated. The difference between results allows comparison of the lubricity of each fluid. Natural synovial fluid and blood serum and its combination with medicinal preparations containing chondroitin sulfate were used for lubrication. Results and discussion: It has been established that medicinal preparations with chondroitin sulfate possess a high lubricating capability in comparison with pure blood serum. When these preparations are administered into blood serum, tribological articular properties improve. The novel experimental complex has shown that the preparations containing chondroitin sulfate produce a powerful biological effect, as well as a high lubricity when used on natural friction surfaces. From tribological viewpoint, the preparations are most useful when used in combination with blood serum.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 28867**

**ALKAPTONURIC OCHRONOSIS – A REVIEW OF 8 CASES**

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Alkaptonuria and its sequelae ochronosis is a rare disease having incidence of 1 in 125000 to 1 in 1 million worldwide. 8 cases (age range 34 yrs to 49 yrs) came with gradually worsening low back ache as initial presentation. One patient had associated severe arthropathy of bilateral hip joints and subcutaneous nodules over both knees and tendoachilles. He had bilateral hip replacement. The second patient had intramedullary calcification of femur. Another patient had associated caries spine at third and fourth lumbar vertebrae and had resolution of symptoms after ATT intake for 18 months. Fourth patient had associated features of hyperthyroidism which was an incidental finding. All the remaining patients had typical features of low back ache and arthritis of large joints. The parents of all patients were non consanguineous and siblings were found to be affected in two patients. Diagnosis was established by typical clinical, radiological findings and biochemical analysis. Initial screening was done by simple biochemical tests on urine; black discoloration with the addition of sodium hydroxide or transient green discoloration with ferric chloride. The diagnosis was confirmed by thin layer chromatography in all patients. MRI was used to establish diagnosis of caries spine. A high likelihood exists of this disease being left unnoticed. Therefore a high index of suspicion and awareness is needed as early management will significantly lessen the morbidity. Our study is unique for presentation with intramedullary calcification in one case, subcutaneous nodules in the other and one patient with associated caries spine.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29641**

**TNF- $\alpha$  INHIBITS MINERALIZATION BUT NOT OSTEOGENIC DIFFERENTIATION INDUCED BY BMP-2**

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Background: The effect of inflammation and cytokines on bone formation has been increasingly evidenced. TNF- $\alpha$  has been reported with conflicting effects on osteogenesis. Dose-dependence hypothesis is likely to be the explanation of the confliction. However, the effect of TNF- $\alpha$  on different phases of osteogenesis has hardly been investigated. Objective: To explore the effect of TNF- $\alpha$  on different phases of osteogenesis. Methods Primary BMSCs and C2C12 cells were used to represent the early stage of osteogenesis while MC3T3-24 osteoblasts were used to represent the late stage of osteogenesis. BMP-2 (100-300 ng/ml) was used to induce osteogenesis. TNF- $\alpha$  (5 ng/ml) was applied simultaneously with BMP-2 in experimental group, compared with non-treatment group. Cell morphology change was observed under microscope. Runx2, Osterix, ALP and osteocalcin mRNA level was detected by RT-PCR. Bone nodule formation was determined by Alizarin Red staining. Results: BMP-2 induced both up-regulation of Runx2, Osterix, ALP and osteocalcin mRNA level, and nodule formation in all three types of cultures. TNF- $\alpha$  significantly reduced osteocalcin mRNA level and nodule formation in BMSCs and C2C12 cells. Also, TNF- $\alpha$  dramatically inhibited nodule formation in MC3T3-24 cells. However, TNF- $\alpha$  only partially inhibited ALP, Osterix and barely inhibited Runx2 expression. Additionally, TNF- $\alpha$  had no effect on BMSCs and C2C12 cells morphological differentiation towards osteoblastic lineage. Conclusion: TNF- $\alpha$  inhibits BMP-2-induced mineralization but not osteogenic differentiation. The molecular mechanism is still under investigation.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29005**

**TRACTION REGENERATION OF PERIPHERAL NERVES TO TREAT SEGMENTAL DEFECTS**

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(PAKISTAN)

Introduction: The repair of large segmental defect in peripheral nerve injuries is very challenging. In this experimental study, the behavior of peripheral nerves was investigated in teddy goats; and the role of mobilization and repair technique was compared with traction regeneration technique to cover the segmental nerve defect. The technique was then used in human beings. Material and Methods: Ten teddy goats were divided in two equal groups A & B. In all goats, 50 mm of peroneal nerve was excised. The microscopic findings of excised segments were taken as Normal Control. In Group A the proximal nerve was mobilized around the ankle and end to end repair performed. In Group B the traction was applied to proximal end with the help of a traction device. Traction was given at 0.25 mm twice a day and desired length was achieved and end to end repair was performed. Three months after repair three specimens of nerves were obtained in both groups (1) 1 cm proximal to suture line (2) through suture line and (3) 1 cm distal to suture line for histological examination under light and electron microscopy for (1) number of nerve fibres (2) diameter of nerve fibres and (3) percentage of neural and fibrous tissue. The Data of Group A & B was compared with control group and each other. Results: There was fall in number and size of nerve fibres and percentage of fibrous tissue in both groups A&B as compared with control. The Comparison of number and size of myelinated and non-myelinated nerve fibres and percentage of nerve to fibrous tissue was slightly better in group A. (Traction Regeneration Group). Conclusion: The Possibility of using Traction Regeneration and Repair technique have been scientifically proven and now is being used in clinical cases by the author.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29670**

**A NOVEL BIODEGRADABLE INJECTABLE POLYCAPROLACTONE-MAGNESIUM HYBRID FOR ORTHOPAEDIC IMPLANTATION**

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Currently developed injectable materials such as calcium-based bone cements have tried to replace the conventional PMMA. However, their brittleness affects their stability and may cause another fracture. Hence, our group has recently fabricated an injectable biodegradable polycaprolactone (PCL) - magnesium (Mg) hybrids to solve the problems. A wide range of mechanical properties was obtained by altering the PCL and Mg composition. And the rapid degradation of Mg was suppressed by the silane coupling agent surface treatment. This study aims to investigate the mechanical and in-vitro properties of the newly developed hybrid. Four types of PCL-Mg hybrids were prepared by incorporating 0.1g and 0.6g Mg beads with and without silane treatment into 1g PCL, respectively. Compression test was conducted to evaluate the mechanical properties of the hybrids. Green fluorescent protein osteoblasts (GFPOB) were cultured on the hybrids for 1 and 3 day(s) to evaluate their cell attachment and proliferation. 1-fold and 3-fold higher compressive moduli were found on the 0.1g and 0.6g Mg-PCL hybrids with and without silane treatment than pure PCL, respectively, indicating that the mechanical property of pure PCL was enhanced by incorporating Mg beads. GFPOBs grew well on the hybrids except the untreated 0.6g Mg-PCL. This was probably due to the large release of Mg which may cause toxic effect. Hence, the results suggested that the silane treatment was able to slow down the degradation of Mg. Further osteogenic properties and in-vivo studies are required for validating this material for clinical use.

**Date: 2011-09-08**

**Session: Research - Miscellaneous I**

**Time: 10:30 - 12:00**

**Room: Club C**

**Abstract no.: 29931**

**MORPHOLOGICAL ANALYSIS OF SYNOVIAL FLUID IN DIAGNOSIS OF OSTEOARTHRITIS**

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**Aim:** to define the possibility of diagnostics of degenerative-dystrophic joint diseases by synovial fluid morphology in normal and pathological conditions. **Materials and methods:** 0.01 ml Synovial fluid was collected during arthroscopic surgeries from 31 patients (age varies from 18-73 yrs) with different orthopaedic pathology of knee joint. All the patients are divided in to 2 groups. In the first group (14 patients), who have no macroscopic changes in cartilage is considered as an absence of osteoarthritis. In the 2nd group (17 patients), who have clear degenerative changes of hyaline cartilage is noted. Synovial fluid is studied under stereomicroscope as a dry drop. Also determined the composition and chemical elements of synovial fluid with different locus (Na, Mg, Si, P, S, Cl, Ca, Zn) by radiospectral microanalysis. **Results:** In the control group, synovial fluid morphologically characterized by the ferny shaped salt structure in the central zone, multiple small rounded formation in the intermediate and marginal zones and network of thin fissures in the peripheral zone. Morphologically, the markers of arthrosis are characterized by spindle-shaped structures in the intermediate zone, presence of marginal amorphous zone and the absence of small rounded formations. According radiospectral microanalysis, multiple increases in calcium and phosphor level is observed in the synovial fluid of patients with degenerative hyaline cartilage disease.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 30138**

**LAMA 4 EXPRESSION IN HUMAN CHONDROCYTES AND REGULATION BY EPIGENETIC MECHANISMS**

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Enhancement of matrix degrading enzymes leads to hypertrophic chondrocytes and loss of extracellular matrix compounds. Interactions of cells, like adhesion or motility can be modulated by integrins like LAMA4. In the last decade researchers are focusing on methylation as a main player in the aging process. We tried to substantiate LAMA4 in degenerating chondrocytes and suspected its expression to be enhanced by demethylation. Methods: We collected 15 probes of human cartilage before undergoing total knee joint replacement. Immunohistochemistry for LAMA4 was performed after immunohistological classification for OA. Four probes were prepared for tissue culture. After digestion, the cells were spread out and half of them were treated with 10 uM of demethylation agent 5-AZA-deoxy-cytidine. After harvesting the cells, RNA was extracted and cDNA was transcribed. Gene expression was performed with the Taqman Realtime PCR Assay. Results: 15 probes with Grade III and IV OA displayed positive staining for LAMA4 especially in hypertrophic clusters of chondrocytes. Lower grades of OA had no intracellular staining for LAMA4. In the 5-AZA-deoxycytidine treated group of grade 0-II OA chondrocytes showed an increase of LAMA4 expression, whereas the group of grade III and IV chondrocytes did not, compared with the untreated cells. Conclusion: Our results lead to the thought that LAMA4 plays a role in hypertrophic chondrocytes and that maybe demethylation is the activating process. Further investigations are needed to detect the function of LAMA4 in cartilage degeneration and to proof, if an epigenetic mechanism is the key for its activation.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 29051**

**TREATMENT OF BIG BONE DEFECTS BY FIX AS STRATEGY**

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Treatment of bone defects caused by removing of pathological processes (mostly tumors) in orthopedic field or caused by primary trauma in traumathology and finally after radical debriding or complications followed by infections, has always been of interest to surgeons and a challenge for the methods and science in general. Possible applications of ceramic allograft can be done on small bone defects with good contact with the local bone and lack of infection. For this reason, the preference is given to microvascular free graft. However, graft harvesting requires the new incision, which lengthens operative time, increase pain and blood loss, and with larger defects, performing several subsequent operations is necessary, which increases the possibility of complications followed by infections. Getting the new good-quality bone by distraction of pineal body as well as by distraction calus after corticotomy and metaphysiary lengthening, has enabled treatment of larger bone defects without autografted cancellous bone with regenerate which is appropriate with its width and density. This has been, certainly, made easier with technical improvements of fixators and dynamic possibilities of structures with area, flexible and extra focal stability. For the last 25 years we've successfully been using compression-distraction method. First 6 years we used Prof G.A. Ilizarov's apparatus, and during the last 19 years, our own external fixator FixAS (Acording Sabic). In this paper we are presenting case of lengthening of lower leg for 28cm by Fix AS, after radical resection of osteosarcoma and extirpation 2/3 of the bone.

**Date: 2011-09-08**  
**Session: Regenerative Orthopaedics**  
**Time: 14:00 - 15:30**  
**Room: Club C**

**Abstract no.: 29198**

**INTRAOPERATIVE CELL SALVAGE IN PRIMARY HIP ARTHROPLASTY**

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Purpose: To determine if intraoperative cell salvage reduces the need for postoperative allogenic blood transfusion, assess any adverse events and its effect on postoperative stay in primary hip arthroplasty. Method: Between February 2009 and August 2010 77 patients underwent primary total hip arthroplasty. Intraoperative cell salvage was used in 38 patients and not used in 39 patients. We prospectively collected data on patient demographics, ASA grade, preoperative and postoperative haematologic features, number of units of packed red cells transfused and the volume of intraoperative reinfused cell salvaged blood was recorded. Total inpatient stay and any post-operative adverse events were recorded. Results: No patients in the cell salvage group required postoperative allogenic blood transfusion compared to three patients (7.7%) in the conventional group. Postoperative haemoglobin drop was lower in the cell salvage group (2.57 vs. 3.3 g/dL). The mean length of postoperative inpatient stay was shorter in the cell salvage group and (5.1 vs. 6.41 days). Three patients in the cell salvage group had postoperative adverse events (1 UTI, 1 hyponatraemia, 1 pseudo-obstruction). Three patients in the conventional group experienced adverse events (2 superficial wound infections, 1 DVT). An average of 361mls of cell salvaged blood was reinfused (110 – 900mls). Conclusions: We have found that the use of intraoperative cell salvage in patients undergoing primary total hip arthroplasty reduces the need for post operative allogenic blood transfusion with no increase in adverse events when compared to conventional measures of blood preserving techniques.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 29752**

**USE OF AUTOLOGOUS DECAL BONE GRAFT IN THE TREATMENT OF NON-UNIONS AND DELAYED-UNIONS OF LONG BONES**

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Though there are many papers describing use of autologous decal bone in the cystic lesions of bone and bone gaps, hardly few reports are available in the literature which describes the use of decal bone for non-union and delayed-union after fractures of long bones. While treating 31 cases of long bone fractures that had non-union or delayed-union, we used autologous decal bone as graft along with plating or nailing. Out of 31 cases 20 had fractures of both radius and ulna, 4 had fracture of radius alone, 2 had fracture of Humerus and 5 had fracture of tibia and fibula. The bone was harvested under aseptic precautions. Most of the time we used the head of femur removed during prosthetic replacement for fracture neck of femur. The donor is tested for all possible diseases including HIV to rule out any chance of disease transmission. It is decalcified using 0.6N HCL for 48 hours and then stored in absolute alcohol in an ordinary refrigerator. Before use the graft was washed with normal saline, and cut into thin matchstick like pieces. Complications included serous discharge in 8 cases for few weeks, infection in 2 cases which required re-operation. Rest 18 cases had good results and their fractures healed in 12 to 16 weeks time. By using this method the complications at the donor site are avoided. Blood loss is lesser. Operation time is also less, as one team prepares the graft while other team opens the fracture site.

**Date: 2011-09-08**  
**Session: Regenerative Orthopaedics**  
**Time: 14:00 - 15:30**  
**Room: Club C**

**Abstract no.: 28395**

**ARTHRODIATASIS FOR MANAGEMENT OF KNEE OSTEOARTHRITIS**

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Introduction: Osteoarthritic disease is the result of mechanical and biological events that destabilize the normal processes of degradation and synthesis of articular cartilage. Because of the progressive nature of the disease, many patients with osteoarthritis of the knee eventually benefit from operative treatment. Purpose: the aim of this study was to evaluate the clinical results of distraction arthroplasty combined with arthroscopic lavage and drilling of cartilage defects for treatment of osteoarthritis of the knee. Patients and methods: nineteen patients (15 females and 4 males, age range, 39 to 65 years) were operated upon. We compared preoperative and postoperative findings. Control group composed of 42 patients treated with arthroscopic procedures only were evaluated for comparison. The follow-up period ranged from 3 to 5 years. Results: clinically, pain and walking capacity improved in most of the patients. Radiologically, joint space widening was noted in nearly all patients. Conclusion: We conclude that treatment using arthrodiatasis device showed improvement in management of osteoarthritic knees in mid-term study.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 27449**

**PLATELET-RICH PLASMA IS MORE EFFECTIVE THAN CORTISONE FOR CHRONIC PLANTAR FASCIITIS**

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Thirty-six patients (16 males 20 females) were prospectively randomized into two study groups. All patients had pre-treatment MRI and ultrasound studies consistent with plantar fasciitis. The first group was treated with a single ultrasound guided injection of 40 mg Depo-Medrol at the injury site and the second group was treated with a single ultrasound guided injection of un-buffered autologous PRP at the injury site. The cortisone group had an average age of 59 (24-74) and had failed 4 months (3-24) of standard non-operative management (rest, heel lifts, PT, NSAIDS, cam walker immobilization, night splinting, local modalities) and had pre-treatment AOFAS scores of 52 (24-60). The PRP group had an average age of 51 (21-67) and had failed 5 months (3-26) of standard non-operative management (rest, heel lifts, PT, NSAIDS, cam walker immobilization, night splinting, local modalities) and had pre-treatment AOFAS scores of 37 (30-56). All patients were then immobilized fully weight bearing in a cam walker for 2 weeks, started on eccentric home exercises and allowed to return to normal activities as tolerated and without brace support. Post-treatment AOFAS scores were PRP 95 (84-100)/cortisone 81(60-90) at 3 months (CI 95%  $p < .0001$ ), PRP 95 (86-100)/cortisone 81 (60-90) at 6 months (CI 95%  $p < .0001$ ), and PRP 94 (86-100)/cortisone 58 (45-77) at 12 months (CI 95%  $p < .0001$ ). This study suggests that platelet rich plasma injection is more effective and durable than cortisone injection for the treatment of severe chronic plantar fasciitis refractory to traditional non-operative management.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 29518**

**CHRONIC LATERAL ELBOW EPICONDYLITIS TREATED WITH EITHER PLATELET RICH PLASMA OR AUTOLOGOUS WHOLE BLOOD. A RANDOMIZED CONTROLLED CLINICAL TRIAL**

Athanassios PAPANIKOLAOU, Christos THANASSAS, George PAPANIMITRIOU, Charalambos CHARALAMBIDES, Ilias PARASKEVOPOULOS

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Chronic lateral elbow epicondylitis is a tendinosis with angiofibroblastic degeneration of the wrist extensors' origin. Healing of this lesion is reported with the use of autologous blood as well as with platelets rich plasma (PRP). A comparative study of these two treatments was conducted in an effort to investigate the possible advantages of PRP. Twenty eight patients were divided equally in two groups, after blocked randomization. Group A treated with a single injection of 3 ml of autologous blood and group B with 3 ml of PRP under ultrasound guidance. A standardized program of eccentric muscle strengthening was followed by all patients in both groups. Evaluation using pain visual analogue scale (VAS) and Liverpool elbow score was performed at six weeks, three months and six months. VAS score improvement was higher in group B at every follow-up interval but statistically significant only at six weeks, when mean improvement was (95% CI) 3.8 points (3.1 to 4.5) in group B (61.47% improvement) and 2.5 points (1.9 to 3.1) in group A (41.6% improvement),  $p < 0.05$ . No statistically significant difference was noted between groups regarding Liverpool elbow score although group B had better outcome at every interval. Regarding pain reduction, PRP treatment seems to be an effective treatment for chronic lateral elbow epicondylitis and superior to autologous blood in the short term.

**Date: 2011-09-08**

**Session: Regenerative Orthopaedics**

**Time: 14:00 - 15:30**

**Room: Club C**

**Abstract no.: 27119**

**A NOVEL METHOD TO TREAT THROMBOANGITIS OBLITERANS BY ILIZAROV RING FIXATOR – A STUDY OF 30 CASES**

Shreenath KULKARNI, Govind KULKARNI, Ruta KULKARNI, Sunil KULKARNI, Vidisha KULKARNI

POST GRADUATE INSTITUTE OF SWASTHIYOG PRATISHTHAN, MIRAJ, CHANDRAPUR (INDIA)

Thromboangitis obliterans is a non-atherosclerotic, segmental occlusive inflammatory disease of small and medium sized vessels. Diagnostic criteria are – Age group between 25 to 45years, prolonged tobacco smoking, claudication and rest pain, absent pulsations, exclusion of autoimmune diseases, artherosclerosis and the investigations of arteriography showing spider legs, or colour Doppler. Material and methods: We studied 30 cases from May 2005 to May 2009. All were males with age group between 25-45 years with prolonged smoking history of on an average 9.5 years. All patients had claudication pain with claudication distance of <30 meters, 8 patients had rest pain, 6 patients had foot ulceration, 4 patients had toe gangrene. Dorsalis pedis and posterior tibial artery were not palpable in any patient. Colour Doppler was done in 10 patients. All patients were encouraged to quit smoking. All patients were operated in the form of longitudinal corticotomy of lateral cortex of tibia and controlled distraction osteogenesis. Distraction is started on 10th post-op day for 20 days with a rate of 1mm/day. Apparatus is removed after 8 to 10 weeks. Results and complications: 25 patients were pain free and satisfied, 1 patient had partial relief of pain. All the ulcers healed. Claudication distance improved dramatically in 25 patients. 4 patients underwent amputation. 2 patients had osteomyelitis of distracted fragment. 6 patients had superficial pin tract infection. Conclusion: Ilizarov ring fixator which causes neoangiogenesis in extremities is a boon to orthopaedic surgeons for treating this difficult and enigmatic disease.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 28327**

**ANALYSIS OF PERFORMANCE METRICS REPORTING IN PAPERS  
COMPARING TREATMENTS OR MATERIALS/DEVICES IN FOUR  
IMPORTANT ORTHOPEDIC JOURNALS FOR THE YEAR 2009**

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Background: Evidence base medicine is now the quality standard for medical research. The Cochrane "levels of evidence" stratify the quality of papers published based on the adequacy of their methodology. This methodology will influence the accuracy and the repeatability/reproducibility of the results and define the value of one technique versus another. However, is this evidence reproducible by the general orthopedist? How can the reader weigh the quality of the surgery performed if no index for surgical quality were used and reported? We propose to look at the quality of performance metrics reporting in papers comparing two or more treatments. Method: Review of papers (1082 papers with 98 papers meeting the inclusion criteria) from four important orthopedic journals published in 2009 revealed that only 32 papers (33%) reported performance metrics – defined as (1) radiographic evidence; (2) training/experience of surgeon(s); and (3) intra-operative measurements. Results: Analysis did not reveal any significant differences in the rate of performance metrics reporting amongst the journals included or amongst the different orthopedic subspecialties topics, however, papers from South Korea and China reported both performance metrics in general and radiographic measurements specifically at a notably higher rate than papers from the western world. Conclusion: The rate of performance metrics reporting in four important American orthopedic journals was poor in 2009 (33%). This might have an impact on the reader's ability to determine the reproducibility of the results published. We propose a new section on performance metrics reporting for editors to include in their instructions for authors.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 28242**

**ALBUMIN COATING FOR PREVENTING BACTERIAL BIOFILM FORMATION ON TITANIUM SURFACES**

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Biomaterial surfaces provide an ideal substrate for bacterial colonization and biofilm formation, resulting in notorious infections following implantation surgery. With no effective treatment once colonization and subsequent biofilm formation has occurred, attention has been paid to decreasing the infection rate by preventing bacterial adhesion and subsequent biofilm formation. We have previously demonstrated that albumin coating dramatically inhibited the adhesion of *Staphylococcus aureus* and *epidermidis* to titanium surfaces (An et al 1996). In this study we evaluated the effect of albumin coating on bacterial biofilm formation to the surface of titanium alloy. An in vitro biofilm formation chamber reported by An et al (2001) was used for the study. Titanium alloy disks with or without albumin coating (bovine albumin cross-linked with carbodiimide by McDowell et al 1995) were incubated in the biofilm chamber for up to 10 days. Samples were taken out of the chamber at day 1, 3 and 10 and evaluated morphologically using confocal microscopy. Adherent bacteria were dislodged and counted using a plate count method. At day 1, 3, and 10, confocal fluorescent microscopy showed samples coated with cross-linked albumin had only small number of adherent bacteria up to day 10, whereas, extensive biofilms were seen on sample surfaces without cross-linked albumin coating. This result was confirmed with quantitative measurements of viable bacteria adhered to the sample surfaces (plate count method) demonstrating a dramatic reduction of adherent bacteria on albumin coated surfaces by 98.97%. This result indicates the feasibility of using albumin coating for prevention of implant infection.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 28131**

**VALUE OF USING CEMENT SPACERS AND ALLOGRAFTS WITH ANTIBIOTIC FOR THE RECONSTRUCTION OF INFECTED BONE DEFECTS**

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Sanatorio Allende - Universidad Católica de Córdoba, Córdoba  
(ARGENTINA)

Introduction: The purpose of this experimental study is to evaluate different types of treatment in open fractures with bone loss, and infected fractures in rabbits. Materials and Methods: Twenty five adult rabbits were included. A mid diaphyseal open fracture of the femur was reproduced in all of them, and was contaminated with Staphylococo Aureus. Group I did not receive treatment (control group). Group II had polymethylmethacrylate with gentamicin and vancomycin intercalated in the fracture area, associated to systemic antibiotics. Group III had polymethylmethacrylate without antibiotic intercalated in the fracture area associated to systemic antibiotics. Group IV had fresh frozen morcialized bone allograft with vancomycin placed in the fracture area associated to systemic antibiotics. Group V had only systemic antibiotic. Histological evaluation of the pseudomembrane formed surrounding the cement was performed. Results: In group I, five positive cultures were found for Staphylococo Aureus. In groups II and IV, all cultures were negative. In group III, there were four negative and one positive culture. In group V two negative and three positive cultures were found. The results obtained at histological evaluation were similar in both groups in which cement was used; showing that the addition of antibiotics to the cement does not alter the histological characteristics of the pseudomembrane. Discussion: When primary open fracture reconstruction is decided, the association of antibiotics to the bone graft help preventing infection; and if staged reconstruction is prioritized, placing a polymethylmethacrylate spacer with antibiotics in the defect during the first stage should be considered.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 29132**

**RELATIONSHIP BETWEEN SAGITTAL BALANCE OF PELVIS AND OSTEOARTHRITIS: PROPOSAL OF A METHOD OF ANALYSIS AND PRELIMINARY RESULTS**

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<sup>2</sup>Centre des Massues, LYON (FRANCE)

The approach of the sagittal hip is made popular since the discovery of the syndrome of Ganz. We conducted a study of the pelvis in patients with hip osteoarthritis to determine whether or not there is relationship between the type of hip, frontal and sagittal pelvic parameters. 68 patients, aged 47-88 years followed for osteoarthritis of the hip at the Massues Hospital (Lyon, France) by two senior surgeons were included in the study. All patients included in this study were at an advanced stage of disease progression, and were offered a total hip replacement. The radiographic work-up included an anteroposterior and lateral views of the pelvis. These images were analyzed with software Optispine and Metros. For each patient we measured the angles in frontal and sagittal images: lateral cover (VCE), acetabular roof horizontality (THE), sharp angle, the pelvic incidence, the sacral slope and the pelvic version, and determined the type of osteoarthritis. The mean pelvic incidence of the series is higher than the general population. We find a significant difference in the type of osteoarthritis for: VCE (29.4° for central medial osteoarthritis versus 29.4° for superior superior pole osteoarthritis) and pelvic incidence (53.3° for central medial osteoarthritis versus 61.9° for superior pole osteoarthritis). This preliminary study shows the frontal parameter already involved in osteoarthritis, but also displays that the pelvic incidence, appears to be involved in the development of osteoarthritis, and in the determination of a type of osteoarthritis.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 29334**

**PERI OPERATIVE HIGH VOLUME LOCAL INFILTRATION OF LOCAL ANAESTHETICS, ADRENALINE AND KETOROLAC DOES NOT INCREASE THE INTRA AND IMMEDIATE POST OPERATIVE BLOOD LOSS AFTER TOTAL HIP REPLACEMENT: A RANDOMISED CONTROLLED STUDY**

Banerjee PURNAJYOTI, Chris MCLEAN, Alexander KIDD  
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Pain after total hip replacement (THR) surgery has been a well-recognised limiting factor affecting post-operative mobilisation and length of hospital stay (LOS). Multi modal high volume local wound infiltration with ropivacaine, adrenaline and Ketorolac, a non steroidal anti inflammatory drug (NSAID) has been introduced in an attempt to reduce opioid requirements postoperatively, but it is unknown if local infiltration with NSAID cause any excess blood loss in the intra operative or immediate post operative period. We evaluated the intra operative and immediate post operative blood loss associated with the use of peri-articular multimodal drug infiltration in THR. We hypothesised that there will be no difference in blood loss amongst patients infiltrated with ketorolac to those who were not. We randomised 86 patients undergoing primary THR to receive either peri-articular intra operative multimodal drug injection with ketorolac (with or without ropivacaine and adrenaline; n=43) or infiltration with ropivacaine (with or without adrenaline; n=43). Blood loss was measured directly per-operatively and indirectly post-operatively after 48 hours of surgery. There were no significant differences in the intra operative and the post operative total blood loss measured at 48 hours between the groups infiltrated with ketorolac (P=0.63 and P=0.72 respectively). We did not find any major difference in the pre and 48 hours post operative haemoglobin levels as well (P=0.56). Our study is the first to report that high volume multi modal wound infiltration including NSAID does not lead to increased blood loss after primary THR.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 29465**

**METASTATIC BONE DISEASE STUDY OF 250 CASES**

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In the last two to three centuries the number of cancer cases is on the rise, due to increase in life expectancy & other factors like genetic, racial etc world wide. Due to longer survival of cancer patients due to advances in chemotherapy, radiotherapy & surgical treatment the no. of patients presenting with metastasis are also on the rise though authenticated data are not available. Bony metastasis does not lead to death but they definitely increase the morbidity of a terminally ill patient this is a study of 250 cases of carcinoma breast the average life after metastasis was 18 months. Patient without visceral metastasis survived longer than with visceral metastasis along with bony metastasis. treatment of metastasis is both by chemo, radiotherapy, hormones, herceptin, surgery along with other medicines. These are bisphosphonates, calcitonin, steroids, nsaid, opiates & vit d. this regime of steroids, bisphosphonates calcitonin & vit. d definitely helps in making the patient comfortable & decreases the osteolytic process & helps in strengthening the bone. Out of 250 cases 30 cases needed surgery for spinal & extraspinal metastasis. 5 patients were for prophylactic fixation for impending fracture, rest for pathological fractures supplemented by bone cement along with chemotherapy & radiotherapy. These are complimentary to each other. patient nursing care improved, self confidence increased. 2 patients died in post operative period. Longest survival is three years the survival varied from 5 weeks to three years. It can be seen that the overall quality of life & survival has definitely improved with these modalities as compared to previous years.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 30038**

**INTERPRETING A HIGH METAL ION RESULTS FOR THE MOM PATIENT**

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<sup>2</sup>Newcastle University, Newcastle (UNITED KINGDOM)

Introduction: We examined the relationship between wear of explanted components, blood/serum CrCo levels and the risk of early failure of hip resurfacing. Methods: We included all resurfaced patients who were three years from the initial blood test for CrCo level. Patients with increased Co (>4µg/L) or pain were examined with ultrasound scans. The presence of a moderate or large effusion was an indication for revision. Results: There were 78 ASR and 71 BHR patients. ROC analysis of the total volumetric wear rates of retrieved MoM hip resurfacings at our centre since 2008 (n=30) and blood/serum Cr/Co analysis showed serum Co to be the most reliable surrogate measure of wear. Therefore patients were arbitrarily split into sub groups according to serum Co (Group 1: <2µg/L (n=62), Group 2: 2 – 5µg/L (45), Group 3: 5 – 10µg/L(17), Group 4: >10µg/L(25)). At three years, one Group 1 patient developed ARMD (ASR). In Group 2, 24% of ASR patients developed ARMD compared to 0 of 24 BHR patients in this group. In Group 3, 45% of ASR patients compared to 20% of BHR patients developed ARMD. In Group 4, 80% of ASR patients and 60% of BHR patients developed ARMD. Conclusions: Metal ion testing is a useful tool to assess the in vivo performance of MoM prosthesis. Patients with increased ion levels are at higher risk of early joint failure however it appears that there is variability in an individual's tolerance to metal debris.

**Date: 2011-09-08**

**Session: Research - Miscellaneous II**

**Time: 16:30 - 18:00**

**Room: Club C**

**Abstract no.: 26945**

**BONE FORMATION INDUCED BY GROWTH FACTORS EMBEDDED INTO THE NANOSTRUCTURED PARTICLES**

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(FRANCE)

Tissue engineering has merged with stem cell biotechnology with development of new sources of transplantable biomaterials for the treatment of bone tissue diseases. Bone defects are expected to benefit from this new biotechnology because of the low self-regenerating capacity of bone matrix secreting cells. The differentiation of stem cells to bone cells using bi-functionalized multilayered particles is presented. The functionalized nanoparticles are composed of poly-glutamic acid (PGA) and poly-L-lysine (PLL) with two bone growth factors (BMP-2 and TGF $\beta$ 1) embedded into the multilayered film. The induction of bone from these bioactive particles incubated with embryonic stem cells was demonstrated in vitro. Herein, we report the unique demonstration of a multilayered particle-based delivery system for inducing bone formation in vivo. This strategy is an alternative approach for in vitro and in vivo bone formation. Strategies using simple chemistry to control complex biological processes would be particularly powerful, as they make production of therapeutic materials simpler and more easily controlled.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29676**

**THE ROLE OF LEG MUSCLE ATROPHY IN THE PATHOGENESIS OF IDIOPATHIC CONGENITAL CLUBFOOT**

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Department of Orthopaedics University of Tor Vergata, Rome (ITALY)

Pathologic and clinical studies on idiopathic congenital clubfoot have shown atrophy and shortening of the leg muscles, with both triceps surae and tibialis posterior being mostly affected. In the present study, we investigate whether the atrophy of the leg muscles is primitive or secondary to the treatment of the deformity. We studied the histologic cross sections of the legs of two fetuses with unilateral congenital clubfoot spontaneously aborted at 13 and 19 weeks of gestation respectively and the transverse MRI scans of both legs in 24 patients with unilateral congenital clubfoot (8 babies, 8 children and 8 adults), using a computer program (AutoCAD 2002 LT). Marked atrophy of the leg muscles on the clubfoot side was found in both fetuses and untreated newborns with a percentage ratio of muscular tissue volume between the normal and affected leg of 1.3 and 1.5, respectively. Leg muscle atrophy increased with growth, and the percentage ratio of muscular tissue volume between the normal and affected leg was 1.8 and 2 in treated children and adults, respectively. Fatty tissue tended to increase relatively from birth to adulthood. We demonstrate that the leg muscular atrophy in congenital clubfoot is primitive and increases with the patient's age; we believe that an impairment of the mechanism of muscle growth could be one of the possible pathogenic factors of congenital clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 28517**

**EVIDENCE THAT PITX1 HAPLOINSUFFICIENCY CAUSES CLUBFOOT IN HUMANS AND MICE**

Christina GURNETT, Matthew DOBBS, David ALVARADO, Kevin MCCALL  
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Purpose: Clubfoot is a common musculoskeletal disorder affecting 1 in 1000 individuals. We recently identified a mutation in the bicoid homeodomain transcription factor PITX1 in a family with a range of lower extremity abnormalities, including clubfoot. Because the E130K mutation abolished the ability of PITX1 to transactivate a luciferase reporter, we hypothesized that additional cases of clubfoot could result from PITX1 haploinsufficiency. Methods: (1) Genome-wide copy number analysis was performed on 40 isolated clubfoot patients using the Affymetrix 6.0 array. (2) Segregation analysis of identified copy number variants was performed in families with multiple affected members. (3) Chromatin-immunoprecipitation-sequencing (ChIP-seq) of E12.5 mouse limb buds was performed to identify downstream targets of PITX1. Results: We identified a 241 kb microdeletion of chromosome 5 involving 124 markers and 4 genes, including PITX1, in one patient. The patient's mother and grandmother also had isolated clubfoot, and were found to have the chromosome 5 microdeletion, demonstrating segregation over three generations. In breeding the Pitx1 knockout mice in our laboratory, we noticed that some of the Pitx1  $-/+$  mice had clubfoot. The Pitx1  $-/+$  mice were previously reported to be normal and Pitx1  $-/-$  mice shown to have severe limb shortening but no clubfoot. Clubfoot was present in 20 of 232 Pitx1  $-/+$  mice. To understand the mechanism by which PITX1 haploinsufficiency causes clubfoot, we performed ChIP-seq on E12.5 embryo hindlimb buds using an antibody to PITX1 and a control IgG antibody. We identified more than 300 potential direct transcriptional targets of PITX1 in the developing hindlimb that suggest a possible mechanism by which alterations of this gene cause clubfoot. Conclusion: Haploinsufficiency of the bicoid homeodomain transcription factor PITX1 causes isolated idiopathic clubfoot in humans and mice. Significance: The Pitx1 haploinsufficient mouse represents the first genetic mouse model for clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29614**

**TREATMENT OF IDIOPATHIC CONGENITAL CLUBFOOT: THE EXPERIENCE OF THE ITALIAN GROUP FOR PROMOTION AND PROTECTION OF PONSETI METHOD (IGPPPM)**

Ernesto IPPOLITO<sup>1</sup>, Ignazio D'ADDETTA<sup>2</sup>, Pasquale FARSETTI<sup>1</sup>, Cosimo GIGANTE<sup>3</sup>, Sergio MONFORTE<sup>4</sup>, Gaetano PAGNOTTA<sup>5</sup>, Vito PAVONE<sup>6</sup>, Roberto SCHIAVON<sup>7</sup>

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Ponseti method for treatment of idiopathic congenital clubfoot has proven to be worldwide successful. In September 2009 was founded in Palermo the Italian Group for Promotion and Protection of Ponseti Method (IGPPPM). The aim of the present study is to report the experience of IGPPPM in a multicenter group of patients treated for idiopathic congenital clubfoot. Two-thousand-two-hundred-seven patients affected by idiopathic congenital clubfoot (3479 feet) were treated according to the Ponseti method, in 7 Paediatric Orthopaedics departments (University-Hospital of Catania, Giovanni XXIII Hospital - Bari, University-Hospital of Rome Tor Vergata, Pediatric Orthopaedic Unit of Padua, V. Buzzi Hospital - Milan, Bambino Gesù Hospital – Rome, San Bortolo Hospital – Vicenza), between 2001 and 2009. Age at treatment, gender, side, severity of initial deformity evaluated according to Manes classification, age at tenotomy, compliance with brace, and number of recurrence were recorded. The mean follow up was 49 months (range 7 to 108 months). The age at the beginning of treatment ranged from 4 days to 5 weeks; 1427 patients were males and 780 females (M:F = 1,82); 1272 cases were bilateral. According to Manes Classification, 16.7% of the patients were type I, 47.0% type II, and 36.3% type III. Subcutaneous tenotomy was performed in 1582 patients (86.0%). Recurrence was observed in 239 children (12.6%). Poor compliance with the Denis Browne splint seems to be the main cause of failure. The experience of IGPPPM confirmed the effectiveness of the Ponseti method for treatment of idiopathic congenital clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 28502**

**FAMILIAL ISOLATED CLUBFOOT IS ASSOCIATED WITH RECURRENT CHROMOSOME 17Q23.1Q23.2 MIRCRODUPLICATIONS CONTAINING TBX4**

Christina GURNETT, David ALVARADO, Hyuliya AFEROL, Kevin MCCALL, Jason HUANG, Matthew TECHY, Buchan JILLIAN, Janet CADY, Patrick GONZALES, Matthew DOBBS

Washington University School of Medicine, Saint Louis (UNITED STATES)

**Purpose:** Clubfoot is a common musculoskeletal birth defect for which few causative genes have been identified. The purpose of this study was to identify the genes responsible for isolated familial clubfoot. **Methods:** In the present study, we identified 66 isolated idiopathic clubfoot probands with at least one affected first-degree relative. Individuals were considered to have isolated idiopathic clubfoot only in the absence of additional congenital anomalies (i.e. heart defect, hypospadias) or known underlying etiology (i.e. arthrogyrosis, myelomeningocele, and myopathy). Probands were screened for genomic copy number variants (CNVs) with the Affymetrix Genome-wide Human SNP Array 6.0. **Results:** A recurrent chromosome 17q23.1q23.2 microduplication was identified in 3 of 66 probands with familial isolated clubfoot (Fig. 1). The chromosome 17q23.1q23.2 microduplication segregated with autosomal dominant clubfoot in all three families but with reduced penetrance. Mild short stature was common and one female had developmental hip dysplasia. Subtle skeletal abnormalities consisted of broad and shortened metatarsals and calcanei, small distal tibial epiphyses, and thickened ischia (Fig. 2). Several skeletal features were opposite to those described in the reciprocal chromosome 17q23.1q23.2 microdeletion syndrome associated with developmental delay, cardiac and limb abnormalities. **Conclusion:** In this study, we provide evidence supporting a role for a recurrent chromosome 17q23.1q23.2 microduplication in the etiology of isolated clubfoot. Since few genes have previously been implicated in clubfoot pathogenesis, this discovery represents the most common cause of isolated clubfoot identified to date. **Significance:** The chromosome 17q23.1q23.2 region contains the T-box transcription factor TBX4, a likely target of the bicoid-related transcription factor PITX1 previously implicated in clubfoot etiology. Our result suggests that this chromosome 17q23.1q23.2 microduplication is a relatively common cause of familial isolated clubfoot, and provides strong evidence linking clubfoot etiology to abnormal early limb development.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 28498**

**EXOME SEQUENCING IDENTIFIES MYH3 MUTATION IN FAMILY WITH DISTAL ARTHROGRYPOSIS TYPE I**

Matthew DOBBS, David ALVARADO, Jillian BUCHAN, Christina GURNETT  
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Background: Few genes responsible for distal arthrogryposis type 1 are known although sarcomeric genes have been implicated in many types of distal arthrogryposis. Cost-effective sequencing methods are now available to interrogate all genes in the human genome for the purpose of establishing the genetic basis of musculoskeletal disorders such as distal arthrogryposis. Methods: A multi-generational family with distal arthrogryposis type 1 characterized by clubfoot and mild hand contractures was identified and exome sequencing was performed on DNA from the proband. Linkage analysis was used to confirm segregation of genetic variants. Results: Exome sequencing identified 573 novel variants that were not present in control databases. A missense mutation in MYH3 (myosin heavy chain) causing a F437I amino acid substitution was identified that segregated with disease in this family. Linkage analysis confirmed that this MYH3 mutation was the only exome variant common to all 6 affected individuals. Conclusions: MYH3 gene mutations cause a variety of human diseases associated with distal contractures, including distal arthrogryposis type 1 as shown here. Because distinction between some types of distal arthrogryposis and isolated clubfoot may be difficult clinically, genetic testing may be supportive. Clinical relevance: Exome sequencing is a useful and cost-effective method to discover causative genetic mutations, though extended family data may be needed to confirm the importance of the hundreds of identified variants.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29155**

**KINETIC ANALYSIS OF THE HIP JOINT IN CHILDREN WITH IDIOPATHIC CLUBFOOT**

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This study evaluates the differences of kinetic parameters of the hip during walking in children with operated unilateral clubfeet compared to the contralateral side and to normal children. Ten children (6-9y) with operated mild or moderate idiopathic clubfeet with 5-8y average follow-up were compared to 20 matching normal children. 3-D Gait analysis was carried out and the data collected by the "Opto-electronic motion analysis system with a force plate unit". Qualisys Motion Capture System was used to measure the excursions of the ankle, knee and hip joints & with a force plate unit to measure the Ground reaction force in them during gait. Results: 1-There was a significant reduction of the extension moment of the affected side when compared to the non-affected side and to the normal group. 2-There was a significant increase of the internal rotation moment of the affected side when compared with both the non-affected side and the normal children. There was also a significant increase in that moment in the non-affected side of the clubfoot group when compared to the normal group. We concluded that there are compensatory mechanisms occurring in the hip joint, of the operated side, especially in extension and internal rotation moments. The evaluation of the kinetic parameters of these hips may help to define the functional deficits and prescribe novel rehabilitation techniques to improve their outcome. We may add that the recent shift to conservative methods may also prove to be logical since surgery might have long term detrimental effects on other joints.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 28389**

**PREDICTION OF THE CLUBFOOT PROGNOSIS BY THE RADIOGRAPH AT NEONATE**

Shinichi SATSUMA, Daisuke KOBAYASHI, Maki KINUGASA

Kobe Children's Hospital, KObe (JAPAN)

The purpose of this study is to verify that the relationship between the 1st metatarsus and the ossification center of talus on the radiograph at neonate influenced the prognosis of idiopathic clubfoot. Forty patients with unilateral idiopathic clubfoot treated by Ponseti method were retrospectively examined. Anteroposterior radiographs of the foot were taken at the average age of 15 days (range; 1-79 days) after birth. The length of the 1st metatarsus (LM1) and the ossification center of talus (LOT) of both affected and unaffected feet were measured on the radiographs. The proportion of LOT to LM1 (POTM1) was calculated in each foot. All patients, whose average age at final follow-up were 51 months (range; 9-94 months), were classified into two groups; six patients who were operated for residual deformity or relapse by the time of final follow-up (the operated group), the other 34 patients without any operations (the conservative group). We compared POTM1 between two groups. As results, there were no differences between the average of the LM1 in the affected and that in the unaffected feet (12.7 and 12.9mm respectively). The average of the LOT in the affected feet was significantly shorter than that in the unaffected feet (7.1 and 9.6mm respectively). The average of the POTM1 in the operated group was significantly smaller than that in the conservative group (0.47 and 0.57 respectively). We concluded that the POTM1 could prognose the future needs of the corrective surgery for both unilateral and bilateral idiopathic clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 28621**

**RELIABILITY OF THE DIMEGLIO CLASSIFICATION FOR CLUBFOOT**

Armando TORRES-GOMEZ<sup>1</sup>, Nelson CASSIS<sup>2</sup>, Gilberto RIOS<sup>2</sup>, Ricardo VELUTINI<sup>1</sup>, Juan-Carlos FALCON<sup>3</sup>

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**Purpose:** To report the reliability of the Dimeglio system for congenital clubfoot in terms of intraclass correlation coefficients (ICCs) considering three raters during the process. **Introduction:** Dimeglio's classification for clubfoot has become the most widely used system for grading this deformity. We sought to report the reliability of the Dimeglio system for congenital clubfoot in terms of intraclass correlation coefficients (ICCs) considering three raters during the process and the homogeneity of the scale in terms of Cronbach's alpha. **Methods:** Prolective observational study, with randomly selected patients and three fixed raters (observers) to assess the reliability and homogeneity of Dimeglio's classification for clubfoot. From March 31 2009 to June 31 2010 144 feet (subjects) were evaluated. Sample size was calculated using Bonnet's formula; based upon obtained reliabilities, the number of raters (3), the desired width of the confidence interval ( $w = 0.08$ ) and statistical significance ( $Z\text{-alpha} = 1.96$ ) for a two-tailed alpha level of 0.05 a sample of 130 subjects was obtained. Sampling was achieved with stratified randomization to obtain a platykurtic distribution of scores ( $k = -0.38$ ). **Statistical Analysis:** We used a two-way random effects Analysis of Variance (ANOVA) mixed effects model; mean squares were used to calculate the ICCs: ICC2 (C,1) for consistency and ICC2 (A,1) for agreement. We calculated all the possible split-half reliabilities of the scale (internal consistency and homogeneity) in terms of Cronbach's alpha, for all the observations and for each observer. **Results:** The ICCs (95% CI) for consistency ICC2 (C,1) was 0.8554 (0.8087-0.9022,  $p=0.013$ ) corresponding to the intra-rater reliability. The ICC (A,1) was 0.8521 (0.8049-0.8993,  $p=0.098$ ). Cronbach's alpha resulted in 0.8149, which denoted homogeneity of Dimeglio's classification. **Discussion:** Dimeglio's classification is reliable.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29736**

**EVALUATION OF THE ACCURACY OF THE I-BUTTON FOR MEASURING PATIENT COMPLIANCE WITH BRACE WEAR IN IDIOPATHIC CLUBFOOT**

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Clubfoot or Congenital Talipes Equino Varus deformity affects one in every 1,000 live births. Ponsetti technique involves repeated manipulations and serial casting followed by bracing for a 2 year period and is still the widely accepted and successful management technique. The most important cause for failure after the Ponsetti technique is failure of compliance with brace wear. It is extremely difficult to monitor the duration of brace wear in the patient's home environment. The aim of the study was to evaluate the accuracy of using the Thermocon I -Button as a method for objective assessment of compliance with brace use. The study was a prospective method comparison study. The I -Button was used for collecting the data of time and temperature recessed within the insole. The time the brace was applied and removed was also manually recorded by one observer. The data was assessed for the limits of agreement using the Bland Altman Plot. There were 34 patients. The difference between the two sets of data is likely to differ by less than 8 minutes and this deviation could be in either direction. The 95% confidence intervals are - 6.64 to 8.15. The agreement between the two sets of data was found to be statistically significant. This study proves that the I Button temperature sensor can precisely identify when the brace is in use and when it is taken off and therefore this sensor can be used to accurately evaluate patient compliance with brace wear.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29065**

**THE ACCESSORY SOLEUS MUSCLE AS A CAUSE OF PERSISTENT EQUINUS IN CLUBFEET TREATED BY THE PONSETI METHOD: A REPORT OF 16 CASES**

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Encountering an accessory soleus muscle in children undergoing surgical release for clubfeet is not a frequent occurrence and only a few reports could be traced in literature. The purpose of this study is to report a series of 20 observations in 16 patients with idiopathic clubfeet treated by the Ponseti technique where the accessory soleus muscle was responsible in preventing full ankle dorsiflexion after Achilles tendon tenotomy. Following its division, adequate dorsiflexion could be achieved. To our knowledge this is the largest series published to date on this topic. In addition, we discuss the frequency and epidemiology, as well as the anatomy of the accessory soleus muscle, its innervation and embryology. The mean age at presentation was 40.7 days (range: 6 to 210 days). The accessory soleus tendon was observed in 6 right and 6 left feet, 4 feet had bilateral involvement. The average ankle dorsiflexion after complete tendo Achilles tenotomy was 2.5° (SD: 6.38), and after sectioning of the accessory soleus tendon, it was 19.5° (SD: 5.59) ( $p < 0.001$ ). Correction was obtained in all patients, after 3 to 10 casts. In conclusion, the recognition of an accessory soleus muscle, in patients with clubfeet, is important, and its release is necessary to fully correct the deformity. Failure to recognize this muscle may lead to persistent hindfoot deformity.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 30052**

**ASSESSMENT OF THE TALO-NAVICULAR JOINT BY ULTRASOUND DURING PONSETI MANAGEMENT OF CLUBFEET**

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**BACKGROUND:** It is well known that proper correction of the displacement in the talo-navicular joint and maintenance of the corrected position is crucial in the treatment of clubfeet. **MATERIAL:** In an ongoing study we follow more than 30 children with clubfeet by repeated ultrasound examinations from the neonatal period to the end of bracing treatment at the age of four years. **METHODS:** Our original protocol includes the medial malleolus-navicular distance and a semi quantitative grading of the navicular luxation. To improve the assessment of the navicular displacement we have added to our measurement protocol the perpendicular distance from the most medial edge of the navicular to the tangent of the medial side of the talus. Negative values means that the navicular edge is medial to the tangent and positive values that it is lateral to the tangent. In the control group the values are close to zero when the feet are in neutral position. **RESULTS:** When the clubfeet were clinically enough corrected to discontinue manipulation and casting and it was time to continue the treatment by foot-abduction-orthosis (modified Dennis Browne) the navicular was still significantly more medially positioned than in normal feet. This displacement gradually decreased during the bracing period. **CONCLUSION:** At the end of the manipulation and casting, there still remains a medial displacement of the navicular bone which gradually decreases during the bracing period. This emphasizes the importance to fulfil the bracing treatment even if the foot looks normal.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 29160**

**CLUBFOOT SEVERITY CHANGES DURING THE FIRST WEEK OF LIFE**

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**Purpose:** To evaluate the clubfoot severity on the first and seventh days of life. **Materials & Method:** This study reviews 28 neonates with 40 moderate and severe clubfeet (initial equinus was 95 degrees or more, initial Pirani score was 2,0 points or more). Patients with arthrogryptic clubfeet and other syndromes were not included. Age at presentation ranged from 10 min to 24 hours. Clubfeet were assessed on the first and seventh days of life using Pirani score. Foot dorsiflexion angle in maximum correction was carefully calculated. All assessments were done by senior author. No treatment was performed in patients of this group until the seventh day of their life. **Results:** Clubfoot assessment on the first day of life was 2,0 – 3,5 points according to the Pirani scale ( mean 2,87 ), foot dorsiflexion angle was 95 – 118 degrees (mean 106,8). Clubfoot assessment on the seventh day of life was 3,0 – 5,0 points according to the Pirani scale ( mean 4,07), foot dorsiflexion angle was 101-130 degrees (mean 116,3). Total Pirani score increased in each foot during the first week of life, additional points varied from 0,5 to 1,5 ( mean 1,2). Foot dorsiflexion angle increased from 6 to 12 degrees in every foot (mean 9,5). **Conclusions:** Clubfoot severity was progressing in all assessed neonatal feet during the first week of life. It is optimal to start the clubfoot treatment in the first days of life.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Clubfoot - Basic Science & Clinical Research**

**Time: 08:00 - 09:30**

**Room: Club D**

**Abstract no.: 30211**

**ULTRASOUND ASSESSMENT OF CLUBFOOT IN INFANTS**

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Purpose: Clubfoot is a relatively common musculoskeletal disorder. It is characterised by equinus and varus of the hindfoot, adduction of the forefoot, supinatus plus or less cavus. The purpose of this study was to establish the usefulness of US in clinical practice, to determine the value of the different US items analyzed and to compare the talo-calcaneal angle measured by US and plain films. Material and Methods: Using a linear high frequency transducer, the US was performed along medial, dorsal, posterior and lateral borders of the foot. The talo-navicular relationship was established and quantified from medial and dorsal approaches. Measurement of the distance between the navicular and the medial malleolus was evaluated. The talo-calcaneal divergence was assessed in order to correlate with angle obtained on plain films. The tibio-talo-calcaneal axis in dorsiflexion of the foot was evaluated by a posterior approach. The relationship between the cuboid and the calcaneus was established and quantified with examination of the lateral border of the foot. Results: 110 patients with idiopathic clubfoot were assessed by US (73% male; mean age at first exam 11.5 weeks; 66% bilateral involvement). Patients with neuromuscular disorders or other syndromes were excluded. Morphological changes of the talo-navicular joint, the distance between the medial malleolus and the navicular, and the talo-calcaneal relationship are good indicators of the clinical severity. There is good agreement between US and plain films measurement of the talo-calcaneal angle. Conclusion: US is an effective technique to assess and quantify the deformity in clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 29114**

**IMPLEMENTING NATIONAL PONSETI CLUBFOOT PROGRAMS IN UNDER-RESOURCED NATIONS: FACTORS FOR SUCCESS**

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Purpose: To evaluate the factors resulting in the successful implementation of country-wide training and service delivery programs for early intervention of clubfoot deformity by the Ponseti method in under-resourced developing nations. Methods: 10 developing nations in sub-Saharan Africa, Latin America, and Asia were selected for simultaneous introduction of Ponseti clubfoot training and service delivery in a distributed model following public health principles. The targets over two years were to establish at least 1 referral clubfoot clinic, train 20 personnel and treat 250 babies in each country. Independent quantitative and qualitative review was undertaken after 2 years. Factors resulting in relative degrees of success were analyzed. Results: 112 clubfoot clinics were established, 634 practitioners were trained, and 7705 babies were treated in the two year span of the project. Practitioners, managers and caregivers applauded the program and desired continuing support. Identified factors resulting in more successful programs included: support from the national Ministry of Health and implementation within national health structures, an enthusiastic and committed country leader, a country coordinating administrator, support for clinic database management and support/supervision, clinic social workers, and subsidy support for foot abduction braces. Conclusion: Country-wide programs for the treatment of babies with congenital clubfoot can be successfully implemented if appropriate health systems administration is followed. Overall this project exceeded targets almost threefold and the methodology was found to be applicable across continents and cultures. Significance: The project highlights the value of a public health approach to early intervention and orthopedic care for clubfoot deformity.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 29809**

**PONSETI CLUBFOOT TREATMENT BY ORTHOPAEDIC OFFICERS: PROSPECTIVE COHORT STUDY IN UGANDA**

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<sup>1</sup>University of British Columbia, Vancouver (CANADA), <sup>2</sup>Makerere University, Kampala (UGANDA)

Background: The Uganda Sustainable Clubfoot Care Project's aim is to reduce consequences of disability from neglected clubfoot by institutionalizing the Ponseti clubfoot treatment throughout the Uganda Healthcare System so as to provide universal and effective Ponseti clubfoot treatment. This study reports characteristics of the first 370 infants and children that were identified in seven clinics in Uganda between January 2006 and December 2007 and their outcomes to end of casting. Methods: This is a multicenter prospective cohort study. Orthopaedic paramedical (orthopaedic officers) provided Ponseti treatment under the supervision of an orthopedic or general surgeon. The diagnosis was made clinically. Outcome criteria were Pirani scores noted at each visit. Results: The majority of children seen were under 14 weeks of age. There were 111 girls and 259 boys for an M:F ratio of 2.3:1. Half (51%) of all cases were bilateral congenital idiopathic clubfoot, 14% were left only, 23% right only, 6% were positional, and 6% were syndromic. The average Pirani Score at diagnosis was 5.4 falling to less than 2 by treatment six. The majority of children were corrected by the sixth treatment. There were no serious complications but minor complications occurred at the rate of 19/1000 manipulation and castings, most being associated with plaster burns. The adherence rate to end of casting was 83%. Conclusions: The diagnosis and management of clubfoot deformities by orthopedic officers is a viable management method in Uganda. Level of Evidence: Level1, prognostic study.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 30029**

**LESSONS AND RESULTS FROM THE FIRST THREE YEARS OF THE MALAWI NATIONAL CLUBFOOT PROGRAM**

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The Malawi National Clubfoot Program was launched in November 2007. It represents a collaborative initiative of several Governmental and non-governmental organisations including CURE Clubfoot Worldwide, Malawi Ministry of Health and CBM (Christian Blind Mission). In the first three years of operation we have held training courses for 178 Clinicians in the Ponseti Method, set up 26 national treatment centers and trained 82 counselors. Over 2000 children with clubfeet have been treated. The demographics of these children differ markedly from those of developed countries with approximately three quarters of cases being bilateral cases and only one quarter unilateral. The ratio of males to females was approximately 3:1. Achilles tenotomy rates nationally were only 45% in the initial months and have subsequently improved to over 80%. So far we have lost 107 children to follow-up and 30 have failed treatment and required surgery. We have learned many valuable lessons on the institution and running of a national program, on improvements in training techniques and the need for effective counseling in delivering quality care to children with clubfeet in this region of Africa. Some of these lessons are discussed in this paper and we believe are also applicable to other regions of the world. We believe working collaboratively with all stake holders and learning from the experience of other projects are important in running a successful national program. Training clinicians alone in the Ponseti method is ineffective in delivering quality Ponseti care to children with clubfeet in a country such as Malawi.

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**Room: Club D**

**Abstract no.: 29377**

**UNDERSTANDING THE BARRIERS FOR EFFECTIVE TREATMENT OF CLUBFOOT BY THE PONSETI METHOD: AN INDIAN PERSPECTIVE**

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Introduction: The utility of the Ponseti method in the Indian scenario with its unique socio-economic pattern has still not been adequately proved. The purpose of this paper is to shed some light on the barriers for effective Ponseti treatment of clubfoot in India. Materials and methods: The database of two groups of patients with CTEV treated over a 3 year period at two different institutes (one government set-up and the other – a private institute) was analysed using prospectively gathered data of 58 patients (99 clubfeet) and 99 patients (153 clubfeet). All patients were treated by the Ponseti method and were compared on the basis of follow-up rate, compliance with brace wear, rate of recurrence and its relation to socio-economic status and educational status of the parents. Results: Though there were marked differences in the socio-economic and educational levels of parents in both groups, the results were not significantly different, with no drop-outs during the treatment phase in both groups. The number of casts required for completion of therapy as well as the failure rates was not statistically different. The follow-up was very poor (<30%) in the government set-up, the probable reasons being poor educational levels of the caregivers, amount of money and time required to travel for follow-up and more tolerance of people towards minor deformities. Thus, until these social barriers are overcome, the Ponseti method may have a high relapse rate in India and a gradual disillusionment might set in, despite its promise of a very high success rate.

**Date: 2011-09-08**

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**Abstract no.: 28944**

**A MANAGEMENT PROTOCOL TO MINIMIZE THE SURGICAL INTERVENTION IN LATE NEGLECTED CLUBFOOT (ABOVE 5 YEARS)**

**Sandeep SHRIVASTAVA**

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Late Neglected clubfoot (presenting after the age of 5 years) require extensive surgeries involving both soft tissues and bones. This study is undertaken with the objective that if a protocol of serial manipulations prior to surgery can minimize the surgical Intervention and achieve correction in the late presenting neglected CETV foot. Between 2009-2010, 27 feet were recruited .Each underwent clinical and radiological evaluation; and planning of surgical corrections by an independent orthopaedic consultant. Subsequently, instead of planned surgical correction they were subjected to the protocol of undergoing serial casting based on Ponsetti s principle and sequence. The major difference being the duration, which was shortened to 3 days. The end point being no further correction possible. The residual deformities were than subjected to the necessary surgical correction, by the author. 23 such feet are finally analyzed for the corrections achieved, and surgical procedures avoided. The study depicts the usefulness of such a protocol before embarking on surgical intervention in late presenting neglected CTEV.

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**Abstract no.: 29566**

**THE UGANDA SUSTAINABLE CLUBFOOT CARE PROJECT (USCCP)**

Shafique PIRANI<sup>1</sup>, Richard MATHIAS<sup>1</sup>, Edward NADDUMBA<sup>2</sup>

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Background/Method: Widespread access to effective Ponseti clubfoot treatment may considerably reduce the incidence of neglected clubfeet. USCCP was established to build capacity, using public health principles, for: 1. Ponseti clubfoot treatment within Ugandan health systems, and 2. Ponseti clubfoot teaching within Ugandan schools of healthcare. Its purpose is to make available a universal, effective, efficient, and safe treatment of the congenital clubfoot deformity in Uganda, in a sustainable fashion. Results: The Ministry of Health approved the Ponseti method to treat the congenital clubfoot deformity in all its hospitals using a model of paramedical care delivery. 2171 children have received treatment at 36 clubfoot clinics across Uganda's four regions. 1081 health care professionals (147 orthopedic officers, 26 orthopedic technicians, 815 nurses and 12 surgeons) have benefited from training in the Ponseti method. Together, the project and the Ministry have run a paper based awareness campaign to spread the message that clubfoot can be treated and that treatment is free. The Project and Uganda's medical/paramedical schools developed a comprehensive Ponseti Method training module for healthcare students, which is now being used in 80% of the Uganda schools of healthcare. 2705 students (638 medical students, 41 residents, 659 student orthopaedic officers, 171 student orthopaedic technicians and 1196 student nurses) have benefited. Conclusion: USCCP has used public health principles to build capacity for Ponseti clubfoot care & for Ponseti clubfoot teaching, thereby improving access to timely and effective care for children born with clubfeet.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 28369**

**TREATMENT OF SEVERE TALIPES EQUINOVARUS IN CHILDREN**

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The objective of the study was to assess the effectiveness of combined treatment of the severe talipes equinovarus in children. Material of the study included 32 patients (52 feet) with severe talipes equinovarus. Etiology of the deformity included relapsing clubfeet after primary surgical treatment (8 children), neurogenic forms (6 children with spina bifida, diastematomyelia, peroneal and ischiadicus nerves palsy) arthrogriposis (10 children) and skeletal dysplasias (8 children with diastrophic dwarfism and multiple epiphyseal dyaplasia). The complex protocol of treatment included serial casting with plaster above-knee casts according to the principles of Ponseti method. Achilles tenotomy was performed in 50% of children on the early stage to facilitate correction process. The second part of protocol was posteromedial release which was accomplished by release and realignment of the first cuneiform and tibialis anterior transfer. This maneuver gives the possibility to adopt the axes of tarsal and metatarsal bones and achieve normal relations between hindfoot and forefoot without corrective osteotomies. The results demonstrated, that in 70% of patients this approach gives stable long-lasting correction and these children were not underwent additional surgical procedures. In 30% of children during follow-up period of 4 years additional surgical correction with osteotomies and/or Ilizarov frame was performed. As a conclusion, two-stage approach in treatment of severe talipes equinovarus in children gives better results with minimal rate of surgical complications.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 28943**

**PREDICTIVE FACTORS OF EARLY RECURRENCE DURING CLUBFOOT TREATMENT WITH THE PONSETI METHOD: DOES TEMPERAMENT MATTER?**

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Relapse is a well recognized phenomenon of clubfoot treatment. We sought to investigate the effects of clubfoot severity, demographic factors, orthotic compliance and two previously uninvestigated variables, child temperament and parental stress, on early recurrence of an idiopathic clubfoot deformity during the Ponseti method. Nineteen patients (28 clubfeet) received initial casts at a mean age of 17 days and were followed for a mean 32 (22-48) months. At the time of enrollment, clubfoot severity was measured by the Pirani score; child temperament and parental stress were assessed by the Unadaptability domain of the ICQ and the Parental Distress score of the PSI-SF (higher scores indicate a less adaptable temperament and more stress). Parental compliance was gathered 1-3 months after initiating orthoses. Twelve feet demonstrated recurrence requiring re-casting; 4 feet required further operative procedures including 2 hindfoot releases for atypical clubfeet. Univariate analyses demonstrated the recurrence group had a larger number of pre-tenotomy casts (8.0 versus 5.6,  $p=.048$ ), higher Pirani scores (5.3 versus 4.3,  $p=.043$ ), lower compliance (16.4 versus 21.5 hours/day,  $p=.020$ ), lower Unadaptability scores (8.3 vs. 11.4,  $p=.042$ ), lower Parental Distress scores (18.8 versus 22.3,  $p=.028$ ), lower income ( $< \$30,000/\text{year}$ ,  $p=.019$ ) and were more likely to be non-white ( $p<.001$ ). Multivariate analysis demonstrated children with an Unadaptability score  $>10$  were 24 times less likely ( $p=.010$ ) and those with a Pirani score  $\geq 5.5$  were 11 times more likely ( $p=.043$ ) to recur. A more adaptable temperament and a higher presenting Pirani score had a predictive effect on recurrence. We have introduced parental stress and child temperament as new variables in the evaluation of clubfoot recurrence.

**Date: 2011-09-08**

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**Room: Club D**

**Abstract no.: 28419**

**OPTIMAL ASSEMBLY OF SOFTWARE BASED ORTHO-SUV FRAME FOR FOREFOOT COMPLEX DEFORMITY CORRECTION**

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Objective: Correction of complicated foot deformity using hexapod frame is recently becoming popular. However there are some difficulties because of the narrow space that resulted in the collision of the struts. We report the assessment of several types of assemblies of software-based Ortho-SUV Frame (<http://www.rniito.org/download/ortho-suv-frame-eng.pdf>) for forefoot correction. Methods: Six variants of Ortho-SUV Frame assemblies were investigated experimentally using plastic bone model. In all types, the basic module consisted of two supports: "wire-pin" support at the level VII of the shin and half-ring support fixed by the wires to the calcaneus. Distal mobile module was fixed by two-four wires to the metatarsal bones. The method of the unified designation of external fixation was used for the description of frame configurations (<http://rniito.org/solomin/download/mudef.zip>). Results: In the optimal assembly, the plane of proximal module, to which the 1st, 3rd and 5th joints are fixed, was placed parallel to the tibial axis, and was placed dorsal site of the ankle. The plane of distal module, to which the 2nd, 4th and 6th joints are fixed, was placed orthogonally to the axis of the metatarsal bones: VI,12,120; VII(8-2)8-2; VII,10-4 \_ calc.,10-4, calc.,8-2; calc.,6,90 \_ talus,9-3 -SUV- m/tars.,10-4, m/tars.,8-2. This assembly enabled us to correct the biggest range of deformities: 50° of distal foot flexion, 40° of extension, 50° of each abduction/adduction and 45° of each supination/pronation. We applied this assembly to the three patients with complex multicomponent forefoot deformities, and could correct successfully. Conclusion: Optimal assembly of Ortho-SUV Frame enables us to correct wide range of forefoot deformities.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 28271**

**APOS THERAPY FOR MAINTAINING CORRECTION AFTER RECURRENCE OF CLUBFOOT DEFORMITY**

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Relapse clubfoot following treatment according to the Ponseti method should first be treated by serial casting. Heel cord lengthening may be required if the equinus deformity persists. In order to prevent further relapses, tibialis anterior tendon transfer should be considered. We present 3 patients ages 5, 6 and 9 years, in whom recurrence of the clubfoot deformity occurred after 4 years of age. Serial casting was applied and good correction of the deformity was achieved. In order to prevent further relapses, tendon transfer was advised however the parents refused. Instead, the patients were treated with a novel device comprised of 4 modular elements, attached to a foot-worn platform. The modules are 2 convex shaped elements attached to each foot, one under the heel and the other beneath the forefoot. The device was calibrated to each patient (APOS therapy). The patients were instructed to walk with this device a few hours every day. They were also encouraged to keep on using the abduction brace during night time as tolerated. One patient was followed for 2 years and two patients for one year. Good correction was maintained in all patients at the last follow-up. We believe that this device improves the proprioception of the lower limbs enables strengthening of the peroneal muscles and stretching of a short heel cord. Therefore APOS therapy should be considered as an option for maintaining correction after recurrence of clubfoot deformity in patients older than 5 years.

**Date: 2011-09-08**

**Session: ICFC/SICOT: International Clubfoot Treatment Programs & Strategies for Managing Difficult Clubfeet**

**Time: 10:30 - 12:00**

**Room: Club D**

**Abstract no.: 28191**

**ASSESSMENT OF CHILDREN WITH CTEV PRE-TIBIALIS ANTERIOR TENDON TRANSFER: DO THEY DIFFER FROM THOSE WHO DON'T REQUIRE A TATT?**

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Introduction: Tibialis anterior tendon transfer (TATT) is commonly used to treat recurrent CTEV and residual dynamic supination. Methods: From August 2009 to October 2010, 17 children (average age 51 months  $\pm$  10 months) with 22 CTEV feet were assessed prior to a TATT. All children had undergone prior treatment according to the Ponseti protocol. Assessment was undertaken using the Dimeglio Scale, Foot Posture Index, hand held dynamometry (HDD) for strength, pedobarography and quality of life with the Clubfoot Specific Index Questionnaire and the Children's Health Questionnaire. These results were compared to 5 controls (average age 47 months  $\pm$  16 months) with 8 CTEV feet that did not require a TATT. Results: Differences were noted in several key areas. The average Dimeglio score in the TATT group was 5 ( $\pm$ 2.1) compared to 2.9 ( $\pm$ 0.7) in the control group. Resting foot alignment in standing assessed with the Foot posture Index identified a more supinated posture with an average score of -0.2 ( $\pm$ 3.5) compared to the control group average of +3.6 ( $\pm$ 3.6). The ratio of eversion to inversion strength in the TATT group was 0.7 compared to 1.29 in the control group. Conclusions: Children with CTEV assessed pre-tibialis anterior tendon transfer show differences in objective measurements compared to their CTEV controls of the same age. The authors are undertaking a prospective trial to assess if tibialis anterior tendon transfer correlates with a change in strength, foot posture, gait and quality of life.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 28534**

**TIBIALIS ANTERIOR TENDON TRANSFER FOR DEFORMITY CORRECTION IN CLUBFOOT PATIENTS TREATED WITH THE PONSETI METHOD**

Nelson CASSIS<sup>1</sup>, Gilberto RIOS<sup>1</sup>, Armando TORRES-GOMEZ<sup>2</sup>, Andrea ZEDILLO<sup>1</sup>

<sup>1</sup>Shriners Hospital for Children, Mexico City (MEXICO), <sup>2</sup>ABC Medical Center, Mexico City (MEXICO)

The purpose of this research was to study the epidemiology of the recurrence of adductus deformity (RAD) that requires a Tibialis Anterior Transfer (TAT) in patients with clubfoot, treated with the Ponseti method. To determine the associated factors for RAD that require a TAT and to evaluate the functional outcomes of TAT. We present a case-control study (1:2) of a cohort of 114 patients with clubfoot, treated with the Ponseti method with a mean follow up of 22 months. 38 cases had RAD., Age at treatment and functional outcome with AOFAS were evaluated. Statistical Analysis included normality tests, descriptive statistics, hypothesis testing were performed with a Man Whitney Test for independent samples and a Wilcoxon sum rank test for related samples. Results: Total 114 patients, divided into two groups one of the cases with 38 and a control group with 76. The group of cases had a median age of 3.75 months at the beginning of treatment, while the control group had a median age of 2 months ( $p=0.452$ ). Patients that required a TAT scored a median of 77.5 (IQR=28), in comparison to 86 (IQR=20) in controls ( $p=0.988$ ). The group treated with a TAT improved in AOFAS score from a median of 60.5 (IQR=16) to 77.5 (IQR=28) ( $p<0.001$ ). Conclusion: Residual adductus deformity treated with TAT to the center of the foot results in good function, comparable to patients that did not required a TAT. TAT improved function in patients with recurrences. Age at the initial treatment was not a factor that determined the need for a TAT.

**Date: 2011-09-08**  
**Session: ICFC/SICOT: Ponseti Method**  
**Time: 14:00 - 15:30**  
**Room: Club D**

**Abstract no.: 29744**

**THE PONSETI LEARNING CURVE**

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The Ponseti Method of treating congenital talipes equinovarus has been shown successful in correcting the deformity, reducing the rate of major surgical corrections. Delivering the treatment protocol is a complex, highly skilled process requiring detailed anatomical knowledge, practical and inter-personal skills, and is therefore likely to be subject to a learning curve. This paper examines the improving performance of the Ponseti Clinic at Chelsea and Westminster Hospital over three distinct time periods. This paper analyses 147 patients, 237 feet, which were divided into three groups based on date of first presentation. It demonstrates that there is no significant difference between the groups in terms of age at presentation, sex distribution, laterality, previous treatment and initial Pirani score. It goes on to show that Group 1, the earliest presenting feet, had significantly poorer results in terms of recurrence rate (25/79) when compared to Group 2 (9/79  $p=0.003$ ), which is similar to Group 3 (13/79,  $p=0.49$ ). Group 1 also demonstrated higher rates of tibialis anterior tendon transfer (16/79 vs 4/79  $p=0.007$ ) and extensive soft tissue release (7/79 vs 0/79  $p=0.014$ ) than group 2. There was no significant difference between group 2 and group 3 for any of these outcome measures. This is one of the largest series of feet treated by the Ponseti method ever published and is the first paper to demonstrate the effect of the learning curve in administering the Ponseti method of treating clubfeet.

**Date: 2011-09-08**  
**Session: ICFC/SICOT: Ponseti Method**  
**Time: 14:00 - 15:30**  
**Room: Club D**

**Abstract no.: 28664**

**FURTHER ADVANCES OF THE DYNAMIC FUNCTIONAL TREATMENT**

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Introduction: The Dynamic functional treatment is based on the pathoanatomy of the newborn, and not on the weight-bearing clubfoot. Its aim is the repositioning of the Talus, Calcaneus and Navicular in relation to each other. The gentle movements of this treatment were modified in order to reduce the previously necessary daily physiotherapy sessions. Method: Any reduction in a joint has to be performed directly on the bone requiring repositioning. Starting on the first days after birth a supple pressure applied on the lateral, prominent side of the clubfoot, on the Talus, initiates the key movement. The Talus is repositioned between the two malleoli, allowing the heel (Calcaneus) to move freely. This single movement is pivotal for properly aligning the foot and for dorsiflexion. Results: Thirteen children with 18 severe and very severe clubfeet (11 – 20 pts in the Dimeglio-/Bensahel score) were treated in the last two years focusing on this direct reduction of the joints. All feet were supple, in perfect form and had excellent active movements at the conclusion of our treatment sessions. Fourteen feet (78 %) did not require intervention after our treatments, and only four feet required surgery on the Achilles-tendon, with none of the surgeries including total release. Conclusion: The results of the study yielded feet that were excellent in both passive and active movements, despite the fact that physiotherapy was only performed intensively for the first two to three weeks of life. Therapy thereafter occurred on a weekly basis and became less and less frequent with time.

**Date: 2011-09-08**  
**Session: ICFC/SICOT: Ponseti Method**  
**Time: 14:00 - 15:30**  
**Room: Club D**

**Abstract no.: 29136**

**PREDICTING THE NEED FOR ANTERIOR TIBIALIS TENDON TRANSFER  
IN CLUBFEET TREATED WITH THE PONSETI METHOD**

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**Purpose:** To determine factors associated with need for anterior tibialis tendon transfers (ATTT) in patients with idiopathic clubfoot treated with Ponseti method. **Methods:** From 2000-2010, 186 patients with idiopathic clubfeet were treated and were of an age when they could be considered candidate for ATTT (if needed). Age at presentation, number of casts, need for percutaneous Achilles tenotomy, age of foot abduction orthosis (FAO) initiation, FAO compliance, need for additional casts, and need for ATTT were noted. Dimeglio/Bensahel and Catterall/Pirani scores were recorded at initial presentation and FAO initiation. **Results:** Sixty-one (89 clubfeet) of the 186 patients (33%) had complete records. Thirty-eight of 89 feet (43%) had undergone ATTT. Feet that required ATTT compared to feet that did not have ATTT had significantly higher Dimeglio/Bensahel scores (15.00 vs 12.77,  $p < 0.0001$ ) and Catterall/Pirani scores (4.80 vs 3.80,  $p = 0.007$ ) at presentation as well as significantly higher Dimeglio/Bensahel scores at FAO initiation (3.42 vs 2.17,  $p = 0.002$ ). ATTT group needed more casts for correction (5.84 vs 5.14,  $p = 0.017$ ), was less compliant with FAO ( $p = 0.003$ ), and was more likely to need additional casting after FAO initiation ( $p = 0.04$ ) than group that did not have ATTT. **Conclusion:** In idiopathic clubfeet treated with Ponseti technique, those requiring ATTT tended to present with worse Dimeglio/Bensahel and Catterall/Pirani scores, require more casts to achieve correction, and were less frequently compliant with FAO use.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 28897**

**A PHYSIOTHERAPIST-LED PONSETI SERVICE FOR THE MANAGEMENT OF IDIOPATHIC AND COMPLEX CLUBFOOT DEFORMITY**

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Great Ormond Street Hospital, London (UNITED KINGDOM)

Introduction: A physiotherapist-led Ponseti service gives good early results in managing idiopathic clubfoot and in a comparison study such a service was equivalent to a surgeon-led service. Care of the complex syndromic foot is considered more difficult. This study assesses a physiotherapy-led service for management of both complex and idiopathic clubfeet. Materials and Methods: In 2005, a physiotherapy-led Ponseti service was established at our tertiary referral centre. Treatment was performed by specialist physiotherapists supervised by an orthopaedic surgeon. Patient data was collected prospectively. The complex feet included neuromuscular (21) and arthrogryptic (4) conditions. All tenotomies were performed by an orthopaedic surgeon in clinic. Results: Between 2005-2010, 131 clubfeet in 85 children were treated: 89 idiopathic feet (60 patients) and 42 non-idiopathic feet (25 patients). The mean Pirani scores were 4.6 and 5.2, mean casts number 5.3 and 8.1 respectively. 54% of idiopathic and 100% of non-idiopathic feet required Achilles tenotomy. Brace compliance was 90 %. At mean follow-up of 35 months, recurrence rates were 5% in idiopathic and 36% in non-idiopathic feet. No idiopathic foot required surgery but a soft tissue release was required in 36% of non-idiopathic feet. The overall loss to follow up was 11%. Conclusion: A physiotherapist directed service is highly effective in clubfoot management. Complex feet require significantly more input. Results for idiopathic and complex clubfeet are comparable to those published. Significance Families benefit from continuity of care and access to consistent advice and review with minimal input from medical staff. Other contractures can be treated concurrently.

**Date: 2011-09-08**  
**Session: ICFC/SICOT: Ponseti Method**  
**Time: 14:00 - 15:30**  
**Room: Club D**

**Abstract no.: 28730**

**VULPIUS PROCEDURE FOR CORRECTION OF EQUINUS DEFORMITY IN PATIENTS WITH RESIDUAL OR RELAPSED CLUBFOOT**

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Background: Regardless of the mode of treatment, the clubfoot has a strong tendency to relapse especially in hindfoot equinus. Contracture or shortening of Achilles tendon causes an equinus deformity of the ankle. Its release is therefore required in the correction of equinus deformity in patients with residual or relapsed clubfoot. Purposes: To determine if Vulpius technique can be effective in correcting equinus deformity in residual or relapsed clubfoot. Patients and Methods: Eighty idiopathic clubfeet were treated with conservative method using Ponseti protocol from March 200 to July 2008. Among the 32 feet which were identified to have had residual or relapsed equinus deformity, 22 feet had Vulpius procedure for correction of equinus deformity. The mean patient age at the time of surgery was 27 months and the mean follow-up period was 46 months. We reviewed the dorsiflexion angle of ankle joint for clinical evaluation and talocalcaneal and tibiocalcaneal angle on dorsiflexion lateral views of the feet for radiographic evaluation. Results: The mean ankle dorsiflexion angle improved from -0.7 degree (-10 to 5) preoperatively to 14.5 degree (10 to 25) at the last follow-up ( $P<0.05$ ). The mean tibiocalcaneal angle improved from 86.8 degrees (65 to 119) preoperatively to 67.0 degrees (48 to 81) at the last follow-up ( $P<0.05$ ). The mean lateral talocalcaneal angle improved from 17.6 degrees (1 to 36) preoperatively to 27.6 degrees (11 to 49) at the last follow-up ( $P<0.05$ ). Conclusions: Vulpius procedure is thought to be an effective surgical procedure in correcting equinus deformity in residual or relapsed clubfoot.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 28378**

**CAN SOFT CAST BE AN ALTERNATIVE MATERIAL IN PONSETI CLUBFOOT TREATMENT?**

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Purpose: The purpose of this study is compared the use of soft cast (SC) with Plaster of Paris (POP) in efficacy of clubfoot treatment by Ponseti method. Methods: During one year period, there were consecutive 22 patients (33 clubfeet) treated at our hospital using Ponseti method. Patients were randomized into two groups, POP and SC, based on medical recorder number. We used Dimeglio and Bensahel classification for pretreatment severity. Achilles tenotomy was performed in those with sagittal plane score of more than 2 points. At the completion of Ponseti treatment, the severity was recorded again. Questionnaires were provided to monitor the prognosis and parent satisfaction. We used independent t-test for statistical analysis with  $p < 0.05$  as significant. Results: 8 patients (12 feet) were received POP, and 14 patients (21 feet) received SC. The mean baseline and final severity of the 2 groups were not significantly different. The incidence of Achilles tenotomy was significantly lower in SC than POP (50% vs 83%). There was a higher scores for tolerance, durability, and parent satisfaction in the SC (4.05 vs 3.16, 1 = unsatisfactory). Conclusion: This study supports the use serial casting with SC for clubfoot. There was a higher parent satisfaction in the SC. Incidence of Achilles tenotomy was lower in SC. With less padding and skin tight soft casting, we may have better feeling of the position of the foot in the cast. Hence, a better correction may ensure. However, this difference on long-term outcomes remains to be studied.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 28332**

**RESULTS OF AN EFFECTIVE HUB AND SPOKE MODEL FOR TREATMENT OF CLUBFOOT**

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Introduction: Peripheral hospitals in Birmingham with no paediatric orthopaedic service have physiotherapists providing a Ponseti casting service for surgeons based at a central children's hospital. The Ponseti-trained physiotherapist provides initial assessment and casting without any orthopaedic input. The timing of the Achilles tenotomy is determined by the physiotherapist but performed by the surgeon under general anaesthesia. Follow-up care with foot abduction orthoses is also done by physiotherapists. Materials and Methods: We performed a retrospective review of 49 consecutive patients, with 71 clubfeet, referred to a single surgeon with a median follow-up of 40 months. All clubfeet, including those with associated syndromes, were included in this regimen. Results: No patients developed serious complications of casting requiring cessation of treatment. Eight feet required repeat tenotomies within the first year, usually due to poor compliance with the boots and bar. The two patients with arthrogryposis and a patient with a non-compliant family required a third tenotomy for persistent equinus deformity. Two cases with complex idiopathic clubfeet failed to correct fully requiring transfer to another centre. No feet required open release for persistent deformity. Discussion: We conclude that our hub and spoke model is safe and effective for use where paediatric orthopaedic services are geographically scarce.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 27393**

**MANAGEMENT OF IDIOPATHIC CLUBFOOT BY PONSETI TECHNIQUE:  
OUR EXPERIENCE AT A TERTIARY REFERRAL CENTRE**

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<sup>1</sup>PGIMER, Patiala (INDIA), <sup>2</sup>PGIMER, Chandigarh (INDIA)

**Background:** Clubfoot or congenital talipes equinovarus is a common congenital abnormality of uncertain etiology. The purpose of this study is to assess the results of Ponseti method in India and to look for the demography of the relapse and resistant cases. **Methods:** A total of eighty six children (total of 146 feet) below one year of age who had presented to the paediatric orthopedic outpatient department of our institution between June 2003 and January 2007 with unilateral or bilateral idiopathic clubfoot deformity were included in our study and treated conservatively by the Ponseti technique. **Results:** 128 feet responded to Ponseti casting technique initially and 18 feet were resistant to the conservative treatment. Out of the responsive feet, in 20 feet there was a relapse of the deformity. Evaluation of the results showed that poor compliance to splintage was the most common cause for relapse, while delayed presentation and atypical clubfeet had high resistance to this technique. The correction rate at our centre was 82.18%. This correction rate was less when compared to many recent studies and could be attributed to increased incidence of delayed presentation, poorer compliance and atypical feet in our population. **Conclusion:** We conclude that Ponseti technique is recommended for management of clubfoot and strict compliance to splintage is essential to prevent relapses. The people of lower socioeconomic status are at high risk for relapse and they have to be targeted to create awareness among them about the importance of compliance to splintage.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Ponseti Method**

**Time: 14:00 - 15:30**

**Room: Club D**

**Abstract no.: 30114**

**THE ROLE OF ULTRASOUND IN CLUBFOOT TREATMENT.  
CORRELATION WITH THE PIRANI SCORE AND ASSESSMENT OF THE  
PONSETI METHOD**

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Hesham Taha KOTB

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Background: To evaluate neonates and infants with clubfoot, clinical and imaging modalities are required. Conventional radiography is of limited value because the studied bones are not fully ossified. Purposes: We attempted to (1) evaluate clinically and sonographically the reliability of the Ponseti method in correcting clubfeet; and (2) determine whether various ultrasound variables correlated with each other and with the Pirani score before and after treatment. Methods: We prospectively followed 17 infants (25 clubfeet) assessed using the Pirani score and Ultrasound variables (medial malleolus-navicular distance, navicular alignment in relation to the talar head, medial soft tissue thickness, talar length, and calcaneocuboid distance) and treated with the Ponseti method. The mean age of the patients at first casting was 30 days, and repeat assessment after treatment was performed at a mean age of 6.3 months. Patients were followed for a mean of 14.1 months (range, 0.75–38 months). Results: The Ponseti method corrected all feet. We found three clinical/Ultrasound correlations. Before treatment, we observed a negative correlation between the clinical midfoot score and the sonographic medial malleolus-navicular distance. After treatment we observed two negative correlations: one between the midfoot score and the sonographic talar length and the other between the hindfoot score and medial malleolus-navicular distance. Four feet had recurrence of varus, two of which had an increased calcaneocuboid distance despite full restoration of navicular alignment in one foot. Conclusions: US can play a role in clubfoot assessment and may alert the surgeon to feet that may be prone to recurrence.

**Date: 2011-09-08**  
**Session: ICFC/SICOT: Ponseti Method**  
**Time: 14:00 - 15:30**  
**Room: Club D**

**Abstract no.: 29997**

**USE OF DYNAMIC VS STATIC ABDUCTION BARS WITH MITCHELL SHOES**

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Talipes equinovarus (TEV) or clubfoot remains a common congenital musculoskeletal condition affecting 1 in 1000 live births. The Ponseti method of serial manipulation and casting followed by abduction bracing has become the preferred treatment in much of the world. The bracing phase of the treatment remains challenging due to poor brace tolerance and compliance. Failure of bracing is associated with a high rate of recurrence. The most critical time for brace compliance is initial acceptance and most recurrences occur in the first year. We have undertaken a prospective randomized clinical trial comparing two styles of foot abduction orthoses with respect to efficacy and patient satisfaction. The orthoses incorporate Mitchell style shoes with either a static or a hinged bar. We present preliminary results with respect to recurrence, compliance, and caregiver satisfaction. 21 patients were enrolled. Average follow-up is 12 months. Five patients required additional intervention after initiation of bracing. Four of these patients had difficult courses with casting and likely represent incomplete correction rather than true recurrence. Two families were non-compliant with bracing, one in each group. Of the 11 families who completed satisfaction surveys, one reported dissatisfaction and brace intolerance, in the static bar group. All other families report that they were very or extremely satisfied with the brace. Overall initial compliance and satisfaction is high with abduction orthoses using Mitchell shoes. At present, we have insufficient data to statistically compare the two groups or to evaluate long-term compliance and recurrence.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 29123**

**REVISION CLUBFOOT SURGERY WITH CALCANEOCUBOID FUSION: RESULTS AT LONG-TERM FOLLOW-UP**

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Purpose: Calcaneocuboid fusion has been used to supplement soft tissue revision clubfoot surgery to tether growth of the outer column of the foot. The purpose of the present study was to reevaluate the clinical and radiographic long-term outcomes of 20 patients (27 clubfeet), treated with this procedure, who were previously examined at mean follow-up of 5.5 years. Methods: Ten patients (13 clubfeet) who underwent this procedure from 1991-1994 returned for radiographs and reevaluation by the original surgeon. Results: Patients had a mean age of 24 years (range 23-26) and an average of 18 years follow-up (range 16-19). The procedure was performed at an average age of 7 years (range 5-8). Eleven of thirteen feet (85%) demonstrated radiographic fusion. The two failed fusions occurred unilaterally in bilaterally treated patients. No patient required major additional procedures. Comparison of Hospital for Joint Diseases Functional Rating System results from earlier to current follow-up for all 13 feet demonstrated: (1) significant decline in mean score, 77.8 vs 65.9 (p=.03), and (2) number of good/excellent ratings went from 85% to 38%. At long-term follow-up: (1) average Foot Ankle Outcomes Questionnaire standardized shoe comfort and core scores were 84.5 (range 25-100) and 85.6 (range 44-100), respectively, and (2) average foot pain was 1.38 (range 0-8) on a scale of 1 to 10. Conclusion: At long-term follow-up, revision clubfoot surgery with calcaneocuboid fusion in patients 5 to 8 years of age produces relatively painless, plantigrade feet with moderate functional outcomes.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 27736**

**PROGRESSIVE SOFT TISSUE RELEASE PROCEDURE FOR IDIOPATHIC CLUBFOOT: 10-YEAR FOLLOW-UP**

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Surgery for idiopathic clubfoot (ICF) remains a subject of debate as the extensive soft tissue release leads to foot stiffness. The progressive soft tissue release (PR), a stepwise correction of the posterior, medial and plantar structures of the ICF was proposed. To assess the long-term outcomes of PR, 24 patients with 36 ICF who underwent PR were evaluated at the average 10-year follow up by the Ponseti score along with anteroposterior (AP) and lateral (LAT) weight bearing radiography. The talocalcaneal (TC), talus-tibia (T-Ti), talo-1st metatarsal (T-1st), calcaneal-5th metatarsal (C-5th), calcaneal-1st metatarsal (Cal-1st), 1st-5th metatarsal (1st-5th) and calcaneal pitch angles were measured. Normal feet from unilateral ICF were used as the controls. The age at PR was 11 months. The Ponseti score was rated as 19 excellent, 13 good, 2 fair and 2 poor outcomes with the average score of 89. On AP, average measurements of ICF versus (vs.) controls revealed TC 20 vs.24, T-1st -2 vs. -11, C-5th -8 vs. -10 degrees. On LAT, measurements in ICF vs. controls revealed TC 28 vs.40, T-1st 5 vs.-16, Cal-1st 148 vs.154, 1st-5th 11 vs.12 and calcaneal pitch 10 vs.11degrees. The difference between dorsiflexion and plantar flexion of TC and T-Ti on LAT was 4 and 27 degrees, respectively ( $P<0.05$ ). Deformity recurred in 2 feet. PR corrects deformities in ICF and maintains subtalar and ankle joint motion. Corrective procedures for ICF should be performed in a progressive fashion with minimum dissection of the subtalar joint.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 28489**

**PATIENT REPORTED OUTCOME AT 16 YEARS OF AGE IN CONGENITAL CLUBFOOT; A SWEDISH MULTICENTER STUDY**

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Background: Congenital clubfoot, one of the most common congenital orthopedic deformities, has a possible impact on adolescents' subjective well-being, function and self esteem. There are still few reports addressing these aspects. Patient reported outcome measures (PROMs) are thereby reported to be useful, both as quality indicator and for quality of life assessment. Patients and methods: In Sweden a total of 156 children, born 1995 with congenital clubfoot, were evaluated at 16 years of age with the use of Oxford Foot Ankle Questionnaire. This survey form comprises 15 items, divided into three subscales (Physical, School and Play and Emotional), and was sent to both patients and parents during first part of 2011. There were 111 (71%) boys and 45 (29%) girls, with 90 (58%) unilateral and 66 (42%) bilateral clubfoot. Initial treatment was manipulation and plaster in 129 (83%) and taping in 22 (14%) patients. At three years of age surgery had been performed in 120 (77%) and non-surgical treatment in 36 (23%) of the patients. Primary surgery was percutaneous Achilles tendon lengthening (ATL) in 26,7% , open ATL in 5,8%, posterior release (PR) in 48,3% and posteromedial release (PMR) in 15%. Results and conclusions: Preliminary results are presented, with special reference to gender differences, differences between children and their parents, and correlation between subjective outcome and given treatment.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 28334**

**LONG-TERM OUTCOMES OF COMPREHENSIVE SURGICAL INTERVENTION VS PONSETI CASTING IN THE TREATMENT OF IDIOPATHIC CLUBFOOT**

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Introduction: The purpose of this study is to compare the long term results of comprehensive surgery and Ponseti casting for idiopathic clubfoot. Methods: Twenty-four young adults (21.8 +/- 2.3 years) who had a comprehensive surgical release performed by the same surgeon and 18 subjects (29.2 +/- 5.5 years) who had Ponseti treatment at a different institution participated. We evaluated 48 healthy adults as a Control Group. Strength, gait temporal spatial parameters and segmental foot motion during gait were analyzed. Standardized outcome tools were used to measure pain, satisfaction, function, activity restriction and disability. Results: All subjects demonstrated a plantigrade foot. The Surgical Group had an average of 1.62 surgeries (33% releases, 18% transfers and 38% bony procedures), and the Ponseti Group had an average of 1.55 surgeries (54% releases, 29% tendon transfers and 10% bony procedures) at a later date than the original corrective procedure. Both treatment groups had diminished foot motion on foot and ankle motion analysis, compared to the Controls. In addition, the Ponseti Group exhibited more coronal range of motion of the hindfoot than the Surgical Group. The Surgical Group demonstrated deficits in temporal-spatial measures compared to the Controls. Both groups showed diminished plantarflexion strength, and the Surgical Group had less strength in foot motion than the Ponseti Group. Both groups demonstrated higher pain and disability compared to Controls, but the Surgical Group had significantly more pain and disability than Ponseti. Discussion: These findings indicate that compared to surgery, treatment of clubfoot via the Ponseti casting method results in better measurable long term outcomes and ambulatory function when these individuals reach the age when they enter the workforce.

**Date: 2011-09-08**

**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 30321**

**RESULTS OF TREATMENT OF CLUBFOOT BY THE PONSETI METHOD:  
10 YEARS FOLLOW-UP**

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Objective: Evaluate the results of the treatment of 229 clubfeet by the Ponseti Method. In the period between 2001 and 2011 and compare them according to the follow-up time. Materials and methods: We treated 155 pacientes (229 clubfeet) by the Ponseti Method divided in two groups: Group I- 72 patients (109 clubfeet- 47,6%) with follow-up time from 62 to 128 months (average of 85). 50 of these were males and 22 females. The average age at the beginning of the treatment was 5.4 months. We rated the clubfeet before the treatment, according to Dimeglio: type I- 9 feet, type II- 1, type III- 72 and type IV- 26 feet. Group II- 83 patients (120 clubfeet- 52,4 %) with follow-up time from four to 57 months (average of 33,5). 69 of these were males and 14 females. The average age at the beginning of the treatment was 3.2 months. Dimeglio type I- 15 feet, type II- 4, type III- 62 and type IV- 39 feet. We considered the results satisfactory for the clubfeet that showed correction of all the components of the deformity and unsatisfactory for the ones that kept the deformity and needed surgical correction. Results: The number of cast changes used in the correction of the deformities was: Group I- average of 9.3 casts. Group II- average of 6,9 casts. The calcaneus percutaneous tenotomy was done in: Group I- 73 feet (67%). Group II- 78 feet (65%). In group I, we obtained satisfactory results in 83 clubfeet (85,4%) and unsatisfactory in 16 (14,6%), while in Group II 117 PTCs were satisfactory (97,5%). The recurrence of the deformities, during the use of abduction braces, happened in 41 (37,6%) feet of group I; 25 of these clubfeet were corrected with new

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**SHORT-TERM CLINICAL RESULTS AFTER THE TREATMENT OF IDIOPATHIC CLUBFOOT – COMPARISON OF PONSETI METHOD AND COMPLETE SUBTALAR RELEASE**

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**Purpose:** To evaluate physical and radiographic outcome of clubfoot correction by Ponseti Method compared with complete subtalar release (Simons). **Methods** We reviewed the medical records of 12 clubfoot patients (17 feet) corrected with Ponseti Method followed by percutaneous Achilles tenotomies (Group P) and 15 patients (24 feet) with complete subtalar release (Group CSR) at Japanese RedCross Sendai hospital. The contralateral feet of unilateral clubfoot were served as a control group (Group N). **Results:** Mean follow-up period of Group P, CSR, and N were 4.9, 5.1, and 5.1 years, respectively. Clinically, Dorsiflexion of the ankle joint was significantly better in Group P than CSR ( $p < 0.05$ ). In ankle planterflexion, thigh-foot angle, and transmalleolar axis, no statistical significance was found between Group P and CSR ( $p > 0.05$ ). On x-ray analysis, AP talo-calcaneal angle, lateral talo-calcaneal angle, lateral tibio-calcaneal angle, height of talus body, length of talus, and length of calcaneus, width of distal tibial metaphysis, no statistical significance was found between Group P and CSR ( $p > 0.05$ ). The Hight-Length ratio of talus, defined as height of talus body/length of talus $\times 100$ , and the calcaneus/ tibia ratio, defined as the anteroposterior length of calcaneus to the width of distal tibial metaphysis, was significantly larger in Group P than CSR ( $p < 0.05$ ). **Conclusion:** The physical outcome of clubfoot correction by Ponseti method was comparable with the complete subtalar release. Developmental disturbance of the talus and calcaneus after Ponseti method was less prominent than complete subtalar release.

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**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 29025**

**IS MEASURING THE LENGTH OF THE FOOT A USEFUL TOOL IN THE CLUBFOOT FOLLOW-UP?**

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Background: Static measures of foot length (FL) have been used for follow up of clubfoot but there is a lack of studies analyzing its clinical importance. Aim: To evaluate if the FL measurement is a useful tool for clubfoot follow up. Patients and Methods: We measured the FL of 48 children with congenital clubfoot (28 unilateral, 20 bilateral. approximately every six months, from 2-2,5 years until 7 years of age. The children were initially treated according the Ponseti casting technique (26 cases, 38 feet) or the Copenhagen method (22 cases, 30 feet). Orthoses were used until four years of ages. Both feet were measured in a standardized way in all cases. Repeat surgery or serial casting after the initial treatment was registered. The development of FL was compared with the Clubfoot Assessment Protocol (CAP). Results: The clubfeet showed a slower increase in FL development than the normal feet. Clubfeet not requiring repeat treatment showed a steadily increase in FL. Most feet showing a temporary stop in increase of FL also showed a decrease in range of motion and motion quality. Secondary treatment effected the FL growth positively. There was no significant difference in the FL development between the two treatment groups Conclusions: After analyzing the growth of foot length of 68 clubfeet from 2 to 7 years of age we conclude that measurement of FL seems to be a useful tool for the clubfoot follow up.

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**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

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**Abstract no.: 30021**

**IS JESS EXTERNAL FIXATION USEFUL IN TREATING CLUBFOOT?**

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Introduction: The conservative treatment, anywhat is its technique, doesn't allow to reduce all the idiopathic clubfeet. Hence, it is usual to perform a surgical stage to achieve the reduction. But, surgery may generate fibrosis. In such cases we propose the use of JESS a mini-external fixator according to the principle of a differential distraction. Material & Methods: 178 idiopathic clubfeet in 200 children, aged from 9 months to 12 years old were reviewed for this study. All of them were severe/rigid clubfeet. This device allowed us to perform an asymmetrical distraction for correction of all the components of deformities. The average duration for correction was 6 weeks followed by a plaster cast for stabilization. The functional and cosmetic aspect as well as the tolerance and X rays have been evaluated. Results At follow up (average 7 years), the results are excellent in 70% cases, good in 25% cases and fair in 5% cases according to International ClubFoot Study Group Outcome Evaluation. Minor complications were observed (local infection around K wires, swelling). Local care, then removal of the pins led to healing these complications. At the follow up, there has been no recurrence of any deformity. Conclusion: The JESS Mini-External Fixator using differential distraction seems to be a useful tool for all kinds of residual deformities being resistant to conservative treatment. It is helpful to prevent surgical fibrosis; more, it may be used in the young children.

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**Session: ICFC/SICOT: Long-term Follow-Up Studies & Surgical Intervention**

**Time: 16:30 - 18:00**

**Room: Club D**

**Abstract no.: 29849**

**FROM CONVENTIONAL ILIZAROV TREATMENT TO PONSI TAYLOR EXPERIENCES IN CLUBFOOT TREATMENT USING EXTERNAL FIXATION**

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The Ponseti method for clubfoot treatment is widely accepted. Today in most patients extensive surgical procedures can be avoided. There are still cases of neglected or relapsed clubfoot, clubfeet after previous extensive open release surgeries. Repeated soft tissue procedure may result in extensive postoperative scarring with a high rate of complications like skin necrosis, infection or neurovascular damage. The disadvantage of bony procedures with closed wedge osteotomies and arthrodesis is stiffness and shortening of the foot. To use external fixation for correction is an alternative. Correction can occur through gradual distraction as soft tissues and bones still have remodelling potential. In our experience gradual correction is not limited by extensive scar tissue from previous surgeries. In children older than 8 years the soft tissue correction can be combined with osteotomies: The U osteotomy and the V osteotomy. During the last decade two new concepts have been introduced into the "Ilizarov treatment" of clubfoot: 1. The Ponseti method 2. The Taylor Spatial Frame allowing 6 axis correction including rotational correction without the need of complex frame adjustments and modifications. For this type of treatment the term "Ponsi Taylor" is used. The keypoint of this technique is to insert an olive wire at the neck of the talus from the lateral side. In our experience external fixation with soft tissue distraction without extensive open surgery is an effective treatment option for relapsed or neglected clubfoot to obtain and maintain a plantigrade and functional foot, even after repeated surgeries.

**Date: 2011-09-08**  
**Session: Spine - Deformities I**  
**Time: 14:00 - 15:30**  
**Room: Club E**

**Abstract no.: 28121**

**PREVENTION OF PROGRESSION OF ADOLESCENT IDIOPATHIC SCOLIOSIS WITH THE NIGHT TIME BENDING BRACE IN A DEVELOPING COUNTRY**

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Effective bracing techniques have been expensive and unattainable by majority of our local population. Patients may lack the financial resources to purchase custom made braces, while Orthopods may lack the necessary technical fabrication equipment. Curve progression may best be prevented if not corrected while patients are still skeletally immature. Based on the principles of the Charleston night time bending brace, as designed by Hooper and Reed, the proponents of the study are replicating the side bending brace by correcting or overcorrecting the curvature of the spine with a nocturnal brace. Not a secret in general, the bending brace design has a dose dependent correlation with success rates of prevention or even correction of curvatures. The advantage of wearing a nocturnal or "wear at home" brace is preferable to the active life style of today's youth who would rather not wear a brace in public. Despite the advantages, the braces are expensive and not easily attainable especially in developing countries like the Philippines. By using locally available materials the proponents have been able to adopt the principle for the local setting. With the help of fiberglass cast rolls, a cast cutter, some comfortable lining and straps, a night time bending brace can be fabricated at a tenth of the price of the commercial braces. Preliminary results are still being obtained, but the results are promising. Not only for the patients, but also for the orthopod who chooses to serve his patients with the best of his abilities with out the hefty price tag.

**Date: 2011-09-08**  
**Session: Spine - Deformities I**  
**Time: 14:00 - 15:30**  
**Room: Club E**

**Abstract no.: 29318**

**SURGERY FOR SEVERE CAMPTOCORMIA IN PARKINSON'S DISEASE**

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Camptocormia i.e. functional kyphoscoliosis which aggravates during standing and walking and disappears while lying down is common in Parkinson's disease. Such a functional deformity may deteriorate into a severe degenerative kyphoscoliosis with complete loss of sagittal and coronal truncal balance and pain. The available literature on surgery in this condition is limited to few case reports. We report our complete experience with surgical correction of severe camptocormia. Six patients (4M, 2F, mean age 63.7 (range 58-70) years were operated on 2000-2010. This is the largest series reported so far. All were optimally treated medically and had progressive deformity for > 3 years. The procedures were posterior correction and stabilization with pedicle screws/rods, Smith Petersen osteotomies, and PSO in 4 cases. The mean (range) operation time was 7.4 (4-10) hr, blood loss 4.0 (1.2-7.7) lit., days in intensive care unit 2.7 (0-5), days until first mobilization 4 (3-6), and hospitalization days 17 (8-32). All obtained good correction and pain relief initially. However, a total of 9 re-operations have been performed in this series, mostly due to distal screw loosening/pull-out and/or rod breakage where instrumentation ended short of the ileum. Treatment of these patients has been a taxing learning experience. Corrective surgery is possible, but it has a very high complication rate. We suggest the use of the strongest available implant, long constructs with segmental screws, obligatory sacroiliac fixation and complete balance restoration.

**Date: 2011-09-08**

**Session: Spine - Deformities I**

**Time: 14:00 - 15:30**

**Room: Club E**

**Abstract no.: 29158**

**BENEFIT OF PERIOPERATIVE CELL SALVAGE SYSTEM FOR POSTERIOR SPINAL FUSION IN ADOLESCENT IDIOPATHIC SCOLIOSIS**

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This study investigates efficacy and safety of routine cell salvage system use in adolescent idiopathic scoliosis patients undergoing primary posterior spinal fusion surgery with segmental spinal instrumentation. Forty two consecutive adolescent idiopathic scoliosis patients undergoing posterior spinal fusion by two surgeons at a single hospital were studied. Intraoperative cell salvage system was used in 20 patients and the control group was of 22 patients who underwent surgery without cell salvage system. Average patient age was  $15,06 \pm 1,3$  in cell saver group and  $13,86 \pm 2,0$  in control group. In cell saver group average intraoperative autotransfusion was 411 mL (250-950 mL). Average perioperative allogeneic blood transfusion need was  $1,17 \pm 0,63$  unit in cell saver group and  $2,59 \pm 1,14$  unit in control group. No transfusion reactions occurred in either group. Postoperative first day average hemoglobin level was  $10,7 \pm 1,00$  (hematocrite  $33 \pm 3,4$ ) in cell saver group and  $10,7 \pm 1,02$  (hematocrite  $32,4 \pm 3$ ) in control group. Average hemoglobin level of saver group was  $10,7 \pm 0,84$  and average hemoglobin level of control group was  $10,6 \pm 0,82$  in the day of discharge. During surgery the blood transfusion need is multifactorial and more studies with larger groups are needed to determine the effect of these factors. Cell salvage systems can reduce perioperative transfusion rate for posterior spinal fusion in adolescent idiopathic scoliosis, but they can not reduce transfusion rate to zero.

**Date: 2011-09-08**  
**Session: Spine - Deformities I**  
**Time: 14:00 - 15:30**  
**Room: Club E**

**Abstract no.: 28640**

**THE USE OF SOMATOSENSORY EVOKED POTENTIAL (SSEP) MONITORING IN THE PREVENTION OF NEUROLOGICAL INJURY IN SPINAL SURGERY: A 5-YEAR REVIEW OF TIMING AND RESPONSE TO AN ABNORMAL TRACE**

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**Objective:** This study aims to examine the role of intra-operative somatosensory evoked potential (SSEP) monitoring in the prevention of neurological injury. Focusing on timing of trace abnormality, monitoring sensitivity and sensitivity, and whether the abnormalities were reversible by the operating team. **Design** Case note review of prospectively collected data **Subjects** 2953 consecutive complex spine operations (male 36% female 64%, median age 25yrs) prospectively performed using spinal cord monitoring at a single institution (2005-2009). **Methods:** All traces and neurophysiological events were prospectively recorded by the neurophysiology technician. All patients with a significant neurophysiology event were examined clinically by a neurologist, separate from the spinal surgery team. Significant trace abnormality was defined as a decrease in signal amplitude of 50% or a 10% increase in latency. Timing of trace abnormality, surgeon's response and prospective neurological outcome were recorded. Sensitivity, specificity, positive / negative predictive value were calculated. A Chi-squared test was performed to assess the impact of intervention on neurological outcome ( $p < 0.05$ ). **Results:** 2953 operations involving SCM were performed and 106 recorded a significant trace abnormality. This most often occurred during instrumentation and the most common reaction was adjustment of metalwork. SSEP monitoring had a sensitivity of 100%, specificity 97.3%, positive predictive value 24%, negative predictive value 100%. There were 79 false positives and no false negatives in this series. Chi-squared test was not significant ( $p=0.18$ ) possibly suggesting intervention did not affect neurological outcome. **Conclusions:** Triggering events are uncommon and the development of a persistent neurological deficit is rare. We found an incidence of 0.85% in this series of 2953 operations. In the majority of cases detection of a monitoring abnormality prompts a corrective reaction by the surgeon. Of those with an abnormal trace 76% were neurologically normal at outpatient follow up.

**Date: 2011-09-08**

**Session: Spine - Deformities I**

**Time: 14:00 - 15:30**

**Room: Club E**

**Abstract no.: 27455**

**BIOMECHANICAL GROUNDING FOR MINI-INVASIVE TECHNOLOGY OF SPINAL OSTEOSYNTHESIS FOR MANAGEMENT OF PATIENTS WITH SCOLIOSIS**

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Biomechanical disorders of the spine in scoliosis manifest by change of the vertebra shape at the deformity apex and, as a result, formation of the major and compensatory curvature arches and inter-vertebral discs disorders. Scoliotic deformities are multicomponent: disorders in frontal and sagittal planes, rotation, secondary pelvic and shoulder asymmetry. Correction of scoliosis by an external transpedicular fixator is a mini-invasive controlled technology, because spinal osteosynthesis is done through skin micro-cuts; the construction is assembled externally; and it allows gradual correction of all deformity components. Radiographic, neurologic and orthopedic control of correction process allows avoiding vascular and neurologic disorders associated with traction of the spine and contents of the spinal canal and enables prevention and correction of such negative moments of spinal deformity correction as pelvic and shoulder tilt. Selection of type and scheme of osteosynthesis is differentiated and depends on the degree and type of deformity. Transpedicular screws are interconnected into support blocks, which are located at the base of deformity apexes, and if necessary – at the apex of deformity. Fixation of pelvic bones as a separate block is a support point for all corrective manipulations and allows correction of its tilt. Deformity correction is accomplished by compression-distraction between blocks of the fixator. Acute correction of spinal deformity up to 25% of the initial value is done on the operating table. Correction of sagittal deformity (kyphosis) is done by compression between blocks of the fixator located at the curvature arch base. Thoracoplasty and fixation fusion constitute treatment stages.

**Date: 2011-09-08**

**Session: Spine - Deformities I**

**Time: 14:00 - 15:30**

**Room: Club E**

**Abstract no.: 28182**

**THE APPLICATION OF SELECTIVE SCREW INSERTION AND CORRECTION ON THE CONVEX SIDE IN THE TREATMENT OF SCOLIOSIS**

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**Aim:** Summarize the clinical outcome of 106 cases of spinal scoliosis that underwent selective screw insertion and correction on the convex side. **Method:** In this study, total 106 cases with spinal scoliosis was defined including 45 males and 61 females. The average age was 16.8 years old. In this group, 41 cases were congenital scoliosis (including 33 cases of completely segmented lateral hemivertebrae and 8 cases completely segmented posterior hemivertebrae), 62 cases were adolescent idiopathic scoliosis and 3 cases were scoliosis with neuroinomatosis. The preoperative coronal Cobb's angle and sagittal Cobb's angle of primary curve were  $74.0\pm 15.20$  and  $31.3\pm 11.10$  respectively. Within the correction segments, the screws were selectively inserted with an interval of one or two vertebrae. One to three more screws were selectively inserted into the convex side of the primary curve when the vertebral osteotomy or hemivertebral resection was not necessary. One to four more screws were selectively inserted into the one to two segments proximal and distal to the resection site on the convex side. **Results:** The average follow-up period was 4.5 years, ranged from 1 to 8 years. In the final follow-up, the coronal Cobb's angle was  $21\pm 6.90$  and the correction rate was 74.6%. The sagittal Cobb's angle was  $20.2\pm 4.20$  and the correction rate was 35.6%. The average height increment was  $2.5\pm 1.1$ cm. During the follow-up period, the correction loss on the coronal plane and sagittal plane were  $3.1\pm 0.30$  and  $1.1\pm 0.20$  respectively.

**Date: 2011-09-08**

**Session: Spine - Deformities I**

**Time: 14:00 - 15:30**

**Room: Club E**

**Abstract no.: 30048**

**HIGHER DEGREES OF CURVE CORRECTION CORRELATE WITH WORSENERD SAGITTAL BALANCE**

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Introduction: Current treatment methods for AIS can have unintended negative effects on sagittal balance. The purpose is to investigate the correlation between coronal correction and sagittal balance at 2 years postop. Methods: Review of prospective multicenter dataset was performed to identify patients with AIS following PSFI. For 1053 patients with 2 year follow up demographic, clinical and radiographic measures were reviewed. Patients were grouped in two cohorts according to coronal correction >50% and <=50%. Results: Sagittal balance averaged -14.3 mm preoperatively and -23.4mm postoperatively. 490 (46.5%) patients demonstrated worsening sagittal balance at 2 years. The two groups had equal sagittal balance score at baseline (14.5 vs 13.6 mm; p=0.74). Patients with >50% major curve correction had significantly worse negative sagittal balance at 2 years when compared to those who had <50% curve correction (-24.5 vs -19.9mm; p=0.04). Only Lenke 1 curves showed a trend toward significant difference (p=0.066). When looking at lumbar modifiers only Lenke 1A curve's sagittal balance remained significantly affected after >50% correction was performed (p=0.03). Patients with sagittal modifier "N" with >50% correction had worsened sagittal balance at 2 years (p=0.03), and those with "+" (>40) curves showed a trend (p=0.08). Conclusion: 46% of patients treated for AIS experience significant worsening of sagittal balance at 2 years postoperatively, an effect that seems to be correlated with >50% of coronal correction. This association should be considered especially in Lenke 1 curves and in curves that have neutral or positive sagittal balance preoperatively.

**Date: 2011-09-08**  
**Session: Spine - Deformities I**  
**Time: 14:00 - 15:30**  
**Room: Club E**

**Abstract no.: 29827**

**THE INFLUENCE OF BRACE TREATMENT ON THE PULMONARY FUNCTION TEST IN ADOLESCENT IDIOPATHIC SCOLIOSIS**

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**Objectives:** To analyze the influence of brace treatment on the FVC and FEV1 parameters of pulmonary function tests (PFTs) in AIS. **Methods:** 349 patients were classified into two groups: group A-with preoperative brace treatment, 90 cases; group B-no preoperative brace treatment, 259 cases. Compare the differences of the PFTs between 2 groups. **Results:** The percentage of actual value and predicted value of FVC and FEV1 in group A and B were 80.4% and 86.9%, 85.5% and 92.7%, respectively. The patients with preoperative brace treatment had significant lower values (all  $P < 0.05$ ). This difference was significant in the patients with a primary thoracic curve ( $P < 0.05$ ), while not in the patients without a primary thoracic curve ( $P > 0.05$ ). In the 61 patients with a primary thoracic curve and preoperative brace treatment, there were negative correlation between the total length of brace treatment and the percentage of actual value and predicted value of FVC and FEV1 ( $P = 0.017$ ;  $P = 0.032$ ) and positive correlation between the sagittal Cobb angle of the thoracic curve and the percentage of actual value and predicted value of FVC and FEV1 ( $P = 0.000$ ;  $P = 0.000$ ). **Conclusions:** Preoperative brace treatment can reduce the actual values and the percentage of actual value and predicted value of FVC and FEV1 in thoracic AIS. The total length of brace treatment and sagittal Cobb angle of the thoracic curve may be the influential factors of the FVC and FEV1.

**Date: 2011-09-08**  
**Session: Spine - Deformities I**  
**Time: 14:00 - 15:30**  
**Room: Club E**

**Abstract no.: 29603**

**SPONTANEOUS DEROTATION OF THE LUMBAR CURVES DURING THORACIC CURVE CORRECTION AND COMPLEX GEOMETRIC SPINAL TORSION IN AIS**

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Introduction: Spontaneous lumbar curves correction is regular phenomenon during correction of thoracic main idiopathic scoliotic curve. We focused to prospective monitoring of spontaneous lumbar derotation and its relation to the complex geometric scoliotic spinal torsion. Material and Method: A total number of 31 patients with diagnosis of AIS Lenke 3 type, treated with thoracic curve correction from posterior approach, were prospectively evaluated with spiral CT and x-ray examinations. We measured apical vertebral rotation in both curves (spiral CT preop. and 4 month postop.) and coronal correction with Cobb angle measurement (X-ray preop., 3 days, 4 month and 3 years postop.). Finally we compare preop. with postop. sum of thoracic and lumbar apical vertebra rotation to come nearer to geometrical complex spinal rotation. In this way we established Rotational Index (RI). Results: Spontaneous derotation of lumbar curve was in average 5,9° (43.7%). An average spontaneous coronal correction of lumbar curve was 23° (67%). First group (23 pts. with an average value RI=1,15) demonstrated 3 y. postop. final loosening of correction in thoracic (primary surgically managed) curve of about only 2° (4%). On opposite site in second group (8 pts with an average value RI=0,89) there were the same loosening of about 12° (38%). Conclusion: Complex geometric spinal derotation (RI>1,0) allows long-term keeping of coronal correction and give good conditions for posterior bony fusion maturing. Better and more exact derotative methods allow more accurate correction and functional spinal status in future.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 27141**

**REDUCTION OF THE DOSE OF IONISING RADIATION IN NAVIGATED TRANSPEDICULAR SCREW PLACEMENT**

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**Introduction:** The purpose of this study was to compare a computer-assisted navigation to a conventional procedure in order to assess if it is possible to reduce radiation exposure while preserving accuracy of pedicular screw placement. **Methods** The first “conventional” group consisted of 30 patients. 1,9 segments of thoracolumbal spine were stabilized on average. Screws were inserted transpedicularly under fluoroscopic guidance. In the second “navigated” group of 30 patients, stabilization of 1,8 segments was performed on average. A CT-free 2D spinal navigation system was used intraoperatively. For each surgery (navigated or not), the irradiation duration, the surgery duration, and the screw positioning accuracy were recorded. **Results** The irradiation duration calculated to one vertebra (two screws) was significantly shorter in the second group ( $3,97 \pm 1,7$  seconds) than in the first group ( $14,41 \pm 6,7$  seconds). The surgery duration was meanly 7,5 minutes shorter in the first group (range, 4 to 12 minutes). All screws in both groups were placed accurately because of routinely very meticulous pedicle palpation before screw insertion. **Conclusion** During the conventional surgical procedure many X-ray images are made to control the accuracy of the screw insertion. Navigation allows in our hands to keep the same accuracy of pedicle screw placement reducing radiation exposure of the surgeons and operating room staff by close to  $\frac{1}{4}$ . In multiple level vertebral instrumentations this reduction is more pronounced. In centers where multiple cases of spine instrumentation are done the “saving” of exposure time can mount to hours.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 29585**

**CAUSES OF MALPOSITION OF CERVICAL PEDICLE SCREWS  
INSERTED WITH INTRAOPERATIVE 3D-IMAGE BASED NAVIGATION**

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(JAPAN)

Objective: The purpose of this study was to evaluate causes of malpositioning of cervical pedicle screws (CPSs) inserted using navigation. Methods: With the intraoperative-3D-image based navigation, 182 CPSs were placed in 46 patients. Retrospective investigation was performed using postoperative-CT scans for evaluation of causes of malpositioning of CPSs in those patients. In addition the relationship between the perforation rate and the distance from the vertebra attached on navigation reference frame (NRF) was evaluated. Results: Of the 182 CPSs, 21 (11.5%) were classified as Grade 1 (>50% of the screw's diameter located within the pedicle) and 10 (5.5%) were classified as Grade 2 (>50% of the screw's diameter located outside the pedicle). These malpositioned CPSs have occurred for following reasons: 14 were malpositioned because of the limitation to appropriate directing of the instruments by posterior cervical muscles, 5 due to hard medial cortical bone of pedicle, 5 due to navigational error, and 7 due to other errors. The perforation rate was 15.4% for the vertebra with NRF, 14.1% for the vertebrae above and below the vertebra with NRF, and 26.9% for the two vertebrae above and below the vertebra with NRF. Conclusion: Even with the current technologies, CPS malposition can occur due to various factors such as NE, the use of incompatible devices, and distance from NRF. Sufficient attention and awareness of the risk factors related to CPS malpositioning should be considered during every step.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 28976**

**HOW TO INCREASE THE ACCURACY OF CERVICAL PEDICLE SCREW PLACEMENT – ANALYSIS OF CONSECUTIVE 100 CERVICAL TRAUMA CASES TREATED BY A SAME SURGEON**

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**INTRODUCTION:** Cervical pedicle screw (CPS) system is a strong tool that provides rigid stabilization for unstable disease; however, misplacement of CPS may cause severe neurovascular complications. Increasing accuracy of CPS placement is an essential requirement in order to avoid the complications. The purpose of this study is to investigate the accuracy of CPS placement with our original “half-tapping technique”. <BR>**METHODS:** A total of 100 consecutive patients of cervical trauma treated with CPS by a same surgeon (first author) were evaluated. First screw hole around 15mm deep from the insertion point is made by a tap-drill which just reaches the transverse foramen or spinal canal even as a misdirection. After confirming the absence of breach using a fine feeler, full length hole is made. With breach, a correct screw hole is remade in a same procedure. Screw misplacement was classified as either grade-1 (under 50% of screw diameter outside of pedicle) or grade-2 (over 50% of screw diameter). <BR>**RESULTS:** A total of 365 screws were used in this consecutive study. Only one screw (0.27%) demonstrated grade-2 perforation, and 9 screws (2.46%) grade-1. There is no neurovascular complication. <BR>**CONCLUSIONS:** In order to elevate CPS to a common tool, establishment of safety measures is most important. Above all increasing accuracy of screw placement has the key to solve the problem. Our original half-tapping assessment technique is one of solutions for safety use of CPS.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 28494**

**PEDICLE SCREW PLACEMENT WITH O-ARM AND STEALTH NAVIGATION**

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Introduction: Various navigation systems are available to aid pedicle screw placement. The O-Arm replaces the need for fluoroscopy and generates 3-D, real-time transverse, coronal, and sagittal images of the spine, similar to CT scanning, that are downloaded to the Stealth Station. The objectives of this study were to evaluate (1) accuracy of pedicle screw placement using O-Arm/Stealth, (2) time for draping, positioning of O-Arm, and screw placement, (3) whether tapping improves screw trajectory accuracy, and (4) accuracy of intraoperative neuromonitoring. Methods: We evaluated pedicle screw placement using O-Arm/Stealth between February and August 2010. The times for draping, positioning the O-Arm, and screw placement were recorded. "Snap-shot" navigation images of the awl and O-Arm-CT scan confirmation images were analyzed for accuracy. Results: Of 188 screws (25 patients), 116 had adequate images for analysis. The average time for O-Arm draping was 3.5 minutes, initial O-Arm positioning was 6.1 minutes, and final positioning was 4.9 minutes. The mean time between array attachment and screw placement was 8.1 minutes/screw. The mean time for screw placement alone was 5.9 minutes/screw. Screw placements on final CTs were on average 3.14 mm deeper than on the O-Arm snap-shot navigation images. Three screws (2.5%) breached the medial cortex and three screws were misaligned. Neuromonitoring was normal in all cases, resulting in a 1.59% false negative rate. Conclusions: The use of O-Arm/Stealth was associated with a low rate of pedicle screw misalignment. The time to place screws was less than previously reported with CT navigation, but longer than conventional techniques. It is important to be aware of the potential discrepancy between snap-shot images and actual screw placement on CT-O-Arm. Our findings suggest that final screw positions may be deeper than awl positions appear on navigation.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 29848**

**EVALUATION OF THE PULMONARY COMPLICATIONS OF CONCAVE RIB OSTEOTOMIES IN SCOLIOTIC PATIENTS WITH RIGID CURVES IN SINA HOSPITAL 2001-2003**

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Background and object: To decrease the magnitude of the spinal curves, operations such as anterior or posterior releases can be use. Concave rib osteotomy is an example of posterior release. The main complication of this operation is pulmonary complications and related morbidities. In this study, the frequency of the pulmonary complications has been evaluated. Material and methods: the pulmonary complications of concave rib osteotomies were studied in a series of 14 patients in sina hospital in a 2 years period of time (2001-2003). After this operation each patients was observed. Results: 8 patients were females and 6 were males. During the operation 3 pleural tear were detected and chest tube was inserted. We had no pneumothorax and only one asymptomatic pleural effusion postoperatively. Conclusion: this operation is a simple one. If do valsalva maneuver and detect pleural tears intraoperatively pulmonary morbidities will not increase significantly. KEY WORDS: Scoliosis, Osteotomies, Pulmonary, Morbidity.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 30063**

**DO WE NEED TO KNOW SACRAL HIATUS ANATOMY FOR SUCCESSFUL CAUDAL EPIDURAL BLOCK?**

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Knowledge of sacral hiatus anatomy is imperative in clinical situations requiring caudal epidural block for various diagnostic and therapeutic procedures of the lumbosacral spine to avoid failure and dural injury. Aim was to evaluate various morphometric parameters of sacral hiatus for a successful epidural block. A detailed anatomic study of the sacral region was carried out on 56 male adult Indian cadavers. Dorsal surface of sacral region was dissected to study sacral cornua, sacral hiatus and the dimensions of triangle formed by the right and left posterosuperior iliac spines with apex of the hiatus. Midsagittal sections were subjected for various anatomical measurements. The angle of needle insertion and the depth of caudal space were noted. Cornu was not palpable bilaterally in 8 (14.3%) and palpable unilaterally in 13 (23.2%) specimens. Mean (standard deviation) distance between apex of hiatus and coccyx tip was 58.3 (8.3) mm and length of sacrococcygeal ligament was 34.4 (7.4) mm. The dimensions of the triangle were found to be interchangeable in 25 cadavers. The level of maximum curvature of sacrum was S3 in 38 (67.9%) of cases. The dural sac was found to terminate at S2 in 46 (82.1%). The mean (SD) angle of depression of the needle was 65.2 degrees (5.3) (range 57-79 degrees). The measurements described for the identification of the sacral hiatus, optimal angle of depression and depth of the needle may improve the safety and reliability of a caudal epidural block.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 30209**

**TREND OVER TIME AND FACTORS INFLUENCING BLOOD LOSS DURING POSTERIOR SPINAL FUSION IN AIS**

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The objectives of this study were to review the evolution of blood loss and the factors associated with increased blood loss over the last 18 years in a major university hospital center. Materials and Methods: This retrospective and prospective study was conducted on all patients with AIS who underwent a posterior spinal fusion. Preoperative Cobb angles, age, sex, menarche, type of instrumentation, upper and lower levels of instrumentation, number of instrumented vertebrae, surgeon, cell saver use, hemodilution, number and type of implants and anaesthesia and surgery durations were analysed. Linear regression analyses were performed. Results: A total of 470 patients with AIS were treated surgically over the period: age=15.0±2.0, 420 girls. Blood loss decreased significantly from year to year (p=0.001). Blood loss was shown to be significantly decreased by sex (girls -379 cc's, p=0.043), menarche (-376 cc's, p=0.004) and pre-op hemoglobin (-7cc's/dg of Hg, p=0.045). Factors increasing blood loss were the total number of vertebrae included in the fusion (+114 cc's/level instrumented, p≤0.001), use of cell saver (+369cc's, p≤0.001), use of hemodilution (+192cc's, p=0.034) and surgery duration (6cc's/min, p≤0.001). The total number of implants, even if increasing from year to year (p≤0.001) decreases overall blood loss (-23cc's, p=0.046). Conclusion: Overall, blood loss during AIS surgery decreased significantly over the analyzed period. Post-menarchal females with higher pre-op hemoglobin seem to have less blood loss. The number of vertebrae included in the fusion significantly increased blood loss while more complex instrumentation (screws vs. hooks) and total number of implants did not.

**Date: 2011-09-08**

**Session: Spine - Complications in Spine Surgery**

**Time: 16:30 - 18:00**

**Room: Club E**

**Abstract no.: 27411**

**EFFECT OF INTRAMUSCULAR INJECTION OF BOTULINUM**

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Background: Low back pain is a challenge in daily clinical activity. The prognosis for single episodes of acute pain is good, but many patients have persistent/recurrent illness, often characterized by a complex pattern of somatic, psychological and social factors. Several methods have been used to treat chronic low back. Here we examined the effect of intramuscular injection of botulinum neurotoxin type a (BTX- A) in chronic low back pain. Method: Study design a randomized, double-blind, Patients were assigned to one of 2 groups. One group received local injections containing normalsaline only; the other group, local injection of BTX-A. 20 women and 17 man, aged 24 to 62 years (mean 45.6 years) with low back pain of 6 months included. Pain were assessed with Oswestry scale at baseline (before injection), 3 weeks, and 8 weeks after injection of normal saline and BTX-A into varies part of para-spinal muscles (between L1 and S1) bilaterally,The dose per site 500 units. Result: Significant improvement in back pain occurred at 8 weeks after treatment with BTX-A. Conclusion: Botulinum toxin A improves refractory chronic low back pain with a low incidence of side effects.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 28833**

**BLOOD SAVING TECHNIQUES DURING PRIMARY TOTAL KNEE REPLACEMENT**

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Background: The traditional use of pneumatic tourniquets and reinfusion drains in Total Knee Replacement (TKR) has recently been challenged and many studies have reported considerable doubt with respect to the benefits of their usage. Aim of our study was to compare the outcomes of three different blood management techniques in primary TKR. Materials and Methods: We prospectively examined 87 patients who underwent a primary TKR, using the same implant. Patients were randomised into three groups; Group A: 29 patients without the use of tourniquet and reinfusion drain; Group B: 27 patients without the use of tourniquet and reinfusion drain but application of intraoperative cell salvage system; Group C: 31 patients with the use of tourniquet and reinfusion drain. All groups were matched for age, sex, pre-operative haemoglobin levels, range of knee movements and pre-operative anticoagulant usage. All patients were assessed at the second post-operative day. Results: There was no significant difference between the post-operative haemoglobin drop, allogenic blood transfusion rate, degree of swelling, skin bruising and knee range of movement. Only 2 patients in Group C had post-operative thromboembolic events (DVT, TIA). Readmission rate due to knee stiffness and superficial wound problems did not reveal any significant difference within each group. The average operative time and hospital stay were the same in all groups. We did not record any complications such as wound haematoma and deep infection. Conclusions: All techniques are safe and it is the surgeon's choice as to which one they use routinely in their clinical practice.

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**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 28225**

**A COMPARATIVE STUDY OF USE OF TOPICAL VERSUS INTRAVENOUS  
TRANEXAMIC ACID FOR MINIMISING BLOOD LOSS IN CARDIAC  
PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY**

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Total Knee Arthroplasty is a surgery which is being performed in increasing numbers the world over, due to increased life expectancy of the patients, and due to their demands for a more productive, active and pain-free life. It is also true that the age-group that undergo this surgery belong in majority to the geriatric group. Many of these patients have associated cardiac problems, and are under cardiac care. Also, since TKA leads to bleeding post-operatively and the geriatric patients may already be anemic, control of blood-loss also becomes a very important issue. The use of traditional methods of minimizing blood loss by using Tranexamic Acid intravenously is contraindicated in the patients having associated cardiac problems. This led us to use Tranexamic Acid topically for such patients. The use of Tranexamic Acid topically gives comparable results to its intravenous use in terms of minimizing blood loss. The use of Tranexamic Acid topically minimizes the systemic absorption of Tranexamic Acid and its associated side-effects on the cardiac condition of these potentially high-risk patients, while affording comparable benefits in terms of minimizing blood loss. The use of topical versus intravenous Tranexamic Acid for minimizing blood loss after TKA in cardiac patients is discussed in this paper.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 29922**

**THE COMPARISON OF AMOUNT OF BLOOD FROM WOUND DRAINAGE AFTER TKA BETWEEN POSTOPERATIVE CAST IMMOBILIZATION AND NON IMMOBILIZATION: A RANDOMIZED CONTROLLED TRIAL**

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This study compared the blood from suction drainage after TKA between postoperative cast immobilization and non immobilization. A consecutive series of 142 knees in 142 osteoarthritis patients who required TKA were randomly divided in long leg cast group and non-cast group (webril and elastic bandage wrapped). Both groups were removed their restrained at 3 days postoperation. The volumes of blood from suction drainage were recorded for 24 hour after operation. Maximum knee flexion at 8 weeks postoperative and wound complications were also evaluated. There were 69 knees in cast group and 73 knees in non-cast group. The mean  $\pm$  SD of blood loss in cast group was  $324.7 \pm 129.3$  ml and non-cast group was  $546.8 \pm 122.2$  ml. The mean difference in drainage blood lost between cast and non-cast group were 222.1 ml ( $p < 0.05$ ). More maximum knee flexion at postoperative 8 weeks was gained in cast group ( $p < 0.05$ ). Wound complications were more in non cast group but not statistically significant ( $p = 0.497$ ). The immobilized knee with long leg cast after total knee arthroplasty can significantly decrease blood loss from suction drainage when compared with patients who do not use. It is the method that safely reduces blood loss without compromise to postoperative range of motion. However, the disadvantage of cast application such as patient discomfort and additional cost may compromise the patient satisfaction.

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**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 29115**

**THE EFFECTS OF PRE- AND POST-OPERATIVE HAEMOGLOBIN ON TRANSFUSION REQUIREMENTS AND LENGTH OF STAY IN PATIENTS UNDERGOING A TOTAL KNEE REPLACEMENT**

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**Aim:** The aim of this study was to determine the effects of pre and post-operative haemoglobin (Hb) on blood transfusion requirements in patients undergoing total knee replacement (TKR) and to investigate whether the need for blood transfusion affects length of stay (LOS). **Patients and Methods:** This is a retrospective analysis. All patients who underwent primary TKR at our institution between January 2008 and August 2009 were included (n=431). The medical records were reviewed and pre-operative and first post-operative Hb, Hb drop and LOS recorded. Spearman's rank correlation coefficient was used to compare Hb with LOS. **Results:** A lower pre-operative and post-op Hb were shown to increase LOS ( $p<0.001$ ). Hb drop did not significantly affect LOS. A one-way ANOVA was used to compare mean Hb in those receiving and not receiving transfusions. Results showed that mean pre-op Hb (g/dl) in those who received a transfusion was 12.23 and 13.58 in those who did not ( $p<0.001$ ). Mean post-op Hb was 9.55 and 10.95, respectively ( $p<0.001$ ). Patients with pre-op Hb of 12-15 were shown to have a 5% chance of requiring a transfusion, while those with Hb  $<12$  had a 30% chance. Requirement for a transfusion was associated with a LOS increase of 3.6 days ( $p<0.001$ ). **Conclusion:** Requirement for a transfusion and lower pre and post-operative Hb are significantly associated with prolonged LOS. In addition, pre-operative Hb  $<12$  significantly increases the risk of needing a transfusion following TKR.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 28533**

**POSTOPERATIVE BLOOD LOSS REDUCTION IN COMPUTER-ASSISTED SURGERY TOTAL KNEE REPLACEMENT BY INTRA-ARTICULAR TRANEXAMIC ACID INJECTION TOGETHER WITH 2-HOUR CLAMP DRAIN: A PROSPECTIVE TRIPLE-BLINDED RANDOMIZED CONTROLLED TRIAL**

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A prospective triple-blinded randomized study was conducted to evaluate the effect of intra-articular tranexamic acid injection compared with intra-articular saline injection in 48 patients who underwent computer-assisted surgery total knee replacement (CAS-TKR). Patients were assigned, by computer-generated blocked randomization, to receive either of a mixed intra-articular solution of tranexamic acid 250 mg and physiologic saline (TXA group), or physiologic saline (control group). The mean postoperative drainage volume, total hemoglobin loss and calculated total blood loss in TXA group were 308.8 ml, 2.1 g/dl and 206.3 ml compared to 529.0 ml, 3.0 g/dl and 385.1 ml in the control group ( $p = 0.0003$ ,  $0.0005$  and  $< 0.0001$  respectively). Allogenic blood transfusion was needed in one patient (4.2%) in TXA group and for eight patients (33.3%) in the control group. Postoperative knee scores were not significantly different between groups. No complication such as deep vein thrombosis, infection or wound complication was detected. Intra-articular tranexamic acid injection with clamping drain was effective for reducing blood loss and blood transfusion in CAS-TKR.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 29372**

**THE PERCENTAGE OF POLYMORPHONUCLEAR CELLS (PPMNC) IN SYNOVIAL FLUID SUSPICIOUS FOR PROSTHETIC JOINT INFECTION(PJI) CAN PREDICT REVISION SURGERY AFTER TOTAL KNEE REPLACEMENT(TKR) IN EARLY POSTOPERATIVE STAGE**

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After TKR surgery, PJI is one of the most common causes of revision TKR and it is reported in 0.4 to 2 % of patients who underwent TKR. Because there can be postoperative inflammation and edema normally, it is difficult to diagnose a PJI in the early postoperative stage. It is reported that in spite of early PJI, revision TKR was not needed in approximately two thirds of patients after debridement surgery. Any parameter which predicts PJI within 4 weeks after TKR has not been reported, as far as we know. So we evaluated whether synovial fluid suspicious for PJI in the early postoperative period could predict revision TKR. Method: We reviewed 24,766 patients who underwent TKR and identified 333 cases that had a knee aspiration within 4 weeks of surgery for being suspected as PJI. Revision surgery was recommended in 19 cases and performed in 15 cases. Mean FU duration was 3.4 years. Results : In univariate test, serum white blood cell(WBC) count, PPMNC, synovial WBC count and PPMNC were statistically significant variables that affected revision surgery.(P<0.05) In multivariate test, the only statistically significant variable was synovial PPMNC.(P=0.30) In receiver operating characteristic curve analysis, optimal synovial PPMNC cutoff was 92.5%(sensitivity 79%, specificity 77%) for predicting revision surgery. Conclusion: With a cutoff of 92.5%, synovial PPMNC predicted revision surgery after TKR with sensitivity 79% and specificity 77%. This variable was also statistically significant in multivariate logistic regression test.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 29169**

**BIOTRANX: A BIOMECHANICAL STUDY OF THE EFFECT OF TOPICAL TRANEXAMIC ACID ON ARTIFICIAL JOINTS**

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Tranexamic acid (TXA) has been shown to be an effective way in reducing blood loss and blood transfusion when used intravenously, orally or topically. Historically, there have been unfortunate consequences associated with artificial joint interventions when unexpected and unwanted chemical or physical reaction developed leading to massive wear and joint failure. Methodology: Testing specimens made of Cobalt- Chromium and UHMWPE were soaked with saline and TXA for 48 hours. The following biomechanical properties were compared between the two groups: 1. Tensile properties: a. Ultimate strength. b. Stiffness. c. Young Modulus. 2. Wear rate using a multi-directional pin-on-plate machine. 3. Surface topography: a. Surface roughness (Ra) b. Peak-Valley Value (PV). Results The test showed that the stiffness, elastic Young's modulus, load to break value and stress at break were not affected by the fact the specimens were soaked with TXA or saline;  $P=0.740$ ,  $0.740$ ,  $P=0.523$ ,  $P=0.526$  respectively. The wear test involved two multidirectional pin-on-plate machines with 8 stations. After 4 millions cycles, there was no statistically significant difference between the means wear factor between the plates and pins that were soaked in saline or the ones that soaked in TXA  $P=0.768$  and  $P=0.677$  respectively. There was no significant difference in the peak valley distance (PV) and surface roughness (Ra) between the two groups.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 29164**

**A RANDOMISED CONTROLLED TRIAL OF THE TOPICAL TRANEXAMIC ACID IN TOTAL HIP REPLACEMENT**

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University Hospital of North Tees and Hartlepool, Stockton-On-Tee (UNITED KINGDOM)

The aim of this study was to investigate the effect of topical TXA on blood loss and blood transfusion in THR. Design: A double blind randomised controlled trial of 159 patients who underwent unilateral primary THR. OUTCOME MEASURES: Primary outcome: • Blood transfusion required (number of patients needed blood transfusion and number of units of blood transfused until patient is discharged). Secondary outcomes: •drain blood loss (First 48 hour). •Haemoglobin and Haematocrit drops. •General quality of life measure (EUROQOL) preoperative and at 3 months postoperative. •Oxford hip score preoperative and at 3 months postoperative. •Length of stay. •Cost effectiveness analysis. •Complications. Results: There was a significant difference in the amount of blood loss and blood transfusion rate in favour of TXA. Twenty four patients out of 87 who received a placebo needed blood transfusion versus 7 out of 72 who received TXA ( Chi Square  $P=0.005$ ). The mean blood loss in the placebo group was 380 ml versus 265 (95% CI: 35.7 to 195.8 ml;  $P=0.005$ ). Length of stay was not statistically different between the two groups. There was no significant difference other outcomes. In conclusion, TXA reduced the blood loss and transfusion rate in THR. However it is not as effective as in TKR. This is probably because the TKR is performed in a bloodless field using a tourniquet.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 28835**

**IS ROUTINE USE OF ANTICOAGULANT CHEMOPROPHYLAXIS IN JOINT REPLACEMENT ARTHROPLASTY JUSTIFIED: A CLINICAL STUDY**

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Background: To evaluate the routine prophylactic use of low molecular weight heparin (LMH) in patients undergoing joint replacements. Material & Methods: A prospective cohort of 200 patients undergoing hip or knee replacements who did not receive any prophylactic LMH and a retrospective cohort of 200 patients who received routine prophylactic LMH were included in two groups A & B respectively. Colour Doppler was done 100 patients from group A in the preoperative period and on 4th postoperative day. Results: No symptomatic DVT was found in any patient. Doppler ultrasound showed DVT in two of 100 cases from group A however these two patients had no signs or symptoms of thromboembolism. Out of 200 cases of group B, post operative excessive bleed loss in wound drain was seen in 24(12%) cases, wound hematoma and surrounding tissue staining were seen in 52 cases (26%), postoperative infection was seen in 10 cases (5%), epidural bleeding was seen in 4 cases (2%) and nonfatal intracranial bleeding was seen in one patient (0.5%). From group A only two patients had post operative infection (2 %) and no other significant complications were seen in this group. Conclusion: Routine prophylactic use of LMH in patients with joint replacements is associated with transfusion of more units of blood, drainage of persistent wound hematoma, delayed wound healing and wound infection. Therapy is expensive; it increases hospital stay and does not change the incidence rate of fatal pulmonary embolism.

**Date: 2011-09-08**

**Session: Knee - Blood Loss Control**

**Time: 14:00 - 15:30**

**Room: Club H**

**Abstract no.: 28843**

**CLINICAL EFFICACY AND SAFETY OF CONTINUOUS INTRA-ARTICULAR LEVOBUPIVACAINE INFUSION FOLLOWING KNEE ARTHROPLASTY**

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**Introduction:** Our aim was to assess the safety and efficacy of continuous intra-articular Levobupivacaine infusion following Knee Arthroplasty (KA), and the need for post-operative patient controlled analgesia (PCA) and nerve blocks (NB). **Materials and Methods:** Fifty consecutive patients undergoing cemented KA who received a continuous postoperative infusion of 0.25% Levobupivacaine at a rate of 5ml/hr for 48h (Infusion Group = IG) were compared to 47 patients who underwent KA (following similar rehabilitation regimes) and had received other modalities of post-operative analgesia (Control Group = CG). Data regarding pain scores, satisfaction scores, mobilisation pain, length of hospital stay (LOS), complications and the use of opioids, PCA or NB, was collected prospectively by an independent observer. **Results:** There was significant reduction in post-operative mobilisation pain in the first 48h in the IG compared to the CG ( $p < 0.05$ ). No patient in the IG received PCA compared to all patients in CG. Patients in the IG received a lower total post-operative dose of opioids. Patients in the IG did not have increased complication rates. LOS was shorter in the IG but that did not reach statistical significance. In the IG, patients who did not receive NB ( $n=7$ ) had higher pain scores than those who did ( $p < 0.05$ ). All patients in the CG received NB. **Conclusions:** We believe that the use of a continuous intra-articular infusion of 0.25% Levobupivacaine (rate of 5ml/hr) for 48h post KA significantly reduces pain on mobilisation and need for concomitant use of opioid analgesia.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 28094**

**EFFECTS OF STRONTIUM RANELATE OR BISPHOSPHONATE TREATMENT ON FRACTURE RISK IN WOMEN AGED 80 AND OLDER: META-ANALYSIS**

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**Aims:** Women over 80 years of age constitute 10% of the population but contribute 60% of all non-vertebral fractures. The aim of this meta-analysis is to address the anti-fracture efficacy of bisphosphonates in women over 80 using pooled data from the key regulatory trials. **Methods:** A systematic search was undertaken up to December 2010 to identify regulatory trials comparing strontium ranelate, risedronate, or zoledronate versus placebo, and providing data for both incident vertebral and non-vertebral fractures at 3 years in women aged 80 and older. Meta-analyses were conducted with random-effect models. **Results:** We identified 3 regulatory trials providing data in 1940 women. For vertebral fractures, the pooled risk differences were -7.4% (-11.6 to -3.1%) for strontium ranelate versus placebo and -8.2% (95%CI, -11.7 to -4.7%) for bisphosphonates versus placebo, with a number needed to treat of 14 (9 to 32) and 13 (9 to 21), respectively. For non-vertebral fractures the difference was -5.6% (-9.4 to -1.7%) for strontium ranelate versus placebo, with a number needed to treat of 18 (11 to 57). By contrast, the pooled difference for bisphosphonates versus placebo of -1.4% (-4.1 to +1.3%) was not consistent with an effect of bisphosphonates on fracture risk at 3 years. **Conclusion:** While strontium ranelate has documented anti-fracture efficacy against vertebral and non-vertebral fractures in women over 80 years of age with postmenopausal osteoporosis, similar evidence is lacking with bisphosphonates, even when pooling data from different trials. These findings are potentially consistent with recently reported differential effects on cortical bone.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 29303**

**X-RAY ABSORPTIOMETRY INDEXES FOR WOMEN IN POST-MENOPAUSAL PERIOD WITH OSTEOPOROTICAL FRACTURES**

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**Aim:** To estimate structural and functional condition of bone in women in postmenopausal period with osteoporotic fractures, compare the results to referent data for Ukrainian population and to compare the results of X-ray absorptiometry to the fracture risk rate, assessed by FRAX for women in postmenopausal period with osteoporotic fractures. **Object.** 39 women in postmenopausal period aged 50-89 years with forearm (18) and proximal hip (21) fractures, who were on treatment the Traumatology Department #1 of Lviv City Clinical Hospital of Ambulance. They were divided into 4 categories by age (50-59[13];60-69[12];70-79[9];80-89[5]). **Methods:** Nordin Index was measured with the "Osteolog" workstation, developed in the Institute of Gerontology AMS Ukraine under the direction of Professor Povoroznyuk V.V. Fracture risks were estimated using FRAX. **Results:** We found lower cortical indexes for women in postmenopausal period with osteoporotic fractures for 50-59 (Common IN=0,41), 60-69(Common IN=0,40), 70-79 (Common IN=0,36), 80-89(Common IN=0,33) age groups in comparison to referent data for Ukrainian population. Also we found lower cortical indexes for women in postmenopausal period with higher risk of osteoporotic fracture, assessed by FRAX, independent of age. **Conclusion:** Thus, low cortical indexes, measured with the "Osteolog" workstation are reliable predictors of high fracture risk. There is a significant correlation between low cortical indexes and high fracture risk, assessed by FRAX.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 27888**

**TIMING FOR ADMINISTRATION OF BISPHOSPHONATE (RISEDRONATE)  
AFTER THE OPERATION ON PATIENTS WITH HIP FRACTURE AND  
OSTEOPOROSIS**

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For the patient of osteoporotic hip fracture, early treatment of osteoporosis is mandatory to prevent the secondary hip fracture. However, this could lead to unexpected clinical results because the bisphosphonates might inhibit the fracture-healing. The aim of this study was to investigate whether the timing of administration of these agents after surgery might influence the fracture healing and complication rates. Materials and methods: We included 71 osteoporotic patients with intertrochanteric fractures who underwent osteosynthesis in a prospective study for one year. Three groups were randomized according to the timing of administration of bisphosphonates (Risedronate) after surgery: group 1 (one week), group 2 (one month) and group 3 (three months). The outcome of fracture healing was assessed by clinical and radiological bone union and the visual analog scale (VAS) scores (6 months after surgery). Complications regarding the failure of fixation and the mortality rates were compared among three groups. Results: The timing for clinical and radiologic union among 3 groups showed no significant differences ( $p>0.05$ ). The VAS score at 6 months after surgery were not significant differences among 3 groups ( $p>0.05$ ). Complication regarding the fixation loss and mortality rates were not significant differences among three groups ( $p>0.05$ ). Conclusion: The timing of administration of bisphosphonates after surgery had clinically no influence to the fracture healing and the incidence of complication in the hip fracture with osteoporosis. Therefore, early treatment of osteoporosis after surgery should be performed to prevent the secondary osteoporotic hip fractures in those patients.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 28553**

**COMPARISON BETWEEN SINGH'S INDEX AND PHALANGEAL BMD IN PATIENTS OF FRACTURE PROXIMAL FEMUR WITH REFERENCE TO OSTEOPOROSIS**

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Introduction: Osteoporotic fractures are common and associated with significant morbidity and mortality. Diagnosis and treatment of osteoporosis prior to osteoporotic fracture has significant impact on osteoporosis management. Current recommendations of diagnosis and treatments for osteoporosis are based on costly DEXA technology. Grading of X-rays as per Singh's Index is also an affordable and accessible tool for diagnosis of Osteoporosis. This study aims to evaluate usefulness of Singh's index to diagnose osteoporosis in patients of fracture proximal femur compared to phalangeal BMD. Material and Methods: This comparative study was carried out on 150 patients of fracture proximal femur. Preoperative radiographs of Pelvis with both hips AP view with 15 degrees internal rotation, neutral flexion; neutral abduction and standard focus were taken. Five observers were blinded to apply Singh's index on non fractured side. All X-rays were subjected to revaluation by same observers twice at interval of 2 weeks keeping placards of Singh's Index in front of them for ready reference. Phalangeal BMD measured by "accuDEXA" (Schick technologies). Results: Mean inter-observer and intra-observer agreement with use of placards for ready reference was 0.94 (kappa) and 0.99 (kappa). Positive predictive value, negative predictive value, sensitivity and specificity were found to be 99.6%, 96.9%, 98.7%, 99.1% respectively. We found significant correlation between Singh's index and BMD. ( $r = > 0.9$ ). Conclusion: Singh's Index is accessible diagnostic test for osteoporosis and has similar efficacy as compared to bone mineral density measurement by DEXA technology especially if Placards are used for ready reference while grading. Key words: Osteoporosis, BMD, Singh's Index.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 27266**

**DISTRIBUTION OF ATYPICAL FRACTURES AND CORTICAL STRESS LESIONS ASSOCIATED WITH BISPHOSPHONATE THERAPY**

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**Background:** This study defines the distribution of atypical fractures and cortical stress lesions associated with prolonged bisphosphonate therapy, with a view toward recommendations for radiological screening and surgical stabilization techniques. **Patients and Methods:** A retrospective radiological review of 44 patients, aged 69 years (47-92 yrs, SD 10.6 yrs) with atypical femoral fractures in association with prolonged bisphosphonate therapy presenting from May 2004 to March 2010 was performed. **Main outcome measures:** • Absolute distance and ratio (of entire femur length) of each lesion from the greater trochanter • Occurrence of stress risers in follow-up radiographs of surgically stabilized lesions. **Results:** There were 34 right femoral lesions, with 29 in the metaphyseal-disphyseal region. These averaged 106.4 mm (67.0-270.4, SD 52.2 mm) from the greater trochanter at 23.8% ( 15.7 to 58.6, SD 11.2%) of the whole femur length. The left femur exhibited a symmetrical distribution with 34 lesions, with 23 being in the metaphyseal-disphyseal region. These averaged 109.9 mm (73.6-291.2, SD 50.8 mm) from the greater trochanter at 24.4% (16.3 to 66.3%, SD 11.1%) of the whole femur length. All lesions were located in the lateral cortex. Five stress risers requiring revision plating were encountered with extra-medullary fixations. **Conclusion:** Atypical femoral fractures and stress lesions are clustered in the upper two-thirds of the femur shaft. Screening radiographs should include the entire femur. The use of long, antegrade intramedullary devices for surgical stabilization appears a better option.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 29298**

**VITAMIN D-DEFICIENCY AND INSUFFICIENCY IN UKRAINIAN POPULATION**

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To determine the frequency of vitamin D-deficiency and insufficiency in people not previously treated with vitamin D. There were examined 450 patients from different regions of Ukraine (mean age  $57,0 \pm 13,7$  yrs.). 25(OH) vitamin D3 and PTH level evaluated by Elecsys 2010. BMD was examined by ultrasound densitometry (HOLOGIC, Sahara). The study showed that 85.4% examined people had deficiency of vitamin D, 13.9 %-insufficiency and 0.7 % normal level of 25(OH) vitamin D3. The mean level of 25 (OH) vitamin D3 was ( $42,66 \pm 16,68$ ) mmol/l in people of western part, ( $27,08 \pm 14,96$ ) - in central and ( $29,64 \pm 14,58$ ) -- in eastern part of Ukraine. The difference between the groups wasn't significant. 9.9 % people had higher than normal level of PHT. It was found significant correlation between PHT and 25(OH) vitamin D3 ( $r=-0.11$ ,  $p=0.049$ ). No significant correlation between 25(OH) vitamin D3 level and BMD ( $r=-0,06$ ,  $p=0,27$ ) or Stiffness ( $r=0,17$ ,  $p=0,71$ ). 85.4 % examined people had deficiency of vitamin D, 13.9 % - insufficiency and 0.7 % normal level of 25(OH) vitamin D3. No significant difference in mean levels of 25(OH) vitamin D in patients from different regions of Ukraine. 9.9 % people had higher level of PHT. It was determined significant correlation between 25(OH) vitamin D3 and PTH. No correlations between 25(OH) vitaminD3 level and ultrasound densitometry data.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 30084**

**COMBINED PUBIC RAMI AND SACRAL OSTEOPOROTIC FRACTURES**

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Pelvic osteoporotic fractures (POFs) are associated with considerable morbidity and mortality, in addition to prolonged rehabilitation and high costs. The most common sites of POFs include the pubic rami and the sacrum. Combined pubic rami and sacral osteoporotic fractures (SOFs) have been reported previously with varying comments on the mechanism of injury and incidence. Aim of the study: To evaluate the mobility, discharge destination, presence of back pain and length of stay of patients who sustained combined pubic rami and SOFs and to identify the significance of this association. Methods: We prospectively studied 67 patients with low-impact pubic rami and/or SOFs over 12 months. The patients were over 60 years of age and were assessed by the fracture liaison service. MR imaging or bone scan were done when there was back pain or lumbo-sacral tenderness. Results: There were 54 (80.4%) female and 13 (19.6%) male patients and the average age was 87.5 years (Range 65-96). The mean length of stay was 45 ( $\pm$ 35) days. Mortality rate was 10.4%. There was a significant relationship between low back pain and the presence of sacral fracture. Patients with combined pubic rami and SOFs showed significantly longer length of stay than those with isolated pubic rami fractures. Conclusion: We recommend considering the high association between SOFs and pubic rami fractures and the presence of back pain in planning the management of patients with POFs and their rehabilitation, which would potentially exhaust resources, due to their significantly increased length of stay and reduced mobility.

**Date: 2011-09-08**  
**Session: Osteoporosis**  
**Time: 16:30 - 18:00**  
**Room: Club H**

**Abstract no.: 28417**

**EFFECT OF “BIVALOS” THERAPY ON LOWER LEG LENGTHENING IN RABBITS AT PRESENCE OF BONE OSTEOPOROSIS**

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**Aim:** Determine the effect of Bivalos therapy on formation and restructuring of distraction regenerate during lower leg lengthening in rabbits. **Methods:** Lower leg in all groups of rabbits was lengthened by 10mm according Ilizarov method. "Classical" lengthening was performed in the first control group (4 rabbits). In the second control group (5 animals) osteoporosis was created (ovariectomy, hypodynamia, dietotherapy). In the first experimental group (6 animals) Bivalos was inserted (800mg peroral) starting from the fifth day after surgery and till removing the animal from the experiment. In the second experimental group (5 animals) osteoporosis was created and Bivalos was inserted. Radiography was performed before surgery, on the 1st, 10th, 15th, 25th, 35th and 45th days after surgery. Morphological investigation was performed on 25th, 35th and 45th postoperative day. **Results:** According to radiological research in rabbits who received Bivalos therapy, formation and organotypic reorganization of distraction regenerate were accelerated: formation of cortex occurs on 30th day of fixation. The group were animals don't taken the drug, the formation of cortex happened to 45th day of fixation. According to morphometric data while Bivalos use, growth of relative area of bone trabeculae was 30% in healthy animals and 10% animals with artificially created osteoporosis. **Conclusion:** The preliminary data show that the Bivalos use accelerates organotypic reconstruction of distraction regenerate, and increases the density of newly formed cortical bone both in the presence of osteoporosis and without it.

**Date: 2011-09-09**  
**Session: Hip - Metal-on-Metal Bearing**  
**Time: 08:00 - 09:30**  
**Room: Forum Hall**

**Abstract no.: 28804**

**NINE-YEAR CLINICAL EXPERIENCE WITH METAL-ON-METAL HIP RESURFACING**

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Introduction: As literature reports document contradictory results on the use of metal-on-metal hip resurfacing (MOMHR), we wanted to describe our clinical results for this procedure up to 9 years. Methods: Our single surgeon series includes 550 patients (592 hips) treated with Birmingham Hip Resurfacing (BHR) and 259 patients (262 hips) treated with the Adept Hip System. Standard acetabular cups were used in 828 hips, cups with supplementary screw fixation were used in 26 hips. The study includes 536 men and 273 women. Primary diagnoses included 621 osteoarthritis, 48 avascular necrosis, 110 congenital dysplasia, 4 Perthes disease, 5 rheumatoid arthritis patients, and 21 post-traumatic pathologies. Mean age was  $53.77 \pm 2.1$  years (16-82). All surgeries were performed using a postero-lateral approach. Results: Mean acetabular component inclination angle was  $43^\circ$ . The femoral component was implanted with a mean valgus of  $6.6^\circ$  compared to the femoral neck/shaft angle. The average preoperative Harris hip score improved from  $48 \pm 10$  to  $95 \pm 12$  at the latest follow-up. Eleven hips were revised (1.3%), 6 because of femoral neck fractures, 1 because of a pseudotumor which developed two years after surgery, 1 because of progressive loosening of the femoral component, and 2 due to mechanical loosening of the acetabular components. Technical errors were identified as being responsible for 8 out of the 11 revised hips. Three hips dislocated within 3 weeks of surgery and were successfully treated with closed reduction. Discussion and conclusion: MOMHR is a viable surgical indication. In order to optimize outcomes and minimize complications, surgical accuracy is fundamental.

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 29552**

**EARLY RESULTS OF TREATMENT OF ADVERSE REACTION TO METAL DEBRIS**

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Introduction: Adverse reaction to metal debris (ARMD) is an increasingly recognised complication of metal-on-metal hip arthroplasty. A previous study described poor results following revision and recommended early intervention<sup>1</sup>. We determined the outcome of revision for ARMD and present the largest series to date. Methods: Between 2005 and 2010, 98 patients (101 hips) underwent revision for ARMD. Patients were reviewed at 3, 6 and 12 months and annually thereafter. Patient satisfaction, Harris hip scores (HHS) and metal ions were analysed. Results: 54 patients (55 hips) with an average age of 58 years (29 to 81 years) completed minimum one year follow-up (range 1 to 5 years). The mean HHS improved from 49.7 (10 to 79) to 86.3 (40 to 100). Forty-five (81%) patients were satisfied and nine (16%) patients were not satisfied with the outcome. The mean serum cobalt 24.5 (1.65 to 96.6) improved to 1.17 (0.31 to 6.99). Two patients died from unrelated diseases. There were 8 (14%) dislocations and one (1.8%) sciatic nerve palsy. Eight (14%) patients needed re-revision (dislocation: 5 and pain: 3). 26 % had severe soft tissue damage. Discussion: Treatment of ARMD is technically demanding because extensive soft tissue damage can compromise stability. Early intervention reduced the dislocation rate in this series. A small group of patients may have persistent pain and recurrent effusions that may require re-revision. Reference: 1) Grammatopoulos et al. Hip resurfacings revised for inflammatory pseudotumour have a poor outcome. JBJs (Br) 2009; 91-B: 1019-24.

**Date: 2011-09-09**  
**Session: Hip - Metal-on-Metal Bearing**  
**Time: 08:00 - 09:30**  
**Room: Forum Hall**

**Abstract no.: 28157**

**ACCURACY, SENSITIVITY, SPECIFICITY AND PREDICTOR VALUE OF SERUM METAL IONS FOR DIAGNOSIS OF ARMD IN MOM HIP**

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Purpose: To establish the relation of conclusive Metal Artefact Reduction Sequence (MARS) hip MRI with serum metal ions for Adverse Reactions to Metal Debris (ARMD) based on Medicines and Healthcare products Regulatory Agency (MHRA) guidance of serum metal ions ( $\geq 7 \mu\text{g/L}$ ) and local protocols with lower threshold ( $\geq 3.5 \mu\text{g/L}$ ). Method: A retrospective review of investigation for painful MoM hips with MARS-MRI and serum metal ions over two year period. Results: Eighty nine patients had both investigations of painful metal-on metal hips. Median Serum Cobalt and Chromium level were  $3.66 \mu\text{g/L}$  (0.06 -335.6) and  $3.66 \mu\text{g/L}$  (0.24-163.0) respectively. Thirty six (40.44%) scans were positive for ARMD. Increased serum metal ions based on MHRA Guidance had Accuracy: 64%, Sensitivity: 50%, Specificity: 73.58%, Positive predictor value: 56.25%, Negative predictor value: 68.42%. Results for local protocols were: Accuracy of 57%, Sensitivity of 61.11%, Specificity of 54.71%, Positive predictor value of 47.82% and Negative predictor value was 67.44%. Conclusion: With emerging evidence about ARMD in MoM hip device, there is an urgent need of an effective surveillance programme. A threshold of raised serum metal ions for cross sectional imaging remains an important issue due to cost and resources. These results identify that serum metal ions are not adequate screening tool for ARMD. A low threshold for obtaining MARS-MRI in symptomatic metal-on-metal hips even in the presence of low serum metal ions is recommended.

**Date: 2011-09-09**  
**Session: Hip - Metal-on-Metal Bearing**  
**Time: 08:00 - 09:30**  
**Room: Forum Hall**

**Abstract no.: 28443**

**OSTEOLYSIS AFTER CONTEMPORARY METAL-ON-METAL TOTAL HIP ARTHROPLASTY**

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A single surgeon series of 149 cementless total hip arthroplasties that were performed in 146 patients using a contemporary metal-on-metal bearing were retrospectively analyzed. There were 76 men (77 hips) and 70 women (72 hips) with a mean age of 52 years (range, 21 to 80 years) at the time of the index operation. The mean duration of follow-up was 8.5 years (range, 8 to 10 years). Mean Harris hip score improved from 46 points preoperatively to 92 points at the final follow-up examination. Thirteen hips (8.7%) had osteolysis. Of these, five patients (3.3%) with a persistent groin pain underwent revision operation at a mean of 56 months (range, 49-74 months) postoperatively. All five patients exchanged the metal-on-metal bearing into a ceramic-on-ceramic articulation. Intraoperative examination revealed an extensive synovial-like tissue hypertrophy, and histologic analysis showed a perivascular lymphocytic accumulation. Annual volumetric wear rate measured on one retrieved head and liner was 1.03 mm<sup>3</sup>/yr, and roughness measured on three retrieved femoral heads was consistently very low with 8 nm, 51nm, and 117 nm, respectively. After the revision surgery, all the patients noticed disappearance of pain as well as radiographic evidence of healing of the osteolytic lesion. Survival for both components at 10 years, with failure for any reason as the end point, was 90.6% (95% confidence interval, 75% to 97%). Intermediate-term follow-up of this cohort of patients with a contemporary metal-on-metal total hip prosthesis revealed an unexpectedly high rate of periprosthetic osteolysis possibly in association with metal hypersensitivity.

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 28933**

**METAL ON METAL HIPS AND ADVERSE REACTION TO METAL DEBRIS,  
READING EXPERIENCE**

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There are increasing reports of adverse reaction to metal debris and metal hypersensitivity following surface hip replacements and large metal on metal hip replacements. We would like to share our experience of revising failed resurfacings and MOM Hips for ARMD. All patients undergoing conversion of hip resurfacing and large MOM Hips were included in the study. The notes were reviewed for the reason of revision, the make of the implant, time interval between primary and revision procedure and the final diagnosis. Radiographs, CT and MRI were reviewed for signs of loosening, implant alignment, pseudotumors, neck thinning and AVN. 118 patients identified from NJR during 2004-2010. Of those 65 were ASRs including 13 Large metal on metal THRs and the rest 53 BHRS. 19 revisions performed. (11 ASR, 3 BHR and 5 ASR/Corail THR). F: M 14:5 Most of the patients presented with either groin pain or lateral hip pain at an average of 18 months post surgery. Plain radiographs were unremarkable but CT/ MRI showed varying degree of soft tissue masses and bursae in 16 of them. 9 of them required revision implants. There were no infections. Histology confirmed ALVAL in 9 patients and the rest showed varying degree of inflammation. Of the 5 ASR/Corail combinations, one had significant soft tissue and bony destruction requiring pelvic reconstruction. Another required removal of corail stem because of lysis in the proximal femur and long stem revision. The rest had cup revisions only as the femoral components were well fixed. In summary, the at-risk groups are females and predominantly ASRs. Revision of ASR/Corail THRs can be difficult and challenging. Although the sample is small, these findings are consistent with recent published reports and we hope to present the annual follow-up of these patients in due course.

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 29617**

**ULTRASOUND FEATURES OF ADVERSE REACTION FOLLOWING METAL ON METAL HIP REPLACEMENT: A CASE CONTROL STUDY**

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**INTRODUCTION:** Adverse Reaction to Metallic Debris (ARMD) is an emerging problem with metal on metal (MoM) hip replacements. ARMD is an umbrella term encompassing metallosis, pseudo-tumors and aseptic lymphocytic vasculitis associated lesions (ALVAL). The role of imaging in the diagnosis of this complex problem is still unclear. **METHODS:** A retrospective analysis of prospectively collected data was undertaken to evaluate the efficacy of ultrasound in diagnosis of ARMD. The study group included 35 patients with a histological diagnosis of ARMD. The control group included 10 asymptomatic patients of metal on metal hip replacements with low blood metal ions levels. All ultrasound procedures were performed preoperatively with a high frequency probe of 9-13 MHz. **RESULTS:** All patients diagnosed with ARMD had abnormalities identified on ultrasound. Fluid inside the joint (Group A) was noted in 30 (85.7 %) and outside the joint (Group B) in 33 (94.3 %). In Group B, 32 had fluid in iliopsoas bursa and 30 had in trochanteric bursa. Echogenic effusions were noted in 31 out of 35 procedures (88.6 %). Absence of iliopsoas and gluteus tendons was seen in many patients with echogenic fluid collections around the hip. The findings in ARMD group were statistically significant when compared to the control group (p value < 0.05). **DISCUSSION:** This study is the first to demonstrate the efficacy of ultrasound in diagnosing ARMD in painful MoM hip arthroplasty. Fluid collection around iliopsoas and gluteal tendons is highly suggestive of ARMD and should not be thought of as an uncomplicated tendonitis

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 29557**

**POOR PROGNOSTIC INDICATORS OF ADVERSE REACTION TO METAL DEBRIS OUTCOMES IN METAL-ON-METAL HIPS**

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Introduction: Adverse reaction to metal debris (ARMD) is a complication of hip resurfacing/metal-on-metal hip replacement. Various centres have reported their results of treatment. However, poor prognostic indicators have not been reported. Methods: 98 patients underwent revision for ARMD between 2005 and 2010. The pre-operative factors, intra-operative findings, post-revision outcomes were evaluated to determine the poor prognostic indicators from the two groups (good and poor outcome) based on the post-revision pain relief, HHS and complications. Results: 54 patients completed minimum one year follow-up. In the good outcome group (40 patients): Four (10%) had large effusion and 3 (7.5%) had a breach in the capsule with loss of abductors and external rotators. Four (10%) had persistent pain and mean improvement in HHS was 33. In the poor outcome group (14 patients): 10 (71%) had a large effusion and 7 (50%) had a breach in the capsule along with loss of abductors and external rotators that resulted in dislocation. Six (43%) had persistent pain and the mean improvement in HHS was 24. The pre-revision cobalt was lower (4.8) in the poor outcome group. Discussion: The early results of revision for ARMD in the current series are encouraging. The presence of a large effusion and soft tissue damage involving the capsule, abductors and external rotators appear to be the poor prognostic indicators. Early onset of pain following revision is another indicator of poor outcome. High wear does not appear to lead to more complications.

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 30025**

**EARLY FAILURE OF THE 36MM MOM PINNACLE TOTAL HIP ARTHROPLASTY**

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Background: We report on the early failure of the Pinnacle cup in combination with a Corail or S-ROM stem which is a 36mm MoM bearing THR system from Depuy. Methods: Following revision of 40 patients with adverse reaction to metal debris (ARMD) of 36mm MoM bearings we conducted a retrospective review of all patients implanted with the corail AMT Pinnacle Hip system at our centre from 2005. Patients were assessed using Harris Hip and UCLA activity scores. 120 patients had metal ion analysis. Ultrasound scans were performed in patients with unexplained pain or high metal ion results. Explants had full independent wear analysis using a coordinate measuring machine (CMM). Results: Three surgeons carried out a total of 640 Corail Pinnacle THRs. Blood Cr and Co results were generally low, with higher levels associated with cups with low inclination and low anteversion. Twenty-eight patients have been revised/listed for ARMD, an overall failure rate of 4.3% at mean 3.5yrs (range 1.8-5yrs). 19 hips were analysed with the CMM. 15 were found to have low bearing surface wear rates of <3mm<sup>3</sup> /year. In each of these cases, significant damage was identified at the internal junction of the femoral heads. Median cup inclination/anteversion angles in the ARMD cases were 46° and 11°. X-rays showed a characteristic pattern of femoral loosening. Discussion: Mechanical failure at the head/stem interface appears to be a critical factor in the development of adverse reactions following MoM THR. Paradoxically taper failure is associated with low cup inclination and anteversion.

**Date: 2011-09-09**

**Session: Hip - Metal-on-Metal Bearing**

**Time: 08:00 - 09:30**

**Room: Forum Hall**

**Abstract no.: 27886**

**METAL ION LEVELS IN METAL-ON-METAL TOTAL HIP ARTHROPLASTY WITH LARGE-DIAMETER HEAD**

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Introduction: Metal-on-metal bearings for total hip arthroplasty (THA) have gained popularity. However, aseptic lymphocyte-dominated vasculitis-associated lesion and pseudotumor, which are thought to be due to metal ion toxicity or metal hypersensitivity, are causes for concern for patients with metal-on-metal bearings. We investigated serum levels of cobalt and chromium ions in patients with implanted metal-on-metal THA using large-diameter head. Materials and Methods: Seventy-four patients underwent primary metal-on-metal THA using large-diameter head (40, 44, 48 mm) with cementless Cormet cup and CTi II stem (Corin, Cirencester, UK). Serum samples were taken preoperatively, at 3 months, at 1 year, and at 2 years, and levels of cobalt and chromium were determined. Risk factors for the potential influence on metal levels were evaluated, including gender, age, body mass index, head diameter, cup inclination angle, and clinical score (Japanese Orthopaedic Association score). Results: Significant increase in both cobalt and chromium were observed at 3 months compared to the pre-operative values ( $p < 0.01$ ). At 1 year, levels of both cobalt and chromium had increased significantly compared with levels at 3 months ( $p < 0.01$ ). There were no significant differences between levels of either metal at 1 year and 2 years. Risk factors included male gender and high clinical score in cobalt levels at 3 months, however, no factors were found in chromium at each time-point. Conclusion: Patients with metal-on-metal THA with large-diameter head had higher circulating levels of metal ions at 3 months and 1 year, with no additional significant increases at 2 years.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28136**

**FEMORAL REVISION WITH IMPACTION GRAFTING WITH THE UNCEMENTED MRP-TITAN REVISION STEM: RESULTS OF A PROSPECTIVE CONTROLLED STUDY OF 243 PATIENTS**

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Introduction: We present the results of a prospective controlled study of the uncemented modular revision prostheses MRP-TITAN with a distal diaphyseal anchorage with and without metaphyseal bone stock augmentation. Materials and Methods: In a prospective multicenter study 243 cementless stem revisions in matched patients using the MRP Titan Revision Stem with an average follow-up time of  $4.38 \pm 1.79$  years (2.10–9.62 years) were examined. 70 patients (28.8%) received a metaphyseal bone augmentation, while 173 patients (71.2%) did not and served as controls. The clinical outcome was evaluated by the HHS. X-rays were performed focusing on stability, periprosthetic bone remodeling, defect regeneration and radiolucent lines. Results: No significant differences were seen concerning age, BMI, ASA Score, femoral bone defects (Paprosky I–III) and the HHS ( $p > 0.05$ ). Postoperatively no significant differences concerning the HHS and the intra- and postoperative complication rate occurred ( $p > 0.05$ ), plain radiographs showed increasing axial subsidence for controls (6.9% vs. 2.9%;  $p = 0.16$ ). Secondary, a significant reduction of the proximal femoral bone atrophy due to femoral stress-shielding (5.71% vs. 17.9%);  $p \leq 0.05$ ) could be detected after augmentation. Good integration of bone grafts with subsequent defect regeneration was seen in 65 (92.85%) patients after augmentation. For stem diameters  $\geq 17$ mm and femoral bone defects  $\geq$  Paprosky IIC better clinical and radiological findings were detected in patients with augmentation. The revision rate after augmentation was clearly reduced (2.86% vs. 6.36%). Conclusion: The encouraging results we found accentuate the need of metaphyseal bone defect augmentation for femoral bone defects larger than Paprosky IIC and stem diameters larger than 17mm. Subsequent better bone regeneration after metaphyseal bone augmentation indicates increasing physiological load transmission minimizing femoral stress-shielding as a requirement of a prolonged prostheses life.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28718**

**REVISION AND RE-OPERATION AT ONE YEAR IN AN RCT OF LARGE ARTICULATIONS IN TOTAL HIP REPLACEMENT**

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There are potential risks of using large articulations in total hip replacement as well as benefits. The aim of this study was to compare incidence of revision and re-operation one year after primary or revision total hip replacement in patients randomised to receive either a 36 or 28mm articulation. Patients were excluded if they had a high risk of dislocation. Eligible patients were stratified according to a number of other factors which may influence dislocation risk. Patients were randomized intra-operatively to either a 28 or 36mm articulation. Incidence of revision and re-operation was determined prospectively by each collaborating centre. 644 hips in 644 patients undergoing primary or revision total hip replacement were entered into the randomised controlled trial. This trial has already shown that incidence of dislocation one year following total hip replacement with a 36mm articulation was 1.3%, compared to 5.2% with a 28 mm articulation. Within one year, 15 hips with a 28mm articulation underwent revision or re-operation, compared to seven hips with a 36mm articulation. Of these, seven hips with a 28mm articulation and one hip with a 36mm articulation were revised due to recurrent dislocation or instability. Revision for other reasons was required in two hips with 28mm articulations, compared to four hips with 36mm articulations, and re-operation was required in six hips with 28mm articulations and three hips with 36mm articulations. The majority of revisions or re-operations for reasons other than instability were for infection. This study showed that, compared to 28mm articulations, 36mm articulations in total hip replacement significantly reduced incidence of revision due to recurrent dislocation or instability, as well as reducing incidence of dislocation in the first year. Articulation size did not have any effect on incidence of revision or re-operation for reasons other than instability.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28386**

**PROXIMAL FEMORAL ALLOGRAFT-PROSTHESIS COMPOSITES WITH CEMENTLESS DISTAL INTERLOCKING STEM IN REVISION TOTAL HIP REPLACEMENT**

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**BACKGROUND:** Repeat revision surgery can lead to extensive bone loss in the proximal femur. We report the clinical and radiological outcomes and complications of reconstruction using a cementless interlocking stem with an allograft-prosthesis composite (APC) in the presence of circumferential bone deficiency of the proximal femur (Gustilo classification type IV). **METHODS:** This study included 10 hips of 10 patients (3 men and 7 women; average age, 59.6 years). The minimum and average follow-up periods were 3 years and 5.4 years, respectively. Of the 10 revision total hip replacements, 1 was aseptic; 7, septic; and 2, periprosthetic fractures. Clinical results were graded using the Harris hip score at the final follow-up. Radiological outcomes were assessed for evidence of healing at the proximal allograft-host bone junction, trochanteric union, allograft resorption, and complication. **RESULTS:** The mean postoperative Harris hip score was 65 points at the final follow-up. The osseous union of the proximal allograft-host bone junction occurred in 9 hips (90%) (1 infection case was included). Under repeated revision surgeries, the greater trochanter did not unite in 4 hips and disappeared in 4 hips. Mild, moderate, and severe allograft resorption occurred in 3, 1, and 1 hip, respectively. Postoperative complications included 1 infection, 2 heterotopic ossifications, and 1 dislocation. One (10%) hip required repeat revision surgery for re-infection 1 month after surgery. **CONCLUSIONS:** Using a cementless interlocking stem with an APC for reconstruction can provide satisfactory results for repeat revision surgery in the presence of circumferential bone deficiency of the proximal femur.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 29031**

**REVISION TOTAL HIP ARTHROPLASTY WITH SEVERE PROXIMAL BONE LOSS**

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The purpose of this study was to review the experience with revision total hip arthroplasty in patients with severe proximal femoral bone loss using modular cementless tapered stem. The indications for revision were aseptic loosening in 16 hips and periprosthetic femoral fracture in 4 cases with severe periprosthetic osteolysis. Sixteen patients had a femoral revision for Paprosky type IIIB and four for type IV femoral defect. The mean age at the time of surgery was 71 years (range 55-83 years). There were 14 women and 6 men. The mean Harris Hip Score was 39.4 preoperatively and 92 postoperatively. In all cases we used modular cementless tapered stem ZMR (Zimmer, Warsaw, Indiana). An extended trochanteric osteotomy was performed in all cases. The acetabular component was revised in 18 cases. In all cases morselized cancellous bone grafts were used. In two cases additional strut bone grafting was performed. The average follow-up was 2.5 years. No patients had femoral re-revision for any reason. Postoperatively all patients were placed in abduction brace. The average subsidence was 2.5 mm. There was one case of deep venous thrombosis. According to our short-time follow-up we found that ZMR tapered cementless femoral stem allows successful revision using distal fixation and stable construction in patient with severe proximal femoral bone loss.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28454**

**ACETABULAR RE-REVISION OF FAILED REVISION TOTAL HIP ARTHROPLASTY**

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Samsung Medical Center, Seoul (SOUTH KOREA)

The purpose of this study was to report the outcomes of acetabular re-revision of failed revision total hip arthroplasty. We performed at least two revisions of the failed acetabular component in 57 patients (57 hips) between August 1996 and April 2008. Of these, fifteen patients who had undergone multiple revisions because of infection were excluded, and one died before the two-year evaluation. Study cohort consisted of 41 patients (41 hips) with a mean age of 55.5 years (range, 37 to 82 years). Preoperative acetabular bone defects was classified as Paprosky Type-2A in four hips, Type-2B in six, Type-2C in nine, Type-3A in sixteen, and Type-3B in two. The mean duration of follow-up was 5.5 years (range, 2 to 12 years). Mean Harris hip score improved 45 points (range, 14 to 74 points) preoperatively to 85 points (range, 50 to 97 points). Four patients required additional revision procedure: two for deep infection, one for aseptic cup loosening, and one for recurrent dislocation. One patient had reactivation of latent tuberculosis with loosening of the acetabular cup but refused further surgery and is being managed on long-term suppressive anti-tuberculosis medication. Other complications included one periprosthetic fracture of the femur requiring stem revision and one dislocation that was managed with closed reduction and brace immobilization. Our findings indicate that repeat acetabular reconstruction with contemporary uncemented acetabular component or antiprotrusio cage is a reliable and straightforward method for the management of failed revision total hip arthroplasty with considerable acetabular bone defects.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 29523**

**TWO-YEAR OUTCOME FOLLOWING THE USE OF TRABECULAR METAL SHELL IN THE TREATMENT OF SEVERE ACETABULAR BONE DEFICIENCY**

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Reconstruction of an acetabulum following severe bone loss can be challenging. The aim of this study was to determine the outcome of acetabular reconstruction performed using trabecular metal shell for severe bone loss. Between June 2003 and June 2006 a total of 29 patients with significant acetabular bone stock deficiency underwent revisions using trabecular metal shell. According to Paprosky classification, there were 18 patients with grade IIIA and 11 patients with grade IIIB defects. Nineteen patients required augments to supplement the defects. Functional clinical outcomes were measured by WOMAC and Oxford hip. Detailed radiological assessments were also made. At most recent follow up (average 4.5 years, range 2.5-7.5) the mean Oxford hip score improved from 12 preoperatively to 27.11 postoperatively and WOMAC score from 17.57 preoperatively to 34.14 postoperatively. The osseointegration was 83% according to Moore's classification. There were two reoperations; one was for instability, and one for aseptic loosening. One patient has a chronic infection and one had a periprosthetic fracture, both treated conservatively. Despite challenges faced with severe preoperative acetabular defects the early results using this technique in Grade III A and B is encouraging.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28353**

**THE UNCEMENTED CANNULATED CANNULOK REVISION PROSTHESIS: DO WE KNOW ENOUGH ABOUT IT?**

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**Introduction:** The Cannulok, a long stem uncemented distally locked cannulated hydroxyapatite coated femoral prosthesis offers many advantages for the management of periprosthetic femoral fractures, proximal femoral bony metastasis and revision of the loose femoral prosthesis. Minimal follow-up data exists for the Cannulok prosthesis since its introduction and this study aims to determine the early outcome of this prosthesis. **Methods:** We retrospectively identified 59 patients who had received a Cannulok prosthesis at one of two UK regional orthopaedic units between 2006 and 2010. We collected demographic, admission and mobility data from case notes and reviewed X-Rays to determine the time to union. Oxford Hip Scores were completed to determine individual patient reported outcome and satisfaction. **Results** 59 patients had a Cannulok femoral revision stem implanted between 2006 and 2010 with a mean age of 78.4 years and an average follow-up of 18 months. The mean operating time was 208 minutes with an average blood loss of 1300mls. Time to union was a mean of 5.4 months and there was a major complication rate of 22.7%. The mean Oxford Hip Score at follow-up was 43. **Discussion** An increasingly elderly population combined with growing primary hip arthroplasty rates and pharmaceutical prolongation of life despite bone metastatic malignancy will increase the requirement for this versatile femoral prosthesis. Our results suggest a satisfactory union time and overall patient satisfaction but we advise careful and precise implantation to reduce the risk of intra-operative femoral fracture and dislocation.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 29505**

**REVISION TOTAL HIP REPLACEMENT USING FULLY COATED DISTALLY LOCKED LONG STEM**

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Extensive loss of bone is a problematic issue in revision total hip replacement (T.H.R). Increasing primaries in young age will consequently increase the need for revisions during which poor bone stock due to resorption, osteolysis, infection and periprosthetic fractures add to the complexity of the procedure. 20 revisions were performed between 2006 & 2008 in AL-Helal hospital aiming to bypass the poor bone stock proximally whatever the reason using hydroxyapatite coated cementless stem fixed distally by using locking screws. The reason for revision was aseptic loosening in 9 cases, septic loosening in 3 cases and loosening secondary to periprosthetic fractures in 8 cases. Extended trochanteric osteotomy was performed in 16 cases for adequate removal of cement and the existing implant. Patients who had a previous infection of the involved hip were treated initially with resection arthroplasty and then with staged reimplantation. Harris hip score was determined for each case and the patients were followed up for 30 months and a successful result was defined according to Gross et al., as a postoperative increase in the Harris hip score of more than 20 points, accordingly at the follow up, 7 cases were excellent, 11 cases were good, and 2 poor cases. The reported complications were one dislocation and two infections. Conclusion: The use of modular cementless hydroxyapatite coated femoral stems with distal locking screws is a good biological option for revision of cases with poor proximal femoral bone stock. Keywords: revision hip, modular stem, distal locking.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28446**

**IS EXTENDED TROCHANTERIC OSTEOTOMY SAFE FOR USE IN 2-STAGE REVISION OF PERIPROSTHETIC HIP INFECTION?**

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While an extended trochanteric osteotomy (ETO) has been well documented as an effective exposure technique in revision total hip arthroplasty, it is rarely described in the setting of periprosthetic joint infection. To evaluate the safety of using an ETO in 2-stage revision of periprosthetic hip infection, we performed a retrospective review of 23 patients using an ETO in revision of infected hip arthroplasty and compared them to 46 patients using an ETO in revision of non-infected hip arthroplasty. In the study group of 23 patients, mean Harris hip score improved from 36 points (range, 13-59 points) preoperatively to 82 points (range, 9-72 points) postoperatively. Infection was eradicated in 22 (96%) of 23 patients. The ETO healed in all patients (100%) at a mean of 10.6 weeks (range, 6-28 weeks). No stem revised for aseptic loosening. Complications included 2 periprosthetic fractures, 1 peroneal nerve palsy, and 1 dislocation. Postoperative Harris hip score, ETO union rate, time to healing of the ETO, stem stability, and complication rate did not differ between the two groups. Our data suggest that an ETO can be safely used in treating periprosthetic hip infection.

**Date: 2011-09-09**  
**Session: Hip - Revision**  
**Time: 10:00 - 11:30**  
**Room: Forum Hall**

**Abstract no.: 28516**

**INTRAOPERATIVE FEMORAL FRACTURES IN REVISION TOTAL HIP REPLACEMENT: WHOM CAN WE BLAME?**

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Introduction: Loss of bone stock, stress shielding of the proximal femur and non-weight bearing are predisposing factors to intraoperative fractures Material and methods: In the last five years 172 revision total hip were performed in our unit. Thirty nine of these revisions were for infection and 133 for aseptic loosening, instability and peri-prosthetic fractures. Long cementless revision stems were implanted in 124 of these revisions while short cementless stems were used in 18 and cemented stems were implanted in 30 hips. Intraoperative fracture of the femur was reported in 6 hips. All fractures were fixed by locked plates plus circulage wires. Results: The incidence of intra-operative femoral fracture in this series is 3.4%. All fractures happened in patients who had more than one revision. Three of these hips received anatomic long cementless stems, while one had short cementless stem and two were cemented. The fractures were distal to the the stem in three hips, at level of the stem in two and involving the calcar in one. All fractures went to full bony union within 6 months. Conclusion: A 3.4% incidence of femoral fractures in this series is comparable to what had been published of 4% with anatomic and 15% with straight long cementless stems. The location of the fracture distal to the tip of the stem in four of the cases suggests that the design of the stem and/or instruments should not be blamed. Positioning of the leg and severe osteoporosis are likely to have contributed to these incidents.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 28837**

**ENDOSCOPIC STABILIZATION OF ACUTE ACROMIOCLAVICULAR JOINT DISLOCATION USING A SYNTHETIC LIGAMENT: RESULTS AFTER A MINIMUM OF 12 MONTHS**

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**Objectives:** The treatment for acute acromioclavicular (AC) joint dislocation remains controversial because of the elevated level of complications and related morbidity. The objective of this study was to evaluate clinical outcomes, radiographic results, and the complications after arthroscopic stabilization of acute acromioclavicular dislocations. **Material and Methods:** Twenty patients (19 males and 1 female) found to have Rockwood stage III or IV AC joint dislocation were operated. All the patients were stabilized arthroscopically with placement of a synthetic ligament applied between the clavicle and the coracoid. The application of the synthetic ligament reduced the dislocation and stabilized the AC joint, allowing healing of the coracoacromial ligament. Results were assessed clinically (Constant score) and radiographically. **Results:** Despite the excellent clinical results at one year minimum follow-up both in terms of the Constant score (mean, 91 points; range, 60–100) and patient satisfaction, 3 patients required revision surgery while some had pain over the clavicular button. The x-rays showed three cases of partial loss of reduction due to distal migration of the flip button. **Discussion:** Arthroscopically assisted treatment of acute AC joint dislocation is advantageous because it provides good clinical results and few complications. The rate of recurrence and the postoperative loss of reduction require better definition of the indications and improvement of the surgical implants and technique.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 28852**

**VARIABILITY IN CLAVICLE FRACTURES DISPLACEMENT ACCORDING TO PATIENT POSITIONING DURING RADIOLOGIC EVALUATION**

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Introduction: The purpose of this study is to evaluate the effect of patient positioning (standing or lying position) in the degree of displacement in clavicle fractures, when being studied with X-rays. Materials and Methods: An observational prospective study was performed. 54 patients admitted to the emergency room of our hospital with clavicle fracture were included from May 2009 to May 2010. Clavicle X-rays were taken in standing and lying position, comparing the different degree of horizontal and vertical displacement in the two projections. Results: Regarding vertical displacement, it was observed that in 46.29% of the cases (25 patients) the displacement went from less than 20mm in the lying position to more than 20mm in the standing position. Regarding horizontal displacement, it was observed that in 18.51% of the cases (10 patients) the displacement went from less than 20mm in the lying position to more than 20mm in the standing position. There was a total of 50% of the cases (27 patients) that had a displacement greater than 20mm when position changed from lying to standing, taking into account that there were 8 patients in which switching the position produced a displacement in both vertical and horizontal plane. Conclusion: The degree of displacement is one of the most important factors to consider when deciding the orthopedic or surgical treatment to perform in clavicle fractures, considering that, in general, displacements greater than 20mm have a surgical indication. In our study, 50% of the patients who had a displacement lesser than 20mm in the lying position, showed a displacement greater than 20mm when switched to the standing position, confirming our hypothesis that the degree of clavicle fracture displacements varies depending on the position in which X-rays are taken.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 28355**

**OPEN REDUCTION INTERNAL FIXATION OF MIDSHAFT CLAVICLE FRACTURES AUGMENTED WITH AUTOGENOUS BONE GRAFT VERSUS BIORESORBABLE CALCIUM PHOSPHATE: A COMPARATIVE STUDY**

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Background: Recent studies have demonstrated that nonoperative treatment of displaced midshaft clavicle fractures have a high prevalence of symptomatic malunion and nonunion with nonoperative treatment. Although good results have been demonstrated with open reduction internal fixation (ORIF), complications still exist thus fixation was augmented. This retrospective study was undertaken to determine the efficacy of open reduction and internal fixation (ORIF) augmented with bioresorbable calcium phosphate (BCP) cement compared with standard autogenous bone grafting (ABG) of acute displaced, midshaft clavicle fractures. Methods: At our level I trauma institute, from July, 2007 to September, 2008 each patient who presented with a clavicle fracture that was deemed operative received plate fixation supplemented with bioresorbable calcium phosphate cement or autogenous bone grafting. Patient records and radiographs were retrospectively reviewed. Follow-up included standard radiographs to evaluate union at a minimum of 6 months. All complications were also reviewed. Results: Two different clavicle plating systems, Smith and Nephew (18 clavicles) and Implant Technology Systems (24 clavicles), were used with autogenous bone graft (14 patients) or bioabsorbable calcium phosphate (28 clavicles). Of forty patients treated with open reduction internal fixation, 6 complications have occurred at a minimum of 6 months follow-up. Three prominent hardware occurrences necessitated plate removal. One nonunion, one distal screw cut-out and one hardware breakage have been treated successfully with revision plating. No statistical significance was seen between the autogenous bone grafting and bioabsorbable calcium phosphate in regard to overall failure incidence ( $p=0.66$ ). Complications necessitating revision ORIF with bioabsorbable calcium phosphate and bone graft were not statistically significant either ( $p=0.73$ ). Conclusion: There appears to be no statistically significant difference between union and complication rates between bioresorbable calcium phosphate cement and autogenous bone graft in this retrospective study.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 28902**

**LOCKING PLATE OSTEOSYNTHESIS OF CLAVICLE NON-UNION**

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The incidence of posttraumatic clavicle non-union range from 0 to 16,7%. Therapy of clavicle non-union very often is linked to increased high complication rates with challenging operative techniques. During the last 10 years plate osteosynthesis has been selected in nearly 80% of the studies. This correlates with the recommendations of the AO. The platingsystems predominately used are DC, LCDC, Wave (S shaped DC), Reko, Half or third pipe plates. In our literature search, there was no publicated studie or casereports of clavicle non-union treatment with a locking, multidimensional anatomical plating system. The purpose of this consecutive, retrospective study was to proof secure treatment option of the of clavicle non-union with a special locking plate, with a free range of motion physiotherapie program. 10 patients, operated for clavicle non-union from January, 2006 to November, 2009 were included in the study. One patient demonstrated a pathological clavicle non-union, caused by a Plasmozytoms of the Kappa light chain type. The remaining nine patients had a traumati clavicle non union. Eight were found in the midshaft, one in the lateral area. The Operationtime was in median 92.5 minutes (rank 71-179). The hospitaly amounted in median 6.5 days (rank 4-22). There were no wound healing disturbances. We had one plate breakage, requiring a reoperation. The plate break belongs to insufficient bone transplation from our allogen bone stock. The successful Reoperation, using a tricortical pelvic bone transplant, was followed by a postoperative course without complication and free range of motion in the rehabilitation program. The functional outcome was performedusing standard investigation protocols of the shoulder, including Constant Score, DASH score, a visual Analgoscale and a patient's questionnaire. In conclusion, treatment of clavicle non-union with a mutlidimnesional locking plate is a reliable therapy with low complication rates.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 29923**

**ACROMIOCLAVICULAR JOINT REDUCTION AND RECONSTRUCTION USING SUTURE ANCHOR AND ENDOBUTTON: A MODIFIED SURGICAL TECHNIQUE**

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Introduction: Acromioclavicular joint dislocation is an increasingly common injury requiring surgical intervention. We describe a method for surgical management of acromioclavicular dislocations using suture anchor and endobutton. Material and methods: The study was conducted over the last 2 years. 15 patients were included (11 males), average age being 38 years. Mean period of follow-up was 11 months (range 6-22 months). All patients had AC joint disruption of grade III or above. (Rockwood et al) Technique: It involves insertion of suture anchor into coracoid process; 2 holes, one anteriorly and one posteriorly are drilled into superior surface of clavicle and a fibre wire/ ethibond suture is passed through them, over an endobutton. After reducing ac jt. the suture is tied to the suture anchor. This is checked on image intensifier. The ligaments are then repaired meticulously as in weaver-dunn method. Results: All our patients regained full range of motion postoperatively and were able to function at their pre injury level. Radiographs at 3 months post op showed maintenance of AC joint reduction. ASES score improved from 32 (mean pre-op) to 82 (mean post-op). Conclusions: This is a simple and effective method of fixation. It is strong enough to allow rapid return to normal function. It avoids complications related to wire/screw migration and hardware failure. The suture anchor in coracoid allows for an anatomical line of pull on clavicle and natural healing of remnant coracoclavicular ligament. No arthroscope is required. It favors comparably with other published studies using similar methods of fixation.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 29700**

**PLATING FOR FRACTURE CLAVICLE: IS IT ESSENTIAL TO PRESERVE THE SUPRACLAVICULAR NERVES?**

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Fractures of clavicle are common injuries in adults, accounting for 5% of all fractures and 44% of all shoulder fractures. Traditionally these fractures have been managed conservatively. Review of literature reveals that certain fracture can benefit from operative treatment. Displaced fractures have an increased risk of mal-union or non-union. In simple displaced fractures intramedullary fixation can give good results, but fails to provide optimal preservation of length and rotation in comminuted fractures. Plate osteosynthesis can be used for all types of clavicular fractures. We report our experience in managing 22 cases of mid-clavicular fractures by plating. According to Robinson's classification there were 9 B1 type and 13 B2 type fractures. The interval from injury to operation varied from 4 to 20 (average 14) days. Injury was caused by road traffic accidents in 8 cases, slip and fall in 12 cases and assault in 2 cases. We used AO (Synthes) anterior superior clavicular plates and LC-DCP. Incision was made along the inferior border of clavicle. In half the cases (n=11) the supraclavicular nerves were sacrificed. In remaining cases (n=11) the nerves were preserved by meticulous dissection. All the cases in whom the nerves were sacrificed complained of loss of sensations, paraesthesia, or numbness in the infrascapular area upto the nipple. Two cases had painful neuroma formation. Other group with preserved nerves had no such problems. It is concluded that it is worth spending little more time during operation and preserve the supraclavicular nerves during plating for clavicular fractures.

**Date: 2011-09-09**  
**Session: Trauma - Shoulder**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall I**

**Abstract no.: 27392**

**DISPLACED PROXIMAL HUMERAL FRACTURES: AN INDIAN EXPERIENCE WITH LOCKING PLATE**

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**Purpose:** The treatment of displaced proximal humerus fractures, especially in elderly, remains controversial. The objective of this study was to evaluate functional outcome of locking plate used for fixation of these fractures after open reduction. We also attempted to evaluate the complications and predictors of loss of fixation for such an implant. **Methods:** Over two and a half years, 56 patients with an acute proximal humerus fracture were managed with locking plate osteosynthesis. 47 of these patients who completed a minimum follow up of 1 year were evaluated using Constant score calculation. **Results:** The average follow up period was around 21.5 months. Outcomes were excellent in 17%, good in 38.5%, moderate in 34 % while poor in 10.5%. The Constant score was poorer for AO-OTA type 3 fractures as compared to other types. The scores were also inferior for older patients (> 65 years old). Complications included screw perforation of head, AVN, subacromial impingement, loss of fixation, axillary nerve palsy and infection. A varus malalignment was found to be a strong predictor of loss of fixation. **Conclusion:** Locking plate osteosynthesis leads to satisfactory functional outcomes in all the patients. Results are better than non locking plates in osteoporotic fractures of the elderly. However the surgery has steep learning curve and various complications could be associated with its use. Nevertheless we believe that a strict adherence to the principles of locking plate use can ensure good result in such challenging fractures.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 30002**

**EPIDEMIOLOGY OF ADULT HUMERUS FRACTURES (1998-2009)**

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This study aims at describing the epidemiology of humerus fractures between 1998 and 2009. Demographics of all the patients aged 16 and above with fractures reviewed between 1998 and 2009 were retrieved from database with the help of codes used by the information technology (IT) department. Database was then divided into males and females and further divided according to the number of fractures seen every year. Regional key population and vital statistics were obtained from the database of the Office for National Statistics. Fracture incidence was calculated per 10,000 populations for both sexes. Patients were then grouped according to age into various groups. Regression analysis was performed and correlations were established with age of the patient and year of incidence as independent predictors for fracture incidence. A total of 1766 fractures were seen with 819 males and 947 females. A steady increase in fracture incidence was seen females from 16 years onwards [regression coefficient (RC)=1.25]. A strong correlation was seen between incidence and age ( $r= 0.785$ ). In males, a decrease in the incidence was seen until the age of 64 (RC=-0.285), after which the incidence increased (RC=1.11). A strong correlation was seen between total fracture incidence in adults and the years of incidence in both males and females. For females, the correlation coefficient and regression coefficient were 0.761 and 0.131 respectively ( $p=0.004$ ). For males, the correlation coefficient and regression coefficient were 0.718 and 0.071 respectively ( $p=0.009$ ).

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 29666**

**MANAGEMENT OF FOUR-PART FRACTURE-DISLOCATION OF SHOULDER**

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Content: We report 18 cases of four part fracture dislocation of shoulder treated over a period of last 9 years. 1 pt was conserved & 4 referred for hemiarthroplasty were not included in study 13 patients underwent operation (ORIF) within 2 to 7 days from injury. 5 patients were male and 8 were female. Age group varies from 35 to 70 years with an average of 50 years. 4 patients were laborers, 7 house wives and 2 were doing sedentary jobs. 10 patients had a fall, 2 patients had RTA & 1 patient had epilepsy. 10 patients had anterior and 3 patients had posterior dislocation of the head of the humerus. Open anatomical reduction and fixation of 4 parts using Tension Band Wiring technique was done. Two cancellous screws were used to fix greater and lesser tuberosity to the head of the humerus after its closed reduction and wire was used to fix proximal shaft of humerus with screws. After completion of rehabilitation program, fracture union was achieved in 12 patients, 3 patients had excellent, 5 had good, 4 had fair and remaining 1 had poor result. Results were evaluated by using constant score at the time of recent follow up (minimum 3 months to maximum 8 years of follow up). Complications such as superficial infection in 1, redislocation in 3, 1 nonunion and AVN changes in 4 patients were observed. ORIF using TBW technique gives good functional results inspite of many complications seen in this series. However, in selected patients, hemiarthroplasty is another option.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 29839**

**FUNCTIONAL OUTCOME OF HUMERAL SHAFT FRACTURES WITH ANTEGRADE HUMERAL LOCKING INTRAMEDULLARY NAIL**

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Humeral shaft fractures are relatively common injuries and compression plating has been the gold standard operative treatment. Previous studies on intramedullary nailing have shown mixed results. 152 patients among all called came for follow up. In 124 (81.58%) patients closed interlocking nail was done and open reduction was done in 28 (18.42%) patients. 15 (9.87%) patients had sustained multiple trauma and 12 (7.89%) fractures were open. Delayed union or non union was found in 16 (10.53%) patients and autogenous iliac crest bone graft was done. The mean follow up period was 25 months. The outcomes were evaluated using constant shoulder score and Short Form 36 score. In 129 (84.87%) patients primary union was observed. The average time for union was 14.8 weeks. All patients of delayed union and non union had fracture union. In 11 (7.24%) patients revision surgery was done. 135 (88.82%) patients had constant shoulder score as excellent or good. Physical component score more than 45 on Short form-36 scale was seen in 132 (86.84%) patients. Complications included impingement due to prominent nail in 9 patients, radial nerve involvement post operatively in 3 patients, irritation due to prominent interlocking bolts in 11 patients and stiff shoulder in 12 patients. Antegrade Humeral Locking intramedullary nailing is a reliable and effective method with excellent results and good shoulder function in most cases. It can be recommended as a primary treatment where conservative treatment is not possible or if it fails.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 29674**

**ANGULAR STABILITY PLATE FOR TREATMENT OF THE FRACTURES OF PROXIMAL HUMERUS IN OLD PATIENTS**

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**Purpose:** The aim of this study is to valuate the clinical and radiologic result of angular stability plate osteosynthesis of proximal humeral fractures in old patients. **Material and methods:** From 1998 to 2009 197 patients were treated for proximal humeral fractures. Of those 50 patients, with 3 and 4 part humeral fractures were treated with angular stability plate with a minimun follow up of 24 months. To all patients were made an X-ray valuation in A-P view, Axillar view and Outlet view; we evaluated the clinical and functional outcome in term of ROM and with the costant score. **Results:** In all cases the fractures were consolidated. The ROM post-operatively, compared with the controlateral arm, has shown a deficit of 10° in flexion, 15° in abduction, 15° in external rotation and II vertebral level in intrarotation. The mean Costant score was 77%. We obtain a Costant score of 83,5% in the patients under 50 years. The complications include 4 ANV, 1 mechanical failure and 1 head perforation. **Conclusion:** The analysis of the results evidenced that, after a good and correct reduction, angular stability plate osteosyntesis provides good mechanical stability and allows a rapid mobilization without compromising fracture healing. We have observed most complications in fractures with varus angulation of the humeral head.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 30088**

**COMPLEX HUMERAL FRACTURES: SHOULD WE FIX THESE?**

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Introduction: Fractures of the proximal humerus account for approximately 4-5% of those in orthopaedic outpatients. These fractures have a uni-modal distribution and are mainly of an osteoporotic nature. Management of these proximal/middle third humeral fractures is controversial. Around 85% of fractures are either undisplaced or minimally displaced and respond well to conservative treatment. There remains no real consensus in the literature with regards to optimum treatment. Materials and Methods: We retrospectively collated data for humeral fractures over the past 4 years at the Worcester Royal Hospital. The data was divided into conservative, conservative management followed by fixation and immediate fixation. 33 patients were identified. Each patient was then telephone interviewed to assess function and effect on occupation using the Quick-Dash questionnaire and work score. 8 patients were lost to follow up and one was deceased. Results: The average work time lost was greatest for those who were conservatively managed and then underwent ORIF at a later stage. The quick dash work score demonstrated that the ORIF group had the highest scores and the lowest scores were obtained by the conservatively managed group. The patients least likely to return to work were also those who underwent conservative and then surgical management. Conclusion: Our data has shown good outcomes for both conservative and operative management of humeral fractures. The group of patients with the worst outcomes are those that were initially managed conservatively and then proceeded to have operative treatment. Subsequently decisions to operate must be considered early.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 30119**

**OUTCOME OF PROXIMAL HUMERUS FRACTURE FIXATION WITH LOCKING PLATES**

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Aim - Analyze the outcome following ORIF for proximal humeral fractures. To compare it with published literature  
Methods - 20 consecutive patients who underwent open reduction internal fixation for proximal humerus fracture with locking plate by a single surgeon. - Outcome was assessed using Oxford score and Constant score. We also recorded the complications rate, reoperation rate and analysed those with poor outcome.  
Results - 20 consecutive patients with mean age of 61 were included. 6 were displaced two part fractures, 8 were three part and 6 were four part fractures. Mean period of follow up was 7 months. The mean Oxford score was 23. Mean Constant score was 73. Outcome was excellent in 20%, good in 45%, moderate in 15% and poor in 20%. Overall outcome was satisfactory in 80%. Outcome was better in two or three part fractures as compared to four part fractures. Outcome was better in patients less than 60 yrs of age as compared to those >60. Implant failure was noted in 3 cases. Reoperation was required in 3 cases. The results were comparable with other published literature.  
Conclusion - Open reduction and internal fixation of proximal humerus fractures with locking plates achieve consistently good results. Careful selection of patients for surgery can minimise poor outcome.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 28126**

**COMPARATIVE STUDY OF PROPOSED MUKHERJEE'S SHOULDER SCORE FOR EFFECTIVE EVALUATION OF SHOULDER HEMIARTHROPLASTY IN INDIAN SCENARIO**

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Background: There are a number of established scoring systems like the Neer's, UCLA and the Constant & Murley for the purpose of evaluation of shoulder hemiarthroplasty but none are practically suitable for the evaluation in the Indian scenario. So we tried to evolve a new scoring system based on the ADL's and the work considerations of the Indian patients for the proper evaluation of such cases. Methods: Neer 's scoring system, UCLA and the Constant & Murley scoring systems were included for comparative analysis of the Mukherjee's scoring system while the self administered scoring systems were excluded from the study( e.g. SPADI, ASES, DASH etc.). The results of Mukherjee's shoulder hemiarthroplasty performed on 51 patients between August 2001 and July 2008 were evaluated with the proposed Mukherjee's scoring system and the other scoring systems. Results: The majority of the patients obtained satisfactory results with the Neer score being 81.38, UCLA being 29.69 and finally the Constant & Murley score being. The result with the proposed Mukherjee's shoulder scoring system was 75.51. Discussion: The variable scores obtained above with the different standard scoring systems were due to (i) disproportionate scoring (ii) variable non-identical parameters being compared together (iii) non – accountability of specific ADL's related to the Indian customs. So the Mukherjee's scoring system was proposed taking into account the ADL's, social customs and the work considerations of the Indian patients. It is also highly suitable for evaluation of trauma and shoulder pathologies besides Shoulder Hemiarthroplasty.

**Date: 2011-09-09**

**Session: ESSSE/SICOT - Shoulder IV**

**Time: 10:00 - 11:30**

**Room: Meeting Hall I**

**Abstract no.: 28388**

**PLATING VERSUS INTRAMEDULLARY PIN OR CONSERVATIVE TREATMENT FOR MID-SHAFT CLAVICLE FRACTURE: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS**

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Background: Clavicle fractures account for 2-2.6% of all fractures. Plating has been considered the gold standard for treating mid-shaft fracture of the clavicle. Intramedullary pinning and conservative treatments have also been commonly used. Methods: To evaluate the effect of plating versus intramedullary pinning or conservative treatment for mid-shaft clavicle fracture, the Cochrane Central Register of Controlled Trials (CENTRAL) (Wiley Online Library, October 2010), PubMed (1950 to October 2010) and EMBASE (1980 to October 2010) were searched. Randomized and quasi-randomized controlled clinical studies evaluating plating versus intramedullary pinning or plating versus conservative treatment for mid-shaft clavicle fracture in adults were collected. After independent study selection by two authors, data were collected and extracted independently. The methodological quality of the studies was assessed. Pooling of data was undertaken when appropriate. Results: Four studies, involving 305 clavicle fractures, were included. There were no significant differences between plating and intramedullary pinning with regard to outcome for Constant shoulder score, Oxford shoulder score, non-union, infection, fixation failure, and hardware removal. There were more symptomatic hardware events with plating compared to intramedullary pinning. Reduced nonunion, malunion, and neurological symptoms, as well as more satisfaction with ultimate appearance, were associated with plating as compared to conservative treatment. Conclusion: The available evidence suggests that there is no difference in treatment effects between plating and intramedullary pinning, but the use of plating is associated with more side effects. Plating is associated with improved treatment effects when compared to conservative treatment.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28156**

**IMPLANT POSITION AND KNEE ALIGNMENT AFTER PATIENT-SPECIFIC UNICOMPARTMENTAL KNEE ARTHROPLASTY**

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**Introduction:** Implant positioning and knee alignment are two primary goals of successful unicompartmental knee arthroplasty (UCA). The aim of this study was to evaluate the precision of implant positioning and accuracy of leg alignment using novel CT-based, patient-specific instruments and fixed bearing implants in UCA. We hypothesized that the patient-specific UCA solution would result in a precise component orientation and leg axis restoration. **Patients and methods:** This prospective study outlines the radiographic results following 32 patient-specific unicompartmental medial resurfacing knee arthroplasties. By means of standardized pre- and postoperative radiographs of the knee in strictly AP and lateral view, AP weight bearing long leg images as well as preoperative CT-based planning drawings an analysis of implant positioning and leg axis correction was performed. **Results:** The mean preoperative coronal femoro-tibial angle was corrected from 7° to 1° (p<0.001). The preoperative medial proximal tibial angle of 87° was corrected to 89° (p<0.001). The preoperative tibial slope of 5° could be maintained. The extent of the dorsal femoral cut was equivalent to the desired mean value of 5 mm given by the CT-based planning guide. The mean accuracy of the tibial component fit was 0 mm in antero-posterior and +1 mm in medio-lateral projection. **Conclusion:** Patient-specific fixed bearing UCA can restore leg axis reliably, obtain a medial proximal tibial angle of 90°, avoid an implant mal-positioning and ensure maximal tibial coverage.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28298**

**PERIPROSTHETIC TIBIAL FRACTURES USING THE MINIMAL INVASIVE MEDIAL UNICOMPARTMENTAL KNEE ARTHROPLASTY “OXFORD UNI”**

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Analysis of periprosthetic tibial fractures after performing unicompartmental knee arthroplasty (UKA) on fresh frozen tibia. Showing excellent clinical and functional results unicompartmental knee arthroplasties gain more and more importance in the supply of knee joints. Periprosthetic tibial fractures are rare but serious complications. Usually they appear perioperatively and are caused by an error during implantation, especially by sawing defects. In a randomized study unicompartmental knee arthroplasty (UKA) was performed on 10 paired fresh frozen tibiae with and without placing sawing defects of 10° during tibial preparation. The specimens were fractured under controlled conditions with a standardized testing machine. Maximum fracture loads and load capacities were analysed subject to sawing defects. Twenty fresh frozen tibiae (10 corresponding pairs; donor data: f/m = 6/6, age = 75.7 years (47-92 years) and a weight of 65.7kg (32.7 – 136.1kg)) were analyzed with DEXA bone density measurement (BMD). UKA was performed using a tibial sawing jig for standardized positioning of the sawing defect (10°). Customized tibial implants with sizes B to F were implanted. The distal parts of the tibiae were cut off 20 cm distally of the tibial component. Specimens were fixed in a metal base fixture frame using polyurethane and maximum fracture loads of up to 10.000N were applied to the specimens using a standardized machine. Group comparisons were done with the Wilcoxon-Test using SPSS. Maximum fracture loads in the group with 10° sawing defect were statistically significant lower than for the group without sawing defects. Mean fracture loads of 4,473N in comparison to 7,327N in the group without sawing defects could be seen. Unexperienced surgeons seem to place vertical sawing defects while preparing the tibial plateau during UKA. These sawing defects most highly lead to periprosthetic tibial fractures.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 28480**

**TEN-YEAR SURVIVAL AFTER UNICOMPARTMENTAL KNEE ARTHROPLASTY**

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Introduction: The following prospective study describes the clinical outcome and the 10 years survival rates in a series of 242 cemented and uncemented medial Unicompartmental Knee Arthroplasty cases performed in 236 patients for medial osteoarthritis. Material and Methods: Details from patients with unicompartmental knee arthroplasty were recorded and updated on an annually base from 1991 up to the present. Patients were assessed by an independent clinical observer using the Knee Society Rating System as a validated outcome measure. Kaplan-Meier analysis was used to calculate the 10 year survival rates using the endpoint of revision for any cause. Results: The mean elapsed time since the day of surgery was 10.4 years (maximum 18.7 years). There were no failures due to progression of lateral osteoarthritis, aseptic loosening of the femur component or due to polyethylene wear. There had been thirteen surgeries for revision because of failures for any reason and 41 patients had been withdrawn because they had died, giving an all over cumulative survival rate at ten years (knees at risk = 201) of 94.07 %. The Knee Society Rating System (KSRS) showed a significant improvement. The knee (function) score showed an increase from pre 33.5 (54.7) to post operative 94 (83.6) Points. The Range of Motion gained in average from 106.8 to 122.3 degrees. We could not detect a significant difference in the ten year survival rate of patients with a BMI <30 (95.59 %), BMI from 30 to 36 (92.39 %) and a BMI >36 (100 %). Summery: Given strict indication criteria's and appropriate surgical expertise, UKA has a high survival rate comparable to TKA and shows a significant improvement in knee and function scores. The results indicate that there is no relationship between BMI and 10 year survival rate in this cohort.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29375**

**BONE LOSS DURING REVISION UNICOMPARTMENTAL AND TOTAL KNEE REPLACEMENT: AN ANALYSIS OF THE NATIONAL JOINT REGISTRY DATA**

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Chelsea and Westminster Hospital, London (UNITED KINGDOM)

Purpose: To identify if revision of primary UKR to TKR involves greater bone loss, requiring larger poly thickness; and whether it is more complex, requiring increased use of stabilised implants, than primary TKR. Bone loss during revision knee replacement surgery presents a challenge to the surgeon. It is of multi-factorial origin, resulting from the original degenerative process, associated with bone cuts at the time of primary replacement, the pathological process of loosening associated with the need for revision, explantation of primary prostheses and further bone cuts to seat revision implants. We analysed National Joint Registry data for 273146 primary TKR, 13943 revision TKR and 512 revision UKR to TKR procedures over 2003-2009. Using the thickness of the polyethylene bearing as a surrogate for bone loss reveals a mean poly thickness of 10.43mm for primary TKR, 11.31mm for complex primary TKR, 14.86mm for revision TKR and 12.79mm for revision of UKR-to-TKR. Constrained knee replacements were used in 4.9% of UKR-to-TKR revision in comparison to 2.15% of primary TKR. Revision of a primary UK to a TKR is not as simple as a primary TKR. It results in thicker polyethylene bearings, which may represent greater bone loss when compared to a primary or complex primary TKR, but less than that seen with revision TKR. This can lead to the use of more stabilised implants. This data used in conjunction with longevity data can help the orthopaedic surgeon counsel patients regarding the most appropriate primary procedure.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29008**

**TREATMENT OF MEDIAL KNEE OA: AN ALTERNATIVE TO ARTHROPLASTY FOR YOUNGER ACTIVE PATIENTS**

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Statement of Purpose: Knee OA patients who have exhausted conservative treatments, but are not ideal candidates for arthroplasty (due to age, activity level, or disinclination), face a lack of therapeutic options. We investigate an extra-capsular implant (KineSpring® System, Moximed, USA) designed to relieve pain by reducing the load acting on the knee. The potential reversibility of the procedure combined with the preservation of normal knee anatomy and flexibility makes the device an attractive option for these patients. Methods and Results: The device was implanted in 67 young and active members of the working population (mean: 52, 31–68 years). Early surgical experience and adverse events were recorded, and clinical outcomes were collected using validated patient reported outcomes tools at regular intervals. Subcutaneous, extra-capsular implantation was successful, with a mean surgical time of 73 minutes. After a mean hospital stay of 1.4 days (range 1-3), patients resumed full weight bearing within 1-2 weeks and achieved normal range of motion by 6 weeks. Mean WOMAC pain (0-100 scale) improved from 43.2 to 18.6 ( $p < 0.001$ ); mean WOMAC function (0-100 scale) improved from 42.9 to 16.3 ( $p < 0.001$ ) at last follow-up (11.8 ± 7.2 months). This trend continues for patients two years after surgery and beyond. Conclusions: The load absorber demonstrated clinically meaningful and statistically significant pain relief and functional improvement in an active, working-age patient population. The anatomy-sparing procedure and extra-capsular device provide clinical value for patients with medial knee OA and should be considered as an alternative to arthroplasty in this challenging patient group.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29292**

**DIAGNOSIS AND MANAGEMENT OF PROXIMAL TIBIAL STRESS FRACTURES IN PATIENTS UNDERGOING TKR**

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Apollo Gleneagles Hospital, Kolkata (INDIA)

Sixteen patients (all females) with long standing osteoarthritis of the knee presented with an acute increase in the intensity of pain with inability to walk over a short duration. All patients had distinct point tenderness in the upper tibial shaft. X rays revealed a stress fracture in the proximal tibia in 7 patients. The other 9 patients were subjected to radio-nucleide whole body bone scan which revealed a unicortical or bicortical stress fracture in the tibia. All patients underwent TKR with an uncemented tibial stem crossing the site of the stress fracture. Additional plate fixation was required in 3 patients who had rotational instability. Results: The pain of the stress fracture disappeared in the immediate post operative period and all patients were able to walk with support on the second post operative day. recovery of knee function was satisfactory and all the stress fractures healed in 3 months. Conclusions: Occult or overt stress fracture is a common complication in long standing OA knees in osteoporotic patients particularly in post menopausal women. A sudden increase in pain with specific point tenderness on the tibia should raise suspicions of a stress fracture even in the presence of a normal X ray. These fractures can be well delineated by a bone scan. Stabilization with a stem across the fracture during TKR results in rapid control of pain, allows early weight bearing, leads to union and prevents progression to an overt fracture.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29295**

**MANAGEMENT OF MAJOR BONE DEFICIENCY OF THE MEDIAL TIBIAL CONDYLE IN PATIENTS WITH SEVERE VARUS DEFORMITY UNDERGOING TKR**

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A total of 23 knees in 17 patients (11 females and 6 males) with osteoarthritis and varus deformity greater than 45 degrees were treated with TKA and followed up for a mean duration of 2.4 years. All patients had large bony deficiency of the medial tibial condyle. The operative procedure involved extended medial soft tissue release. The size of the defect was minimized by taking a 10 mm tibial cut, lateralizing and downsizing of the tibial tray. The residual defect was treated as follows: Less than 5 mm - cementoplasty 5mm to 10mm - Autogenic bone graft fixed with screws More than 10 mm - Bone graft with tibial stem The implant used was cemented PFC Sigma PS design in 17 and TC3 implant in 6 cases. Results: All patients had satisfactory correction of deformity and were able to weight bear with support from the second post operative day. The mean range of motion gained at the end of 3 months was 118 degrees. All grafts incorporated well and there was no loosening of the cement mantle. Conclusion: Minimizing the tibial bone defect by appropriate cuts and lateralization and downsizing of the tibial tray followed by cementoplasty or bone grafting gives gratifying results in long standing osteoarthritic knees with severe medial condylar tibial bone defects and is significantly less expensive than metallic wedges and augments.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29167**

**CORRECTING VARUS DEFORMITY WITH FLEXION CONTRACTURE DURING TOTAL KNEE ARTHROPLASTY: THE “INSIDE-OUT” TECHNIQUE**

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Introduction: Traditional method of correcting a fixed flexion/varus deformity was described in 1979, which required detachment of the posteromedial capsule from the tibia and semimembranosus tendon, partial or complete. The tight superficial medial collateral ligament (SMCL) was released subperiosteally. To address the risks of over release, hematoma formation and elevation of joint line, the Inside-Out technique was evolved. Our hypothesis is that this technique effectively corrects varus and flexion contracture while reducing these complications. Material and Methods: This method requires femoral and tibial resection at 90 degree of the mechanical axis, and creation of a balanced rectangular extension gap. This is achieved by transverse capsulotomy of the posteromedial capsule at the level of the tibial resection in full extension. The semimembranosus insertion is not released. The tight SMCL is pie-crusting and with serial manipulations a balanced extension gap is achieved. The flexion balance gap is achieved by the “parallel to tibial cut technique” of posterior condyles. Forty-five patients with severe biplanar deformity, with varus > 15 degrees and flexion contracture > 10 degrees underwent TKR with Inside-Out technique. The mean age was 73.3 years. Results were assessed according to WOMAC and Knee Society Scores. Results: The mean Knee Society Score and WOMAC were 95 and 29 respectively. The mean coronal plane alignment was 5.5 degrees. There were no cases of instability or residual flexion contracture. DISCUSSION: The Inside-Out technique is very effective in correcting biplanar deformity without over or under release, hematoma or elevation of joint line.

**Date: 2011-09-09**  
**Session: Knee - Soft Tissue**  
**Time: 08:00 - 09:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29596**

**PATIENT SPECIFIC INSTRUMENTATION – WHEN TO TRUST AND WHEN DO YOU DITCH THEM?**

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Patient specific instrument for knee arthroplasty use the data obtained from the CT or MRI scan and Xrays to design patient matched jigs. The manufacturers claim that these will help to improve the postoperative alignment in a fashion similar to computer navigation. These will also have additional advantage in terms of decrease OR time and inventory. Given the early enthusiasm for the product it is essential to understand the situations in which these can be blindly adapted and also where there use can potentially jeopardise the results. The talk is going to give different scenarios in which it may be necessary to ditch them in favour of conventional methods and also why and how they can potentially replace computer navigation in simple uncomplicated knee replacements. The talk is a case series level IV evidence and will contain examples like extra articular deformity, racial variations, Tibial Tubercle position and its effect on calculations, effect of different proprietary software on outcomes and end results with different rapid prototyping and manufacturing machines.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 29112**

**REVISION IN KNEE ARTHROPLASTY WITH BONE LOSS USING ROTATING HINGED PROSTHESIS. MID TERM RESULTS**

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B' Orthopaedic Dpt., Kilkis (GREECE)

**Aim:** Presentation of the results of rotating - hinge prosthesis use in knee revision surgery.  
**Material – Methods:** Between 2002 and 2010, fourteen patients (12 women, 4 men) underwent 16 primary revisions. Nine patients had two-stage procedure due to infection. Five patients had one-stage procedure due to aseptic loosening of the prosthesis. The mean age was 67 years old (range 48 to 72 years old). Endo–Model rotational knee prosthesis was used. We evaluated the results with the KSS knee score and the KSS function score. The postoperative x-rays were examined for knee alignment, bone quality, radiolucent lines and thereafter for sign of loosening. **Results:** The average follow-up was 63 months (range 14 months to 98 months). Knee stability and proper alignment were achieved in all cases. The mean KSS knee score was improved from 42 to 68 ( $p<0,05$ ) and the mean KSS function score from 44 to 57 ( $p<0,05$ ). The use of walking aid was always present for outdoor activities for the first year postoperatively. There were no major complications. Superficial infection was recorded in two operations and was treated with antibiotics for six weeks. Wound breakdown was noted in four patients and they were treated with the standard wound care policy of the hospital. **Conclusions:** Revision in total knee replacement is mainly a salvage procedure. The rotating- hinge prosthesis can relieve the patient from the symptoms of a failed prosthesis especially when there is massive bone loss and ligament insufficiency.

**Date: 2011-09-09**  
**Session: Knee - Infection & Revision**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall IV**

**Abstract no.: 29519**

**REVISION TOTAL KNEE ARTHROPLASTY USING TEMPORAL SPACERS**

Igor ZAZIRNYI

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**Aim:** to analyze the revision total knee arthroplasty using temporal spacers. **Materials and methods:** over the period of last 9 years, 16 revision surgeries of the earlier located implants were performed. In every case, the implants were removed due to the infection. For four patients we used the bone cement as a spacer with antibiotic. For 12 patients we used the so called "functional" spacer – bone cement with antibiotic together with femoral component, articular surface of tibia component. The postoperative treatment regime was the same as for the patients after the primary operation. The revision surgery was held within 3 months after the condition normalization. During the operation, the previous spacer was removed and instead the new implant was introduced. We used models LCCK "Zimmer" (5 patients), models for the primary arthroplasty with posterior stabilization and stems to tibia plateau and/or femoral component (11 patients). **Results:** the treatment effect was evaluated over the period of 2 – 9 years using 100 points Knee Rating Scale. Thus, for 3 patients out of 5 (with LCCK "Zimmer" implants) the functioning was rated as good (70- 84 points), 2 patients were assessed as satisfactory (60-69 points). For 3 patients (out of 11 who had the model for primary TKA with stems) the knee functioning was rated as excellent (more than 85 points), for 8 as good (70-84 points). **Conclusions:** The use of "functional" spacer after the primary implant removal (due to infection), allows preserving the function of knee joint better.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 30019**

**SURFACE MODIFICATION OF IMPLANTS INHIBITS PRIMARY ATTACHMENT IN BIOFILM FORMING BACTERIA**

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Introduction: Prosthetic infections by Biofilm forming organisms continue to be a menace to the success of orthopaedic surgery, this poses a tremendous social and economic burden in terms of morbidity associated with infections. Recent analysis shows that the incidence of deep infection will exceed 50% by 2030. Materials & methods: Superhydrophobic surfaces were produced using atmospheric plasma liquid system on titanium coupons-surface area; 0.7857cmsquare with contact angles >150 degrees. Laboratory strains of Staph aureus BH1CC and Staph epidermidis 8325-4 were used. Single colonies of BH1CC and 8325-4 were incubated in Brain-Heart infusion broth (BHI), (Oxoid,UK) supplimented with glucose and salt solutions respectively as previously described. The overnight broth cultures were diluted to optical density(OD) of 1.0, and Primary attachment assays were performed by incubating the super hydrophobic titanium coupons in the overnight broth cultures(OD=1.0) in 24 wells tissue treated plates at 37 degrees celcius for 1hour. The coupon is then gently rinsed in sterile deionised water (dH20). This is then treated in 1ml of sterile dH20 in a universal bottle by vortexing and sonication. The 1ml aliquot is then plated on an agar plate (spread plating), and incubated at 37degrees for 24hours. The numbers of colony forming units (CFU) are counted and these represent the number of bacterial attachment. All experiements are in triplicate and a direct comparison is made between the superhydrophobic coupons and plain titanium coupons as controls. Results: There is a statistically significant reduction (p=0.01) in bacterial primary attachment on the superhydrophobic surface suing the paired T test.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 30012**

**REVISION TYPE KNEE ARTHROPLASTIES: SEMI-CONSTRAINED OR CONSTRAINED? RESULTS AFTER MEAN FOLLOW-UP OF 7 YEARS**

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Hospital Clinico San Carlos, Madrid (SPAIN)

**INTRODUCTION:** How constrained implants used in the revision knee arthroplasty are, is critical to preserve the stability of the knee and so to obtain good results. **OBJECTIVES:** To assess if there is any difference between the radiological, clinical and functional situation and the quality of life of patients in whom a semi-constrained (sc) or a constrained (c) knee arthroplasty have been implanted. **MATERIALS AND METHODS:** We studied two comparable groups of 50 patients each, distinguishing how constrained the implants are. The mean age of the patients at the time of surgery were 74(sc-group) and 75(c-group). We assess the functional and clinical situation using the Knee Society Score; the radiological situation and the quality of life using the Short Form 12. We have analyzed the survivorship rate of our arthroplasties as well. Then we compare the results in order to find if there is any difference between the groups. **RESULTS:** We contacted 95 patients. 5 patients (2(sc-group) 3(c-group)) had died without any surgeries in the knee. The survivorship rate of the arthroplasties are 92% (sc-group) and 96 % (c-group) at the time of follow up. 77.4% of the patients of c-group declared themselves satisfied or very satisfied in the last follow up, comparing with 68% of sc-group. The results of the KSS-Clinical were excellent or good in 87.1% of the patients of c-group and 83 % in the sc-group. While in the KSS-Functional were 77.5% in the c-group and 74 % in the sc-group. **CONCLUSIONS:** Assessing the results of both groups we could recommend the constrained implants. However the results were very similar the constrained group is better in all the items.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 29264**

**USE OF FEMORAL HEAD ALLOGRAFT FOR SEVERE BONE DEFECT IN REVISION TOTAL KNEE ARTHROPLASTY**

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**Purpose:** The aim of this study was to assess the clinical and radiographic results of revision total knee arthroplasty using a fresh frozen femoral head allograft for a severe bone defect. **Materials and Methods:** Twenty-seven patients who had undergone revision TKA in our department from March 1996 to March 2003 using a fresh frozen femoral head allograft were retrospectively reviewed. All patients had a severe bone defect. Seven distal femurs, 9 proximal tibias and 11 on both sides required an allograft. The average age at revision and average follow-up period was 69.2 years and 7years 6months. The diagnoses necessitating the revision TKA were aseptic loosening in 19 knees, instability in 6 knees, and infection in 2. The patients were evaluated using The Hospital for Special Surgery knee rating scale. The radiographic evaluation consisted of an inspection for the union of the host, tibiofemoral angle and radiolucent lines. **Results:** The mean range of motion increased from 71 to 113 degrees. The mean HSS knee score improved from 46 to 83. The overall tibiofemoral angle improved from varus 7.3° to valgus 6.1°. In all cases, radiolucency was below 4 scores and there was no loosening of implant. But, 3 cases were found the radiopaque line around the extended rod of tibial stem. In 26 out of 27 knees, union was noted and no collapse occurred. Only one knee had an infection. **Conclusion:** A femoral head allograft can provide a satisfactory method for managing severe bone defects in revision TKA.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 30131**

**SURVIVORSHIP AND REVISION CAUSES IN FIXED MODULAR, FIXED NON-MODULAR AND MOBILE TIBIAL BEARINGS IN PRIMARY TOTAL KNEE ARTHROPLASTY. A REPORT FROM THE NORWEGIAN ARTHROPLASTY REGISTER, 1994-2009**

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Background: Mobile, fixed modular or fixed non-modular bearing (mono-block) are favorable options in TKA. No register studies have compared the revision causes of these designs. Materials/methods: Cemented primary TKAs, without patella resurfacing, registered in the Norwegian Arthroplasty Register the years 1994-2009, were analyzed. With Kaplan Meier and Cox regression analysis we evaluated 8144 fixed modular bearing, 6372 mobile bearing and 3317 mono-block knees. Mean follow-up was 4.2, 4.1 and 5.4 years respectively. Results: 10-years KM survivorship was 94.5% (CI: 93.7-95.3), 93.4% (CI: 92.2-94.6) and 93.1% (CI: 91.7-94.5) in the fixed modular, mobile, and the mono-block groups respectively. The mobile and the mono-block groups had a 20% increased risk for revision relative to the fixed modular group (RR=1.2, CI: 1.0-1.4, p=0.047, RR=1.2, CI: 1.0-1.5, p=0.038). With the fixed modular group as reference, the risk for revision due to tibial component loosening was higher in the mobile (RR=4.8, CI: 3.1-7.2) and the mono-block groups (RR=2.0, CI: 1.2-3.4), loosening of the femoral component was more common in the mobile group (RR=2.5, CI: 1.4-4.3), and revision due to pain was more common in the mono-block group (usually insertion of a patellar component, RR=1.4, CI: 1.0-1.8). Conclusion: Risk for revision due to tibial component loosening or femoral component loosening was lower in the fixed modular bearing group than in the mobile bearing group. Insertion of a patellar component as a revision procedure because of pain was more frequent in the mono-block group. Due to divergent results within groups, a causative explanation cannot be established.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 28722**

**DETECTION OF PERIPROSTHETIC OSTEOLYSIS IN TOTAL KNEE REPLACEMENTS USING A HUMAN CADAVER MODEL**

Bogdan SOLOMON<sup>1</sup>, Roumen STAMENKOV<sup>1</sup>, Andrew MACDONALD<sup>1</sup>, Susan NEALE<sup>1</sup>, David FINDLAY<sup>2</sup>, Donald HOWIE<sup>2</sup>

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Sensitive and accurate measures of osteolysis around total knee replacement (TKR) are needed to enhance clinical management and assist in planning revision surgery. Our aim was to examine, in a cadaver model of osteolysis around TKR, the sensitivity of detection and the accuracy of measuring osteolysis using plain radiographs, computed tomography (CT) and magnetic resonance imaging (MRI). Fifty-four simulated osteolytic defects were created around six cadaver knees implanted with either a cemented or uncemented TKR. Twenty-four defects were created in the femur and thirty in the tibia ranging in size from 0.7cm<sup>3</sup> to 14cm<sup>3</sup>. Standard anteroposterior (AP) and lateral fluoroscopically guided radiographs and CT and MRI scans with metal reduction protocols were taken of the knees prior to the creation of defects and at every stage as the defect sizes were enlarged. The location, number and size of the defects, measured from images obtained by each method, were recorded by three blinded assessors. Overall, the mean sensitivity of defect detection was 48% for AP radiographs only, 66% for AP and lateral radiographs, 83% for CT and 89% for MRI. Mean specificity was 60% for AP radiographs only, 51% for AP and lateral radiographs, 98% for CT and 90% for MRI. Both CT and MRI had significantly higher sensitivities and specificities than AP radiographs and combined AP and lateral radiographs ( $p < 0.005$ ). For a mean defect volume of 3.5cm<sup>3</sup>, the mean accuracy error ( $\pm$  SEM) was 1.3cm<sup>3</sup>  $\pm$  0.4 for CT and 1.4cm<sup>3</sup>  $\pm$  0.1 for MRI. Overall, there was no difference in the accuracy of defect volume measurements between CT and MRI ( $p = 0.574$ ). This study demonstrates the limitations of plain radiographs and the high sensitivity and specificity of both CT and MRI to assess osteolysis around TKR.

**Date: 2011-09-09**

**Session: Knee - Infection & Revision**

**Time: 10:00 - 11:30**

**Room: Meeting Hall IV**

**Abstract no.: 29658**

**PROPIONIBACTERIUM ACNES AS AN AGENT OF PROSTHETIC JOINT INFECTION AFTER HIP AND KNEE ARTHROPLASTY: DIAGNOSTIC AND THERAPEUTIC STRATEGIES**

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Propionibacterium acnes is increasingly recognised as a causative organism in prosthetic joint infection. It is an organism of low virulence and often causes low-grade infections producing pain or loosening in a prosthetic joint with no overt signs of infection. As a result, it frequently remains un-diagnosed. This is compounded by the fact it is often found in the presence of normal inflammatory markers, and negative routine investigations such as radiographs and joint aspiration. We present a series of 15 patients who presented to our unit over one year with a spectrum of complaints from a painful joint replacement in the absence of infective signs, to systemic sepsis. P. acnes, sensitive to penicillin, was isolated from all patients but took from 5-7 to be identified. We describe their clinical presentation and investigation findings and give recommendations for the diagnosis and management of such patients.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 28558**

**CROSS-OVER SIGN AFTER ROTATIONAL ACETABULAR OSTEOTOMY FOR DYSPLASIA OF THE HIP**

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Background: A retroverted acetabulum has been identified as a cause of osteoarthritis. This study was performed to evaluate whether radiographic cross-over sign (COS) influence the long-term result after rotational acetabular osteotomy (RAO) for dysplastic hip. Methods: Between 1987 and 1999, 140 patients (151 hips) who had pre- or early stage osteoarthritis of the hip due to dysplasia underwent a RAO. There were one hundred twenty-nine women and eleven men; their mean age at the time of surgery was 34.7 years. The mean follow-up period was 13 years. Clinical follow-up was performed with use of the system of Merle d'Aubigne. Radiographic analyses included measurements of the center-edge (CE) angle, acetabular cartilage (AC) angle, head lateralization index (HLI), and COS. Results: The mean clinical score improved significantly from 14.5 preoperatively to 17.0 at follow-up. The CE angle improved significantly from mean -0.2 degrees to a postoperative mean of 34 degrees. The AC angle improved from 30 degrees to 2.7 degrees, and HLI from 0.64 to 0.60. The COS was observed in 14 hips (9.3%) preoperatively and in 62 hips (41%) postoperatively. Radiographic progression of osteoarthritis was observed in 14 hips (COS positive; 8 hips, negative; 6 hips). The Kaplan-Meier survivorship analysis predicted a survival rate of 85.9 % at 15 years. The only factors significantly associated with radiographic progression of osteoarthritis were fair (rather than excellent and good) postoperative joint congruency ( $p < 0.0001$ ) and age at surgery ( $p = 0.001$ ). Conclusions: Presence of postoperative COS had no effect on the outcome ( $p = 0.211$ ) in this study.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 27800**

**PERIACETABULAR OSTEOTOMY: A SEVEN YEARS EXPERIENCE**

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Introduction: The Ganz's Periacetabular Osteotomy (PAO) is a worldwide accepted redirection. Our results after the first consecutive cases in seven years are presented. Materials and Method: 54 patients (42 female, 12 male) with a mean age of 27,2 years (16-45) were treated by means of PAO and followed up at 48 months (12-68). Pre- and postop evaluated data included Wiberg's CE angle in AP and Lateral view on plain x-ray, Acetabular Index, Intra operative bleeding, need for post-op blood transfusion, surgical time, WOMAC and Merle d'Aubigne scores. Results: mean Wiberg's CE Angle improvement was 19,5 degree (15-38) in AP view and 22 degree (10-45) in Lateral view, with a mean post-op value of 32,5 and 35,10 degrees respectively. The mean Acetabular Index improvement was 6 degree (2-13) with a mean value of 28 degree (22-38). The mean WOMAC Score improved from a pre-op value of 47,3 to a post-op value of 92,7. The mean Merle d'Aubigne Score improved from a pre-op value of 14,6 to a post-op value of 17,1. We had 19 cases of transient neuroapraxia of the LCFN, one case of transient paresia of the sciatic nerve, 2 cases of delayed bone union at isquion cut. One case of post-op anterior acetabular overcoverage required a mini open anterior acetabuloplasty. One case required THR conversion. Conclusion: PAO provided promising results at short- and midterm, according to other published studies with similar follow-up.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 28288**

**MODIFIED SALTER INNOMINATE OSTEOTOMY WITHOUT INTERNAL PINS FIXATION FOR THE TREATMENT OF HIP DISORDERS**

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The Salter innominate osteotomy is one of the effective surgical procedures with complete pelvis osteotomy for the treatment of hip disorders. However, it has drawback of internal fixation with pins and the subsequent removal procedure. We describe a modification of this osteotomy that does not require pin fixation and secondary removal. We retrospectively reviewed 24 hips in 21 patients who had been operated on by a single surgeon. An oblique rather than the original horizontal osteotomy was used without internal fixation. There were 16 female and 5 male patients. The mean age at operation was 25 months (18 to 84) and the mean follow-up was 30 months (12 to 88). Most patients required additional open reduction, capsuloplasty, and proximal femoral shortening or rotation osteotomy. Clinical outcomes were assessed using the modified McKay criteria to measure pain symptoms, gait pattern, Trendelenburg sign status, and the range of hip joint movement. Radiographic outcomes were evaluated using the Severin method to measure the acetabular index and the centre-edge angle. The clinical and radiographic outcomes were satisfactory with the mean pre-operative acetabular index was  $37.9^{\circ}$  ( $24^{\circ}$  to  $54^{\circ}$ ), which decreased to  $19.9^{\circ}$  ( $7^{\circ}$  to  $29^{\circ}$ ) in the immediate post-operative period, and improved to  $14.6^{\circ}$  ( $5^{\circ}$  to  $25^{\circ}$ ) at the final follow-up (student's t-test,  $p < 0.0001$ ). Post-operative complication was comparatively lower than the traditional Salter innominate osteotomy procedure. The clinical and radiological outcomes of this method are comparable to those of the original technique, but longer follow-up will be necessary.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 29829**

**CHIRON'S VIEW FOR CAM FEMOROACETABULAR IMPINGEMENT:  
AN ANATOMIC STUDY**

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Since AAOS symposium 2008, Hip Imaging should include specific lateral radiographs: Frog Leg, Dunn or Cross table views. We use an original view (Chiron) for the diagnostic of cam femoroacetabular impingement. The patient is installed lying supine; hip in 45° flexion, external rotation and 45° abduction. X-ray beam should be perpendicular to the table with the crosshairs directed on the femoral head. Objective: To compare our incidence with the three above mentioned. Evaluation criteria were Alpha Angle (Notzli) and Anterior Offset Ratio (Eijer). Methods: Cadaver study: we created artificial cam femoroacetabular impingement on normal femoral necks. Femurs were positioned at several angles using orthogonal landmarks. The number of cases necessary to show a 5° difference between the tested view and Dunn view was 19. Validity (Spearman correlation rate with Dunn view) and reproducibility (intraclass correlation coefficient) were analyzed with Stata SE v11.0 Results: 19 femurs were included. The highest mean values of alpha angle were obtained with our view, the lowest with the Cross table. We measured a mean difference of 8.95° with Dunn ( $p=0.00007$ ), Dunn 45° ( $p=0.004$ ) and 13.47° with cross table ( $p=0.002$ ). The intra and inter-observer variability were both excellent (0.99 and 0.87). Spearman's correlation rate with Dunn view was  $r=0.7$ . Results concerning Offset Ratio were not statistically significant. Discussion: Chiron's view is useful to detect mild abnormalities. Our screening of hip impingement now relies only on clinical examination and Chiron's view.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 29857**

**DOES AN EFFECTIVE NON-OPERATIVE TREATMENT EXIST FOR FEMOROACETABULAR IMPINGEMENT? A SYSTEMATIC REVIEW OF THE LITERATURE**

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It is not clear if an effective non-operative treatment exists for Femoroacetabular Impingement (FAI). We undertook a systematic review of the literature. Pubmed, Medline, EMBASE, CINAHL, AMED and Cochrane Library databases were searched using the term: Femoroacetabular Impingement, Femoro-Acetabular Impingement and Hip Impingement. Any article which made reference to, described or provided evidence that related to a non-operative treatment for FAI was included. 45 articles met our criteria. 41 articles were review/discussion based. The detail of non-operative treatment in all articles was limited and could universally be grouped into the categories shown: • A trial of conservative treatment - 28 (68%) • Activity modification - 33 (80%) • Avoiding excessive hip movement and or rest - 15 (37%) • Physical therapy - 18 (44%) detail on the type of physical therapy - 13 (72%). • Non Steroidal Anti-inflammatory Medications - 29 (71%). • Intra-articular steroid injections - 4 (10%). Four articles were primary experiments involving non-operative treatment and were level 4 evidence or below. Two of these articles suggested a favourable outcome with non-operative treatment. One case-series reported poor outcomes for non operative management compared to surgery. However, the groups were not similarly matched with more pre-existing degenerative disease present in those treated non-operatively. The literature on non operative treatment for FAI is limited, lacks detail and has a poor evidence base. Non-operative treatment regimes need to be clarified and formally compared against surgery to determine if they are realistic effective alternatives to FAI surgery.

**Date: 2011-09-09**  
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**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 28754**

**PELVIC AND FEMORAL OSTEOTOMIES IN SPASTIC HIP**

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Introduction: Proximal femoral osteotomies are being very often performed in patients with cerebral palsy (CP), especially derotation varus osteotomy. This procedure offers excellent or good X-ray outcome, although the clinical outcome is usually much worse. That is why we have oriented to the pelvic procedures in the last years. Material and Method: We use two methods of roofing procedures. The first one is an acetabuloplasty. It is a standard method usually recommended in patients from 1,5 yrs.to 10 yrs.of age. We have been performing this procedure since 1988 and due to the excellent results we spread the indication even up to the age of 16. The second one is a periacetabular osteotomy after Ganz. It is a standard, but extensive method which is indicated from the age of the Y-shaped cartilage closure. We have started to perform this procedure in 2005 in our clinic. We have performed the acetabuloplasty in 45 spastic hip of 39 patients (age 4-16 yrs.) from Jan 2004 to Dec 2010. We have performed the periacetabular osteotomy in 4 hips of 4 patients (age 14-42 yrs.) in the same period. Technique of deep transiliac acetabuloplasty and periacetabular osteotomy is reminded. Some interesting case reports are presented. Conclusion: 1.Soft tissue procedures are the golden standard and the first step in CP surgery, aiming to reach the muscle balance. 2. We recommend a derotation osteotomy (it is the most frequent proximal femoral osteotomy performed in CP patients in our clinic). The varus osteotomy is being very rarely indicated. The Schanz osteotomy is being used as a palliative procedure. 3. The acetabuloplasty is a method of choice up to the age of about 15. The periacetabular osteotomy is a very useful method in patients with spastic hip after the Y-shaped cartilage closure.

**Date: 2011-09-09**  
**Session: Hip - Osteotomy**  
**Time: 10:00 - 11:30**  
**Room: Meeting Hall V**

**Abstract no.: 28751**

**FEMOROACETABULAR IMPINGEMENT SYNDROMA – OUR EXPERIENCE WITH OSTEOCHONDROPLASTY VIA SURGICAL DISLOCATION AND VIA ANTERIOR MIS APPROACH**

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Introduction: The prevalence of Femoroacetabular impingement (FAI) is estimated up to 15 %. This disease leads to osteoarthritis of the hip joint. If we accept the impingement concept as a reason of osteoarthritis, it is necessary to accept principles of therapy. Material and Method: Diagnosis: A conventional arthrography, arthroMRI respectively are very helpful in pre-operative decision-making besides typical clinical finding and standard X-ray – AP and lateral view. Treatment: we perform surgical dislocation of the hip with the aid of trochanter flip osteotomy and resection of osteofytes at head-neck junction to restore the femoral head offset. If acetabular retroversion is present, we perform acetabular trimming with labrum re-fixation if it is possible. We perform osteochondroplasty only via anterior approach without dislocation in elder patients when osteoarthritic changes grade II is present. From Jan 2005 to Dec 2010 we have performed osteochondroplasty via surgical dislocation in 58 hips of 48 patients (25 male hips, 33 female hips), via anterior MIS approach without dislocation in 23 hips of 23 patients (11 males, 12 females). Results: Assessment after various scales is discussed, survivorship after both procedures, which are compared, too. Discussion: We tried to perform other approaches (anterior, lateral) in the past but the surgical dislocation seems to be the most proper in younger patients - both femoral head and acetabulum and labral pathology are very well accessible. On the other hand, the osteochondroplasty via anterior approach is very well tolerated even in elder patients. Conclusion: Most patients are satisfied – up to short-term result. Nowadays the quality of labrum-cartilage complex besides femoral head shape seems to be a limiting factor.

**Date: 2011-09-09**  
**Session: Paediatric Trauma**  
**Time: 08:00 - 09:30**  
**Room: Panorama Hall**

**Abstract no.: 30322**

**FRACTURE INVOLVING THE ENTIRE DISTAL HUMERAL PHYSIS:  
A PROBLEMATIC PEDIATRIC FRACTURE**

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The aim of the study: definition of distal humeral physeal injuries involving the entire physis is not unique. Sometimes terms as low supracondylar fracture or separation of the distal humeral epiphysis are used. Low grade of ossification and problematic diagnosis are characteristic. The aim is to present variability of this injury and diagnostic as well as therapeutic approach. Material: during last 3 years (2008-2010) altogether 7.074 pediatric fractures were treated in the Department of Pediatric and Trauma Surgery, 3rd Faculty of Medicine, Charles' University, Prague. From this number 869 fractures were localized in the humerus and only 16 children sustained injury to the entire distal humeral physis (0,23% of all fractures, 1,89% of humeral fractures). Results: fractures involving the entire distal humeral physis can be classified into three types: infantile type (no secondary ossification center visible); children's type (capitellum center visible); adolescent type (physis divided into three parts and all four centers manifested). Diagnosis is difficult and is based on X-rays, USG, MRI and sometimes dynamic skiascopy under general anaesthesia. The distal humeral epiphysis can be separated en-bloc or divided in more fragments. Except in newborns fractures involving the entire distal humeral physis are usually treated surgically. Closed or open reduction and internal fixation should be performed. Conclusion: fractures involving the entire distal humeral physis are from the diagnostic point of view one of the most serious pediatric fractures. They are rare, often misdiagnosed, incorrectly treated with serious sequels.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 28662**

**THE INFLUENCE OF MUSCLE FORCES ON THE STRESS DISTRIBUTION IN LUMBAR SPINE**

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Introduction: Previous studies of bone stresses in the lumbar spine have relied on simplified musculature models, even though muscle forces are major contributors to vertebral bone stresses. Detailed musculoskeletal spine models have recently become available and show good correlation with experimental findings. Purpose: A combined inverse dynamics and finite element analysis study was conducted in the lumbar spine to investigate the effects of muscle forces on a detailed musculoskeletal finite element model of the 4th lumbar vertebral body. Method: The muscle forces were computed with a detailed and validated inverse dynamics musculoskeletal spine model in a lifting situation, and were then applied to an orthotropic finite element model of the 4th lumbar vertebra. The muscle model consisted of roughly 1000 individually activated muscle fascicles. The FE model consisted of 63974 volumetric elements for trabecular bone and 8886 shell elements with a thickness of 0.6 mm for cortical bone. Static analysis of the FE model was performed and the results were compared with those from a simplified load case FE model without muscles. Results: Inclusion of muscle forces in the FE model increased the Von Mises stress by 30 % in the superioanterior and central part of the vertebral body and in the pedicles. Conclusion: Muscle forces play a large and non-negligible role for the stress distribution in the vertebrae. This is important, when considering compression fractures in the elderly population with decreased trabecular strength, where small changes in the load axis combined with muscle forces would lead to such fractures.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 28213**

**LONGITUDINAL RADIOGRAPHIC CHANGES IN SUCCESSFUL ARTHRODESIS PATIENTS AFTER POSTERIOR LUMBAR INTERBODY FUSION USING AN INTERBODY CARBON CAGE – A PROSPECTIVE 5-YEAR STUDY**

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Objective: Using plain radiographs and helical CT scans, the study aimed to show longitudinal radiographic changes for >5 years in bone fusion sites of successful arthrodesis patients after posterior lumbar interbody fusion (PLIF) using current interbody cages. Methods: For 135 consecutive patients who underwent PLIF using interbody carbon cages at 1 and 2 levels, a prospective longitudinal radiographic evaluation including plain radiographs and CT scans was performed for >5 years after surgery. Radiographic findings in the interbody bone fusion site were determined by observing a contrast between radiographic densities of the bone and carbon cage struts (cross sign), continuous bony bridging, extension of bridging bone fusion density, and remodeling status of the grafted bone to the trabecular bone. Interpretation of radiographs and CT scans were graded on a 4-point scale. Results: The average grades for all assessments increased for 5 years after surgery, and differences between these grades at each time interval compared to the previous interval were statistically significant for 3 years after surgery ( $p < 0.05$ ). Only 57.5% of the total 114 fusion levels showed >50% trabecular bone formation in the original bone graft area at 2 years after surgery. Nevertheless, the proportion of levels that showed >50% trabecular bone formation increased to >80% at 3 years after surgery ( $p < 0.01$ ). Conclusions: Longitudinal changes in the interbody fusion site status after PLIF using interbody cages continued beyond 3 years after surgery. Therefore, final assessment regarding success should also be made at least 3 years after surgery.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 28838**

**SYNOVIAL FACET CYSTS AFTER DECOMPRESSIVE SURGERY FOR LUMBAR SPINAL CANAL STENOSIS – A PROSPECTIVE COHORT STUDY**

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**INTRODUCTION:** It is known that synovial cysts arise from the facet joints after decompressive lumbar surgery. However, it is not well known about the incidence or when postoperative synovial facet cysts (PSFC) arise. The purpose of this study is to clarify the incidence and about what time PSFC arises after the surgery. This study is a prospective cohort study. **METHODS:** There were 81 patients who underwent partial facetectomy and flavectomy of the involved level for lumbar spinal canal stenosis. There were 52 male and 29 female (mean age 70 years, ranged from 42 to 85 years). Mean follow up period was 33.8 months (ranged from 24 to 48 months). All patients underwent MRI at 1 month, 3 months, 6 months, 1 year and 2 years after the surgery. Cystic lesions demonstrating low signal intensity in T1 weighted and high signal intensity in T2 weighted MRI axial images, which connected with the facet joints were defined as PSFC. The incidence, the involved levels and about what time PSFC arose were noted. **RESULTS:** Twenty eight of 81 patients (34.6 %) had PSFC at the operated levels. Twenty two (75.9%) were observed at L4-5 level. PSFC was found 4.8 months (ranged from 1 to 23 months) after the surgery in average. **DISCUSSION:** The high incidence of PSFC (34.6%) was observed. Resection of the hypertrophic flavum has to be performed in decompressive surgery. As progress of the facet joint degeneration, synovitis deteriorates and hypertrophied synovium may protrude from the exposed facet joint.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 29783**

**THE PREVALENCE OF SPONDYLOLYSIS AND ITS RELATIONSHIP WITH LOW BACK PAIN IN SELECTED POPULATION**

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**Objectives:** To determine the prevalence rate of spondylolysis in a selected population and to evaluate the association of spondylolysis with low back pain. **Methods and Materials:** A sample of eight hundred fifty five participants from our medical center and who underwent multidetector CT imaging to assess abdominal and urological lesions were included in this study. The occurrence of LBP needed medication in the preceding 12 months was evaluated using a self-report questionnaire. The presence of spondylolysis was characterized by the CT imaging. We used multiple logistic regression models to examine the association between spondylolysis and LBP. Seventy-eight study subjects (9%) demonstrated spondylolysis on the CT imaging. There is no statistically significant difference among age group ( $p=0.177$ ). And the P value of gender is 0.033 but there is no statistically significant due to the selected population bias. Three hundred eleven study subjects (36%) had back pain. There is statistically significant difference among gender ( $p=0.001$ ). No significant association was identified between spondylolysis and the occurrence of LBP. **Conclusions:** The prevalence of LBP is 36.37% and the prevalence of lumbar spondylolysis based on the CT imaging is 9.12% among a selected population who visited hospital for abdominal or urological lesions except LBP. Male demonstrated a similar presence of LBP to female and a significantly greater of presence of spondylolysis ( $p=0.033$ ). The prevalence rate of spondylolysis demonstrated no significant association with the presence of LBP and age group in adulthood.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 29648**

**ARE "PATTERNS" OF LUMBAR DISC DEGENERATION ASSOCIATED WITH LOW BACK PAIN? NEW INSIGHTS BASED ON SKIPPED LEVEL DISC PATHOLOGY**

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Introduction: The clinical relevance of "patterns" of disc degeneration of the lumbar spine is unknown. In the setting of multilevel disc degeneration (2 or more levels), this study addressed the clinical implications of skipped level disc degeneration (SLDD) to that of consecutive, multilevel disc degeneration (CMDD) of the lumbar spine. Methods: A population-based radiographic and clinical study of 3,099 Southern Chinese. Individuals with multilevel disc degeneration of the lumbar spine on MRI (N=1,457) were stratified to SLDD (n=301) or CMDD (n=1,156) groups. SLDD was classified into five types based on location of non-degenerated normal disc(s). Subject demographics, low back pain (LBP), pain status and functional disability were assessed. Results: CMDD increased the likelihood of historical LBP (OR: 1.39) and pain severity (OR: 1.83) in comparison to SLDD (p<0.05). A higher prevalence of LBP and pain intensity was observed in SLDD classification Type V. Functional disability scores did not differ between CMDD and SLDD nor within SLDD classification-types (p>0.05). Conclusions: Our large-scale study is the first to describe novel variants of SLDD-types and their clinical relevance. LBP and severity of pain was more pronounced in individuals with CMDD rather than SLDD. Our study suggests that subjects with similar degree but with different patterns of multilevel disc degeneration do differ with respect to low back symptoms, providing new evidence with regards to the mechanism of LBP.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 28482**

**ACUPUNCTURE THERAPY FOR CHRONIC LOWER BACK PAIN:  
A SYSTEMATIC REVIEW**

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Introduction: Chronic low back pain is a very common condition affecting a significant proportion of the population and has large economic implications on the society. Acupuncture has grown in popularity as an alternative therapy for chronic low back pain. Recent NICE guidelines on low back offer a course of acupuncture as a base line treatment option according to patient preference. Objective: The aim of this systematic review was to evaluate if this treatment option is justified in view of recent evidence available on the efficacy of acupuncture. Method: Studies included were identified by a PubMed search for relevant randomised controlled trials on the 23rd of July 2009. A systematic review was performed. Results: Fifteen randomised controlled trials were identified. Of these, 4 met the eligibility criteria and were critically appraised. Discussion: These trials suggest acupuncture can be superior to usual care in treating chronic low back pain, especially, when patients have positive expectations about acupuncture. Conclusion NICE guidelines of a course of acupuncture, offered according to patient preference as a treatment option for chronic low back pain, are justified.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 29502**

**ROLE OF FACET JOINT TROPISM IN LUMBAR DISC HERNIATION**

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Facet tropism is defined as asymmetry between left and right facet joints and is postulated as a possible etiological cause in occurrence of disc herniation. Research hypothesis 1: Facet tropism is associated with an increased occurrence of lumbar disc herniation at that level, and 2. Lumbar disc herniation is more common on the side of the more coronally oriented facet joint. Sixty patients (18-40 years) with single level disc herniation (L3-L4, L4-L5, or L5-S1). Facet angles were measured using MRI of 3 tesla using the method of Karacan. Facet tropism was defined as difference of 10 degrees in facet joint angles between right and left sides. Normal disc adjacent to the herniated level was used as control. We also examined if disc herniated towards the side of more coronally oriented facet. Twenty five herniations were at L4-L5 level and 35 at L5-S1. Statistical analysis was performed using the Chi-square test. At L4-L5 level 6/25 cases had tropism compared to 3/35 controls ( $p=0.145$ ). At L5-S1 level 13/35 cases had tropism as compared to 1/21 controls ( $p = 0.0094$ ). Of 19 cases having tropism, the disc had herniated towards the coronally oriented facet in 6( $p = 0.11$ ). There was statistically significant association between facet tropism and lumbar disc herniation at L5-S1 and none at L4-5. How presence of facet tropism at a particular motion segment leads to disc herniation and why only the L5-S1 segment and not the L4-L5 segment showed an association are discussed.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 29657**

**INTERVERTEBRAL DISC DEGENERATION ON MRI IS ASSOCIATED WITH LOW BACK PAIN: A POPULATION-BASED STUDY**

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Introduction: The presence of disc degeneration based on MRI and its association with low back pain (LBP) remains under heated debate. As part of the largest radiographic and clinical population-based study of the lumbar spine, this study addressed the association of disc degeneration as noted on MRI with the presence and severity of LBP. Methods: Sagittal T2-weighted MRIs of the lumbar spine were obtained of 2,702 adult individuals of Southern Chinese origin. The presence and severity of lumbar disc degeneration was assessed. An overall degenerative disc disease (DDD) score (range: 0 to 15) was obtained. Additional assessment of spine pathology/abnormalities, LBP, VAS pain scores, and subject demographics were performed. Results: There were 1,614 females and 1,088 males (mean age=42 years). Individuals with disc degeneration had a higher prevalence of LBP ( $p<0.001$ ). VAS pain scores were significantly higher in individuals with disc degeneration ( $p<0.001$ ). DDD scores were significantly greater in individuals with LBP ( $p<0.001$ ). Logistic regression modeling noted a significant quadratic trend ( $r^2=0.95$ ) increased association of disc degeneration severity and LBP ( $p<0.001$ ). Conclusion: This large-scale study noted that disc degeneration based on MRI is significantly associated with LBP. The “global severity” of disc degeneration was found to increase the risk of having LBP. These findings support that the study of disc degeneration on MRI is clinically relevant, and that treatment strategies, such as biological therapies, that can reduce degeneration can also diminish the incidence of LBP.

**Date: 2011-09-09**  
**Session: Spine - Lumbar**  
**Time: 10:00 - 11:30**  
**Room: Panorama Hall**

**Abstract no.: 29699**

**PARS INTERARTICULARIS REPAIR WITH PERCUTANEOUS SCREW FIXATION**

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Pars interarticularis repairs are conventionally performed using instrumentation and bone grafting through open surgical exposures, placing the nerve supply of multifidus at risk. As the goal of surgery is to preserve the motion segment function, it is logical to minimise the damage done at surgery to the muscles that control movement. We describe a 2 stage operation that allows the insertion of a cannulated compression screw [Perpos] using a single midline 1 cm incision, followed by limited paravertebral exposure of the fracture to enable preparation and grafting [Actifuse and BMP-2] using a Metrx Endoscopic camera system [Medtronic]. 6 patients (15 to 42 years) underwent the aforementioned procedure [5 with grafting, 1 with fixation only]. Pars repair was performed on 10 sites at the L5 level in all patients. Post-operatively the patient is discharged after a one night stay, with a simple corset to be worn for 6 weeks. Running is commenced at 3 months and full activity at 6 months following a CT to confirm healing. Out of a total of ten sites, nine demonstrated union on CT at 6-8 months. No screw required repositioning. 4 patients are without symptoms, 2 have improved significantly (including the patient with non-union). No wound related problems. Operating time was circa 2.5 hours average. CT scans showed no diminution of multifidus muscle CSA post operation. This operation enables rapid return to activities, and provides the opportunity to treat symptomatic pars defects especially in adolescents with minimal disruption to their academic and physical development.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 28354**

**NEW UNDERSTANDING OF ETIOLOGY AND PATHOGENESIS OF IDIOPATHIC SCOLIOSIS (IS). PROSPECTS FOR ITS SUCCESSFUL TREATMENT**

Valentyn SERDYUK

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Most complicated problem in orthopedics is treatment of idiopathic scoliosis (IS), what takes place in more than 90% of cases, etiology is unknown. Our aim was to investigate etiopathogenesis of this disease. More than 6900 patients with IS and associated spinal pain syndrome, aged from 1 to 89, were under our investigation and treatment during 14 years period (1996 till 2010). Conclusions: 1. Development of IS is based upon asymmetrical structure of human body, linked with difference of sizes and activity of brains hemispheres. 2. One-sided tension of m. erector spinae leads to inclination of pelvis on a side of weak muscles and following development of sideways curvatures of a spine. Since such a situation is typical for all living people this deformation may be named as functional scoliosis. 3. Further development of bodies of vertebrae, their arches, processes, intervertebral discs, ligaments and other anatomical elements in position of deviation leads to one-sided underdevelopment of mentioned structures. As a result, zones of instability appear in each segment of spine (neck, chest, lumbar and sacral areas). 4. Growing body's muscles asymmetry violates dynamic spinal-pelvic balance and, on the ground of laws of biomechanics and gravitation, initiate rotatory dislocation of vertebrae in zones of instability in all parts of spinal column. Thus, torsion of deformed clinoid vertebrae leads to formation of structural scoliosis. 5. Rotation of vertebrae, described above, has a character of regularity and does not depend upon sex, age and nationality of a patient. Thus, the term "idiopathic scoliosis" must be changed to another one- "spinal muscle's asymmetrical deformation of a reflex origin". Understanding of this regularity gave us a possibility to work out effective nonsurgical method of treatment of scoliosis and associated spinal pain syndrome in patients of all ages.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 28319**

**RIGHT THORACIC CURVATURE PROCESS IN ADOLESCENT PERIOD IN THE NORMAL SPINE**

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Background: Adolescent idiopathic scoliosis (AIS) results in complicated deformities, such as coronal curvature, vertebral body rotation, and rib cage rotation. Right thoracic curvature, trunk asymmetry and vertebral rotation, at times observed in the normal spine, resemble the characteristics of AIS. If it is determined that the features of right thoracic side curvature in the normal spine are the same as those observed in AIS, these findings might provide a basis for elucidating the etiology of this condition. For this reason, we investigated right thoracic curvature in the normal spine. Material and Methods: For normal spinal measurements, 1,200 samples (400 child, 400 adolescent, 400 adult) who underwent a posteroanterior chest radiographs were evaluated. Cobb angle from T5 to T12 was measured and right thoracic curvature was given a positive value. Results: In the child group, the mean Cobb angle from T5 to T12 was 0.6 degrees in males and 0.1 degrees in females. In the adolescent group, the Cobb angle from T5 to T12 was 1.8 degrees in males and 1.5 degrees in females. In the adult group, the Cobb angle from T5 to T12 was 2.3 degrees in males and 2.3 degrees in females. For both genders, a significant right side curvature was observed in the adolescent and adult groups. Conclusion: Based on standing chest radiographic measurements, a right thoracic curvature was observed in normal spines after adolescence.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29276**

**SURGICAL CORRECTION OF SCOLIOSIS IN NEUROFIBROMATOSIS:  
ARE ALL PEDICLE SCREW CONSTRUCTS BETTER?**

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Introduction: All pedicle screw constructs are currently widely used in the treatment of spinal deformities and accurate evaluation of this recent application in Neurofibromatosis patients is necessary. The aim of this work is to compare the results of segmental all pedicle screw constructs versus hybrid instrumentation analyzing the amount of correction achieved, clinical outcome and the incidence of complications. Methods: The study included 28 patients with non-dystrophic NF spinal deformities followed-up for an average of 5.5y (range 2 - 10y). They included 13 consecutive patients corrected by a single stage segmental all pedicle screw construct (Group 1) compared to an earlier series of 15 patients who had an anterior release followed by posterior hybrid instrumentation (Group 2). The average age was 13y+2m and 14y+1m respectively. The average preoperative scoliosis was 61.6° (Group 1) and 57.3° (Group 2). Results: Group 1 had better correction with an average of 80.3% compared to 73.8% in Group 2 and 1.3% correction loss at final follow-up compared to 2.5% at Group 2. The average operative time was 320min (Group 1) and 410min (Group 2). The average blood loss was 740 cc in Group 1 and 1100 cc in Group 2. Group 2 patients had a longer hospital stay and had 4 complications in 4/15 patients. Conclusion: A better correction of non dystrophic spinal deformities was achieved in NF patients by all pedicle screws instrumentation; with less operative time, blood loss, hospital stay and complications.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29163**

**THE EFFECTIVENESS OF POSTERIOR ONLY PEDICLE SCREW INSTRUMENTATION IN THE TREATMENT OF SEVERE SCOLIOSIS (GREATER THAN 70 DEGREES)**

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In this study we aimed to bring out the effectiveness of posterior only pedicle screw instrumentation in severe scoliosis. A total of 9 consecutive patients with severe scoliosis (>70 degrees) were operated with posterior only pedicle screw instrumentation between 2006 and 2009. In all cases Cobb angle reduction was less than 50 degrees in bending radiographs. After placement of pedicle screws, wide facet resections, and posterior release; final correction was performed. In the concave side of apical region long-arm reduction screws were used and gradual correction was accomplished. In the proximal part of curve for correction of shoulder balance, compression distraction; and in the distal part of the curve for pelvic balance, compression distraction, or segmental derotation maneuvers were used. During the surgery continuous neuromonitorization was performed. The mean age was 13.8 (11-26 years). All patients had double thoracolumbar curves. The mean preoperative Major Thoracic curve magnitude was 81.1 degrees (75-105) and major compensatory lumbar curve magnitude was 32 degrees (22-44). The mean thoracic curve correction was 64 degrees (60-73) and mean lumbar curve correction was 28 degrees (20-40). Mean follow up was 20.7 months (12-36). There were no infections, curve progression, no pseudoarthrosis during the postoperative and follow up course. In severe scoliosis which are not reduced less than 40-50 degrees in the bending radiographs, modern multiple segment pedicle screw instrumentation methods under neuromonitorization achieve remarkable curve correction.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29823**

**CORONAL AND SAGITTAL PLANE CORRECTION OF THE MAIN THORACIC CURVE IN ADOLESCENT IDIOPATHIC SCOLIOSIS: A COMPARISON OF DIFFERENT FIXATION DENSITY**

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**Objective:** This study aims to compare coronal and sagittal correction results of AIS that underwent posterior approach with different fixation density. **Methods:** The fixation density was calculated as the number of anchors over the fusion level. 72 patients were divided into Group A with fixation density no more than 1.25(39 patients), and Group B included 33 patients with fixation density >1.25. **Results:** The fixation densities of the 2 groups was 1.0(range, 0.7 to 1.25) and 1.5(range, 1.3 to 2.0), respectively (P=0.000). The mean preoperative Coronal Cobb angles of the MT curves were 50.4° and 48.4°, respectively. At final follow-up, they were 18.0° and 10.5°, with an average correction rate of 64.0% and 78.8%, respectively(P=0.000). The mean coronal correction loss was 3.1° and 2.1°, respectively (P=0.280). The decompensation rate at final follow-up in these 2 groups were 7.7%(3/39) and 6.1% (2/33), respectively (P=1.000).The mean preoperative sagittal Cobb angles of MT (T5-T12) were 19.4° and 12.4°, respectively. At final follow-up, they were 20.3° and 18.6° (P=0.386). **Conclusions:** Both groups can get good correction results of the MT curve in AIS. While with greater fixation density, the correction of the coronal Cobb angle of MT curve is better than that with a lesser fixation density with no increased decompensation rate.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29344**

**POSTERIOR SELECTIVE THORACIC FUSION IN LENKE IC  
ADOLESCENT IDIOPATHIC SCOLIOSIS**

Stanko MILICKOVIC, Zdeslav MILINKOVIC, Oleg KRNETA, Vojislav  
BASARA, Vladimir LALOSEVIC, Budimir JESIC, Zdravko POLEKSIC,  
Aleksandar CURCIC

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We have analyzed outcome of selective thoracic fusion in 34 patients operated between 2000 and 2006 with Lenke I C type of curves (King type II). All patients were followed until the skeletal maturity. In all patients posterior surgery was done with the lowest instrumented vertebra not bellow L1. Postoperatively all noninstrumented lumbar curves show spontaneous correction. Only 5 patients (all skeletally immature with Risser sign of 3 or less) needed additional bracing for coronal decompensation of lumbar curves. Additional surgery for correction of lumbar curves was not necessary. Selective thoracic fusion can be used as safe and effective method for preserving lumbar motion segment in selected cases.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29130**

**ASYMMETRIC PEDICLE SUBTRACTION OSTEOTOMY: A USEFUL TOOL FOR SEVERE SCOLIOTIC DEFORMITIES**

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Introduction: Different osteotomies are used to improve correction power and to eliminate the need for anterior release and traction in severe spinal deformities. The use of asymmetric PSO for correcting coronal plane deformities has been inadequately reported in the literature. The aim of this work is to study the outcome and safety of using asymmetric PSO in treating severe scoliotic deformity. Methods: Twenty-two patients (14 females, 8 males, age range 15-27 years) with severe rigid scoliosis that does not correct on fulcrum bending to less than 50° were treated by asymmetric PSO and were prospectively followed for a minimum of 2 years. This group was compared to a historical group of 25 patients treated by staged anterior release and posterior fixation and fusion 2 weeks later. Preoperative Cobb angle ranged between 75°- 145° in the asymmetric PSO and between 70°-150° in the staged group. Both groups were stabilized posteriorly with pedicle screws only. Results: The total operative time and the duration of hospital stay were significantly shorter in the asymmetric PSO group. The amount of blood loss was significantly less in the asymmetric PSO group. The average preoperative Cobb angle improved from 110° to 38° postoperatively in asymmetric PSO group (65%), and from 102° to 50° in staged surgery group (50%). The difference between the two groups was statistically significant in favor of the PSO group. Complications were minimal in both groups. Conclusion: Asymmetric PSO appears to be a very effective tool to correct severe coronal plane deformities.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 29396**

**TRUNK DIS-PROPORTIONALITY REGRESS DYNAMICS IN THE SCOLIOTIC SPINE DEFORMITIES SURGICAL CORRECTION**

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The aim was to study the dis-proportionality regress in scoliosis surgery. 249 patients with IS at the age of 15-19 years with deformity arches from  $41^{\circ}$ - $157^{\circ}$  with surgical correction by Cotrel-Dubouset were observed. Comparative clinic-radiological method using devised three-dimensional diagnostic algorithm applied. Trunk proportionality was analyzed by the defined Scoliosis Disproportionate Syndrome (SDS). Results: Patients were divided into 4 groups according to the SDS stages. The SDS primary manifestations stage covered 106 patients with arc value  $41^{\circ}$ - $60^{\circ}$ . Medium expressiveness stage was defined in 68 people with arc  $61^{\circ}$ - $90^{\circ}$ , the significant expressiveness stage - in 47 with arc  $91^{\circ}$ - $120^{\circ}$  and super-expressiveness stage - in 28 with arc  $121^{\circ}$  or more. The arcs angle decreased in frontal plane to  $42^{\circ}$ - $71^{\circ}$ ; correction effect was 32,0-94,1%. In sagittal plane the spine profile improved, in horizontal plane apical segments de-rotation was 14,2-20,7%. The first group patients marked the elimination of the primary SDS stage after the surgery. In the second group 52 cases showed the normal proportionality, 16 marked the I SDS stage. Among the third group after the surgery in 8 patients absence of SDS marked, in 26 – the I SDS stage and 13 - the II SDS stage. In the fourth group in 26 cases II stage left, in 2 cases – III stage. Surgery results analysis determined the applicable technology effectiveness with the stages of SDS and its possible regress that should be used as prognostic information at the initial surgery planning.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 27238**

**NAVIGATED PERCUTANEOUS LUMBOSACRAL INTERBODY FUSION:  
A FEASIBILITY STUDY WITH 3D SURGICAL SIMULATION AND  
CADAVERIC EXPERIMENT**

Yu WANG, Cody BUNGER

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Introduction: New possibilities are opened by the latest navigation technologies. Lumbosacral fusion surgery could be performed in a percutaneous and navigated way. The aim of our current study is to prove the concept of the new surgical method. Methods: Firstly, the new method, Navigated Percutaneous Lumbosacral Interbody Fusion (NPLSIF), was simulated on the 3D models of lumbosacral spine. The 3D models were established using the CT data of 60 patients. Secondly, the NPLSIF was performed on two cadavers. After the procedures, the lumbosacral spines were separated from the cadaver trunks in the Department of Anatomy. The lumbosacral disc of one cadaver was bisected coronally, while that of the other cadaver was bisected sagittally. Results: In the 3D surgical simulation experiment, the feasibility of the NPLSIF procedure was verified in every case. In the cadaveric experiment, the NPLSIF procedures were successfully executed. The surgical procedure on the first cadaver took 1.5 hours. On the navigation workstation, the preoperative plan was completed in 3-5 minutes and each intraoperative CT scanning took 30 seconds. The quality of the intra-operative CT images was comparable to that of normal CT images. CT images and the internal view of the lumbosacral discs showed that the NPLSIF procedures had yielded satisfactory discectomy and endplate preparation. Discussion: The feasibility of navigated percutaneous lumbosacral interbody fusion (NPLSIF) was verified by means of 3D surgical simulation and cadaveric experiment. Clinical studies are needed to further investigate the efficacy and efficiency of NPLSIF in clinical practice.

**Date: 2011-09-09**  
**Session: Spine - Deformities II**  
**Time: 08:00 - 09:30**  
**Room: Terrace I**

**Abstract no.: 27237**

**POSTOPERATIVE SPINAL ALIGNMENT REMODELING IN LENKE 1C  
TYPE SCOLIOSIS TREATED WITH SELECTIVE THORACIC FUSION**

Yu WANG, Cody BUNGER, Ebbe HANSEN

Aarhus University Hospital, AARHUS (DENMARK)

Summary: Selective thoracic fusion may cause spinal imbalance in certain patients, how the spinal alignment changes after selective thoracic fusion is highly correlated with postoperative spinal balance condition, however, it hasn't been well investigated. Aims: To investigate change in spinal alignment after selective thoracic fusion in Lenke 1C type AIS treated with posterior pedicle-screw only constructs. Methods: In each standing AP radiograph, CSVL was first drawn, followed by measuring the translation of some key vertebrae, such as the LIV, LIV+1, LIV+2, LIV+3, lumbar apical vertebra, thoracic apical vertebra and T1. Additionally, the Cobb angles of major thoracic and lumbar curves were also measured. Furthermore, clinical photos were taken preoperatively and postoperatively. Results: Of the 278 patients reviewed, 29 met the inclusion criteria. The continuous follow-up of our current study revealed an interesting phenomenon: postoperative spinal alignment remodeling. The results of our current study showed that selective thoracic fusion tended to cause leftward imbalance in these Lenke 1C AIS patients. Although some patients regained spinal balance through postoperative spinal alignment remodeling, there were still about 1/3 of the patients who remained imbalanced at 2-year follow-up. Conclusion: Selective thoracic fusion is prone to cause leftward spinal imbalance in Lenke 1C scoliosis patients. Postoperative spinal alignment remodeling can enable some patients to regain spinal balance. The postoperative spinal balance condition in Lenke 1C scoliosis patients could be improved by selecting LIV at stable vertebra or above, or by checking balance condition during surgery to prevent overcorrection.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 30298**

**PERCUTANEOUS REPAIR OF ACUTE ACHILLES TENDON RUPTURE**

Jean Louis ROUVILLAIN, Thomas NAVARRE, Octavio LABRADA BLANCO, Emmanuel GARRON, Wael DAOUD, Cyril GANE, Chafiq ZEKHNINI  
MARTINIQUE UNIVERSITY HOSPITAL, FORT DE FRANCE (MARTINIQUE)

Introduction: Achille tendon rupture can be treated by cast but re-rupture occurs, or by open surgery, but infection is also frequent. Is percutaneous suture able to avoid these complications? Material and Methods: A prospective study of 60 cases of percutaneous suture for Achille tendon rupture was done from January 2001 to September 2006. Suture technic was close to the Ma and Griffith one. Local anesthesia only was used in 48 cases (80%). Non resorbable thread was used first (18 cases), then replace until now by resorbable vicryl® (42 cases). Twenty- Eight patients practiced sport, three with high competitor level. Results Mean follow-up was 13 months (6–58). Eighty-nine percent patients return to sport activities at mean 5.2 months (3-12) at the same level in 68%. Return to work was 85days (15–270). One leg hop was possible in 90%, ankle was never stiffer than the other site. The repair tendon was always bigger than the other, and in all cases a lighth amyotrophy of the gastrocnemius was noted. There was no sural nerve complication. Five minor and three major complications occurred (one painful subcutaneous knot, oneAchille tendinosis, one algodystrophy and two vein thrombosis; two secondary ruptures and one deep infection). Conclusion The technique is simple, reliable, cheap, and gives better results than a classic open surgical procedure.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 29865**

**A SYSTEMATIC REVIEW OF THE USE OF PLATELET CONCENTRATES ON TENDON AND LIGAMENT INJURIES OF THE EXTREMITIES**

Mohamed SUKEIK, Jonathan BERNHEIMER, Fares HADDAD

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Introduction: Despite its extensive use, research on the efficacy of platelet concentrates (PC) in treating orthopaedic injuries is limited. We conducted a systematic review of RCTs to study the use of PC in tendon and ligament injuries of extremities. Methods: The Cochrane methodology for systematic reviews was implemented. Results: The literature search yielded five RCTs involving 410 patients with mean age of 40.8 years (range 18-70) for the PC treated and 40.9 years (range 18-70) for the control group. Mean follow-up was 46 weeks (range 24-104). Types of injuries included acute ACL tears in two studies, chronic Achilles tendinopathy, chronic subacromial compression and chronic lateral epicondylitis of the elbow. Despite favourable results from observational studies, our study showed conflicting evidence of PC benefit regardless of whether the injury was acute or chronic; PC was given as part of nonsurgical or surgical management and even within the two studies dealing with ACL injuries. The only significant finding was when comparing injuries affecting the upper versus lower limbs where using PC has been associated with better functional outcome and pain scores in upper limb injuries. However, there remains a lot of variability among the study protocols and administered doses to draw firm conclusions. Conclusions: Given the limited amount and conflicting nature of the current data, the benefits of using PC in tendon and ligament injuries remain questionable. Larger multi-centred RCTs on specific injuries that use standard operating procedures are needed to clarify PC's role in these types of injuries.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 27975**

**ANATOMICAL REATTACHMENT OF DISTAL BICEPS TENDON RUPTURE  
- MID-TERM RESULTS AND COMPLICATIONS OF THE TWO  
TECHNIQUES**

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Purpose: To present the techniques (Modified Mac Reynolds and Mitek Anchor), results and complications of anatomical reattachment of distal biceps tendon rupture. Methods: Between 1987 and 2007, 22 patients had surgery for distal biceps tendon rupture. Only one side was affected. All patients were men, mean age 47.5 years at the time of injury. 21 patients were included in this study as one passed away a year after surgery. Analysis was performed by clinical examination and DASH score at the end of 2009. Mean follow-up was 8 years (2-21). Results: 13 patients (62%) had an excellent result. A good outcome with moderate muscle strength limitation was reported in 7 (33%) and one patient (5%) had pain on moderate exercise with recurrent heterotopic ossification. Early surgical repair was performed in all patients except one who was delayed to the 16th day after injury. In all cases, the tendon was detached from its site of insertion but never torn. Intra-operative complications included bleeding from iatrogenic damage of the cubital artery (one patient). Early post-operative complications noted were superficial skin necrosis in one patient and transient neurological deficit of ramus dorsalis nervi radialis, nervus cutaneus antebrachii lateralis (in 3 patients). Late complications were heterotopic ossification in 3 patients and screw migration in one. The results and complications of both methods are similar. The mean DASH was 7,6. Conclusion: Early surgical repair via an anterior single-incision approach is recommended when a rupture of the distal insertion of the biceps brachii is diagnosed.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 27383**

**ARTHROSCOPIC MANAGEMENT OF PARTIAL ACL INJURY**

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Isolated injuries of the ACL are defined as complete or partial tears. In many cases, however, partial tears are not diagnosed clinically, and they may mimic a variety of internal derangements of the knee. Although not as common as complete ruptures the partial tear requires the same thorough treatment plan. Patients and Methods: 42 patients with history suggestive of ACL tear Like tearing sensation or a pop, difficulty bearing weight, a sensation of Instability and an inability to continue activity, poorly localized knee pain and hemarthrosis in some cases. Clinical examination: In 16 cases Lachman test was positive with firm point and grade I positive pivot shift test , in 18 cases positive Lachman test and negative pivot shift test and in 8 cases both Lachman and pivot shift tests were negative. MRI findings of those cases were variable as abnormal intrasubstance signal intensity within intact ligament fibers, bowing or undulation of otherwise intact fibers, non visualization on the T1-weighted image with intact fibers seen in T2-weighted pulse sequences. Surgical Technique: Arthroscopic evaluation, probing of the ACL, generous notchplasty has been done followed by graft harvesting, tunnels drilling and graft fixation. Results: Average follow-up was 14.6 months .All subjects resumed their pre injury level of sports participation and dynamic activities. The subjects had a median Lysholm score of 95 points (range, 92 to100 points) and a median Tegner score of 7 points. Conclusion: Single bundle augmentation of partial ACL tear appears to be effective and allows accelerated early rehabilitation.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 29886**

**OPERATIVE TREATMENT OF DISPLACED MID SHAFT CLAVICLE FRACTURES: USE OF RECONSTRUCTION LOCKING PLATE**

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Clavicle fracture is a common injury caused by direct impact and fall on shoulder tip. Mid-shaft fractures account for 80 % of all clavicle fractures. Traditionally good results with minimal functional deficit have been reported with non operative treatment. Recent studies have shown increased rates of mal union and symptomatic non union following non operative treatment of displaced mid shaft clavicle fractures. Patient based measures have shown more functional deficit and patient dissatisfaction following non operative treatment. In this prospective clinical study 28 patients with mid shaft displaced clavicle fractures were included, all patients were operated by open reduction and internal fixation by reconstruction locking plate over superior surface after molding. Bone grafting was not done in any case. Arm sling pouch was used for immobilization for 7-10 days, followed by physiotherapy and return to work at 12 weeks. Patients were followed up at 3 weeks, 6 weeks, 3months, 6 months and 9 months after surgery. Mean constant score and DASH score were better when compared with the non-operatively treated patients. Locking reconstruction plate offers a good option for fixation of mid shaft clavicle fractures with good results low rates of malunion and non union with minimum complication rates.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 28663**

**MANIPULATION OF THE INVOLUCRUM FOR FEMORAL RECONSTRUCTION AFTER CIERNY-MADER TYPE IV OSTEOMYELITIS: A NEW CLASSIFICATION SCHEME AND MANAGEMENT ALGORITHM**

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• Objective: The Ain Shams University classification scheme (ASU) is developed to radiologically characterize the involucrum in type IV (diffuse) femoral osteomyelitis and suggest a new management algorithm. • Patients and Methods: Six patients with type IV chronic femoral osteomyelitis (5 males and one female) who showed radiological evidence of involucrum formation were operated upon. Three involucra were ASU type II, two were type IA1 and one was type IB1 involucrum. After adequate debridement, the involucrum was manipulated according to the proposed algorithm scheme by Ilizarov external fixator to span the post resection defect. At the end of treatment the external fixation time was compared to the same situation if the involucrum was absent and bifocal bone transport was attempted • Results Mean external fixation time was 97.5 (range: 60-135 days) compared to an expected mean external fixation time of 205 (range: 90-450 days) if involucrum was absent and bifocal bone transport was attempted. Manipulation of an existing involucrum decreased external fixation time by a mean of 107.5 (range: 30-315 days) • Conclusions: Involucrum manipulation with the Ilizarov frame can successfully reconstruct femoral bone gaps with significant decrease in external fixation time and consequently less complication rate. Key words: Chronic osteomyelitis, Ilizarov bone transport, femoral bone defects.

**Date: 2011-09-09**

**Session: Trauma - Soft Tissue & Miscellaneous**

**Time: 10:00 - 11:30**

**Room: Terrace I**

**Abstract no.: 27111**

**CORRECTION OF COMPLEX FOOT DEFORMITY IN SKELETALLY MATURE PATIENTS BY ILIZAROV EXTERNAL FIXATION VERSUS STAGED EXTERNAL-INTERNAL FIXATION**

**Khaled EMARA**

**Ain Shams University Hospitals, Cairo (EGYPT)**

Complex foot deformity is a multi-planar foot deformity with many etiologic factors. Different corrective procedures using Ilizarov external fixation have been described which include, soft tissue release, V- osteotomy, multiple osteotomies and triple fusion. Although a high success rate with the Ilizarov method have been reported, many complications related to the Ilizarov external fixation itself have been also reported. These include; pin tract infection, psychological stress to the patient and family, difficult ambulation was the frame. In this study we compare the results of two groups of skeletally mature patients with complex foot deformity who were treated by two different protocols. The first group (27 patients, 29 feet) were treated by triple fusion fixed by Ilizarov external fixator till full union of fusion. The second group (29 patients, 30 feet), were treated by triple fusion with initial fixation by Ilizarov external fixation till correction of the deformity is achieved clinically, and then the Ilizarov fixation was replaced by internal fixation using percutaneous screws. Both groups were compared as regard the surgical outcome and the incidence of complications.

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 28466**

**EVALUATION OF OUTCOMES IN CONSERVATIVELY MANAGED CONCOMITANT TYPE A AND B POSTEROLATERAL CORNER INJURIES IN ACL DEFICIENT PATIENTS UNDERGOING ACL RECONSTRUCTION**

Kamal BALI, Mandeep DHILLON, Narendranath AKKINA, Sharad

PRABHAKAR

PGIMER, Chandigarh (INDIA)

Introduction: There is enough evidence to suggest operative management of Type C PLC injuries in knees with ACL tear. However there is paucity of literature regarding the outcomes of ACL reconstruction in ACL deficient knees with concomitant Type A and Type B PLC injuries. Materials and Methods: We prospectively evaluated all the patients who underwent arthroscopic ACL reconstruction over a period of 3 years from January 2007 to December 2009. Patients with multi-ligament injury, Type C PLC injury, associated bony/chondral/meniscal injury or those undergoing revision ACL surgery were excluded from the study. A total of 102 patients (who completed a minimum follow up of at least 1 year) were ultimately included in the study. These were divided into three groups: group A with isolated ACL injury (88 patients), group B1 with concomitant Type A PLC injury (6 patients) and group B2 with concomitant Type B PLC injury (8 patients). Outcome assessment was based on IKDC scores measured preoperatively and at last follow up visits. Results: The mean age of the patients was 25.33 years (16-38 years) with 95 males and 7 females. The average follow up was almost 2.5 years (13-46 months). The preoperative IKDC scores were comparable for all the groups. The follow up IKDC scores were similar (statistically insignificant, p value: 0.421) for group A and group B1. Group B2 had poorer follow up IKDC scores as compared to group A and this result was found to be statistically significant (p value: 0.0001). Conclusion: We believe that conservative management of a concomitant Type B PLC injury adversely affects outcomes of ACL reconstruction and should be avoided. Type A PLC injuries, on the other, do well without surgery and can be left as such even when associated with a concomitant ACL tear.

**Date: 2011-09-09**  
**Session: Sports Traumatology - Cartilage**  
**Time: 10:00 - 11:30**  
**Room: Club A**

**Abstract no.: 29516**

**ISOLATED INJURIES OF THE POSTERIOR CRUCIATE LIGAMENT:  
A SEVEN-YEAR FOLLOW-UP**

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There is still controversy concerning the clinical importance and method of treatment of posterior cruciate ligament injuries, especially when this lesion is isolated. Our retrospective study concerns 20 patients that sustained an isolated tear of the posterior cruciate ligament and were treated conservatively. The average follow-up interval from the injury was 7 years and 3 months. The average age of the patients (18 men, 2 women) was 33 years at the time of the follow-up. The evaluation consisted of clinical and radiological examination as well as a modified Noyes questionnaire. Nine patients were submitted to MRI scan. We found that 12 patients had a very good or excellent result (mean Noyes score 88), 6 had a moderate one (mean score 68) and 2 a poor result (mean score 57.5). In the plain radiographs, 14 patients were found to have degenerative lesions affecting the medial and patellofemoral compartments, while 13 reported symptoms affecting mostly the patellofemoral joint. In the MRI scan the signal was similar to normal in eight out of nine cases. For that period of follow-up, conservative treatment of posterior cruciate ligament tears appears to have a good functional outcome (especially when there is little residual posterior translation) with patients complaining more about the patellofemoral joint and less about the remaining instability.

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 28492**

**THE EFFECT OF PROXIMAL TIBIAL VALGUS OSTEOTOMY ON ARTICULAR CARTILAGE PRESSURE AFTER MEDIAL MENISCECTOMY: A FINITE ELEMENT MODEL STUDY**

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Removal of the meniscus, in whole or in part, increases the contact stresses on the articular surface of the tibia. Degenerative changes of the knee joint and clinical follow-up after total or partial meniscectomy are well documented. We hypothesized that proximal tibial valgus osteotomy (PTO) can achieve to decrease the maximum equivalent stresses (MES) on the articular cartilage of the tibia after medial meniscectomy. This study comprises eleven types of models to analyze the effect of medial meniscectomy type and the influence of PTO on articular cartilage pressure after medial meniscectomy. The models were constituted according to location (anterior, posterior, and longitudinal) and percent medial meniscectomy (25%, 50%, 75% and total). While the MES on tibial articular cartilage in the reference model was 0.860 Mpa; the mean MES was 1.510 Mpa in 25% meniscectomy group, 2.390 Mpa in 50% meniscectomy group, 4.935 Mpa in 75% meniscectomy group and 7.333 Mpa after total meniscectomy, respectively. Afterwards we analyzed the all models by increasing the mechanical load bearing axis from 0° to 2.5°, 5°, 7.5°, 10°, 12.5° and 15° valgus position. There was a significant increase of mean MES in all groups of percent meniscectomies when compared with reference model. There were no significant differences in MES between neither 25% and 50% nor 75% and total meniscectomy (respectively,  $p= 0.46$ ,  $p= 0.06$ ). In all models, the MES decreased after PTO. Furthermore; there were no significant differences in MES between reference model with either in all location of 25% or anterior and posterior 50% meniscectomies values that obtained after PTO. As a conclusion of this study; PTO reduce the load bearing stresses on articular cartilage and may prevent the knee osteoarthritis that occurs after meniscectomy.

**Date: 2011-09-09**  
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**Time: 10:00 - 11:30**  
**Room: Club A**

**Abstract no.: 27892**

**ARTHROSCOPIC CARTILAGE REGENERATION FACILITATING  
PROCEDURE FOR OA KNEE**

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In the year of 2005, 571 knees of 367 patients with osteoarthritic knee received a concept of arthroscopic cartilage regeneration facilitating procedure based on the conceptualization of a possible pathogenesis process for osteoarthritic knee featured by focal abrasion phenomenon and soft tissue imbalance. The Knee Society score and the knee injury and osteoarthritis outcome score were used for subjective outcome study. The roentgenographic changes of femoral-tibial angle and joint space width were evaluated for objective outcome. The mean follow-up period was 38 months (range, 36 to 49). The subjective satisfactory rate for the whole series was 85.5%. For 134 knees with complete follow-up evaluation, the Knee Society score and all subscales of the knee injury and osteoarthritis outcome score improved statistically. The femoral-tibial angle improved from 1.52 (95% confidence interval, 0.84~2.19) to 1.93 (1.21~2.64) ( $p=0.03$ ). The joint space width increased from 2.03 millimeters (2.81~3.24) to 2.18 millimeters (2.97~3.38) ( $p=0.01$ ). The degeneration process of the medial compartment was found being reversed in 82.1% of these knees by radiographic evaluation. Based on these observations arthroscopic cartilage regeneration facilitating procedure is an effective option of treatment for osteoarthritic knee. The degenerative process could be reversed and most patients satisfied.

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 28683**

**A GENERALISED LINEAR MODEL TO PREDICT OUTCOME FOLLOWING AUTOLOGOUS CHONDROCYTE IMPLANTATION FOR OSTEOCHONDRAL DEFECTS OF THE KNEE**

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The results of Autologous Chondrocyte Implantation (ACI) for the the treatment of osteochondral defects (OCD) of the knee are variable. Several papers have only used linear regression to identify predictors of outcome. This study utilised a generalised linear model to assess which factors had the greatest effect on outcome, thereby taking into account confounding variables. 100 patients had undergone ACI in a 2-year period. The Modified Cincinnati Score (MCS) was used to assess knee function before, 6, 12 and 24 months after surgery. The predictive factors were aetiology and anatomical site of the OCD. The predictive co-variables were the MCS pre-operatively (MCS 0), age of the patient and size of lesion. The significant predictors of outcome were MCS 0 and aetiology. Those patients who had previous marrow-stimulating procedures had on average 25 points less than those patients treated for osteochondritis dissecans and 11 points less than patients treated for traumatic reasons ( $p=0.01$ ). A single point increase in MCS 0 is likely to increase the MCS 24 by 0.5 points ( $p=0.001$ ). Overall, site was not a significant factor in the model, but when patellar lesions were compared directly with lateral femoral condyle or trochlear lesions, there was a significant difference. Whether patients had received ACI or Matrix-carried autologous chondrocyte implantation (MACI) made no difference to outcome. This study highlights the importance of conducting an appropriate statistical model when analysing predictors of outcome from a surgical procedure. The pre-operative function and aetiology have the greatest effect on outcome and if ACI is being considered in a patient, then marrow-stimulating techniques should be avoided.

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 30135**

**MESENCHYMAL STEM CELLS IN COMBINATION WITH CHONDROCYTES IN THE TREATMENT OF DEEP ARTICULAR SURFACE DEFECT**

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Articular cartilage is a tissue with very low regeneration ability; therefore the new treatment methods of injuries in this location are constantly sought. Improved healing shows the lesions with current violation of the subchondral bone. Therefore, many treatment methods purposefully violate the subchondral bone and allow travel progenitor cells from bone marrow into the defect and ensure at least partial healing (microfracture, forrage). This study describes the results of experimental treatment of deep subchondral articular surface defect of the femur with chitosan nanofibers scaffold transplantation staffed mesenchymal stem cells and chondrocytes mixture. Experimental animals were twenty pigs, the frequency of monitoring 20 weeks. After this period knee arthroscopy and microscopic evaluation was performed and after the protocol culling of the animal followed the histological examination of the healed lesions. The control group was the same defect created by the stress area of the articular surface of the distal epiphysis of the femur on the other leg, left without treatment. The treatment of iatrogenic lesions using transplantation of MSCs and chondrocytes in the composite scaffold led to the filling of defects by a tissue of the appearance of hyaline cartilage. Lesions treated by implantation of the scaffold alone or by the method of microfractures were filled with fibrous cartilage with worse macroscopic, histological and immunohistochemical indicators. This work was supported by the Ministry of Education, Youth and Sports of the Czech Republic (NPV II 2B06130).

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 28631**

**COMBINED ANTERIOR CRUCIATE LIGAMENT REPAIR AND AUTOLOGOUS CHONDROCYTE IMPLANTATION**

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Royal National Orthopaedic Hospital, Stanmore (UNITED KINGDOM)

We present our experience of ACI repair with ACL reconstruction. Three groups were assessed: Group 1: Simultaneous ACL Reconstruction and ACI; Group 2: Previous ACL Reconstruction with subsequent ACI repair; Group 3: Previously proven partial or complete ACL rupture deemed stable and not treated with reconstruction with ACI procedure subsequently. Those who underwent simultaneous ACL Reconstruction and ACI had a 47% improvement in Bentley functional scale, 36% improvement in visual analogue score and 38% improvement in the modified Cincinnati rating system. This is in contrast to only a 15% improvement in the modified Cincinnati rating system, 30% improvement in Bentley functional scale, and 32% improvement in visual analogue score in patients who had ACI repair after previous ACL reconstruction. 68% of patients who had the procedures simultaneously rated their outcome as excellent/good and 27% felt it was a failure. In contrast 38% of patients rated their outcome as a failure if they had ACI repair without reconstruction of ACL rupture. Symptomatic cartilage defects and ACL deficiency may co-exist in many patients and represent a treatment challenge. Our results suggest that a combined ACL and ACI repair is a viable option in this group of patients and should reduce the anaesthetic and operative risks of a two-stage repair. Patients with complete rupture of ACL despite being deemed stable performed poorly at review and our study suggests all complete ruptures regardless of stability should be treated with a reconstruction when performing an autologous chondrocyte implantation.

**Date: 2011-09-09**

**Session: Sports Traumatology - Cartilage**

**Time: 10:00 - 11:30**

**Room: Club A**

**Abstract no.: 29832**

**PRELIMINARY RESULT OF CLINICAL FEASIBILITY TO REPAIR  
ARTICULAR CARTILAGE DEFECT WITH AUTOGENOUS  
CHONDROCYTE IMPLANTATION BY A NOVEL BIPHASIC  
OSTEOCHONDRAL COMPOSITE**

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Autologous chondrocyte implantation (ACI) has been used to treat cartilage defects. We had previously developed a biphasic osteochondral composite for ACI. We further studied the clinical feasibility study of such device to treat osteochondral lesion of knee joints. Ten patients with symptomatic isolated osteochondritis at the femoral condyle were treated by replacing the pathological tissue with autologous chondrocyte-laden biphasic plug of DL-poly-lactide-co-glycolide, with its lower body impregnated with beta-tricalcium phosphate as osseous phase. Osteochondral lesion was drilled to fashion a pit of identical size and shape as the plug. Chondrocyte-laden plug was inserted press-fitting to fill the pit. Outcome was examined by KOOS score at 3, 6, and 12 months postoperatively; tissue sample was collected with second-look arthroscopic needle-biopsy at 12 months. Primary outcome parameter was the postoperative change of KOOS score; and secondary outcome parameter was the regeneration of cancellous bone and hyaline cartilage, in their respective phases, at the repair site. Mean KOOS scores were compared with paired t-test. Mean KOOS score at 3 months significantly improved than the pre-operative baseline. The score kept improving thereafter, but the change from 3 to 6 months was insignificant. At 12 months, gross appearance of the repair site under arthroscopy showed full-filling of the grafted site, with surface of regenerate cartilage flush with the surrounding native joint surface. Microscopically, the regenerate tissue was hyaline cartilage. The preliminary result of ACI with the novel biphasic matrix showed that the matrix was feasible for ACI to treat such lesion in the femoral condyle.

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**Room: Club C**

**Abstract no.: 29733**

**AUTOLOGOUS BONE MARROW CELLS WITH COLLAGEN FLEECE IN TREATMENT OF LOWER LIMB NON-UNION: A NEW METHOD**

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**INTRODUCTION:** The hypothesis of using autologous bone marrow cells implanted on collagen fleece for treatment of non-union of long bones with or without bone loss of the lower limb is not tested before. The aim of this study is to asses this new method in a prospective manner. **METHODS:** There were 13 patients with 14 fractures (10 tibiae, 3 femori, and one transplanted fibula) were treated with the same technique. In 6 cases, there was bone loss more than 5 cm. The bone marrow cells was aspirated from the anterior iliac crest and injected inside collagen fleece. Then implanted at the fracture site or bone defect, then the fracture was fixed with external fixator or locked plate. All patients were followed according to follow up protocol over 18 months. **RESULTS:** In all cases starting bone formation was noticed radiologically at 6th postoperative weeks. At 9 months following the operative procedures (the primary end-point of this study), all patients achieved full weight bearing clinically. Radiological new bone formation was observed replaced collagen fleece filled with bone marrow cells. No case required another different surgical procedure to achieve union. **CONCLUSIONS:** The current study proved the benefit of using collagen fleece filled with bone marrow cells in treatment of lower limb long bone fractures non-union. It is a safe and effective tool in the treatment of these challenging cases. Bigger number of cases and longer period of follow up will validate the early results of this new technique.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 27275**

**STIMULATION OF FRACTURE HEALING WITH PULSED  
ELECTROMAGNETIC FIELDS: POTENTIALS IN NON-UNION  
MANAGEMENT**

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<sup>1</sup>Charing Cross Hospital, London (UNITED KINGDOM), <sup>2</sup>Queens Hospital, Romford (UNITED KINGDOM)

Background: 5-10% of fractures worldwide go on to delayed union or non-union. Several non-invasive methods of bone stimulation have been developed in order to enhance bone healing, such as ultrasound lithotripsy, low-intensity pulsed ultrasound waves and pulsed electromagnetic field (PEMF) treatment. We present our four year experience with PEMF. Methods: We retrospectively reviewed the medical notes and X-rays of all patients with non-united fractures that received PEMF during 2006-2010, to assess the healing effect of this method. The device used was Physio-Stim by Orthofix. 45 patients were included and followed up. Data was considered non-parametric. Numeric variables are presented as median with range in brackets. Mann-Whitney U test, Spearman's rho test and Kaplan-Meier survival plots were performed. Results: Union was achieved in 32/45 patients (70.1%). Median time to union with PEMF was 29 (11-58) weeks. No statistical significance was demonstrated when comparing union with time of treatment ( $p=0.841$ ) or with time until the onset of treatment ( $p=0.081$ ). No significant correlation was found between time from last intervention to onset of PEMF and duration of PEMF, as far as achieving union was concerned ( $p=0.583$ ). Conclusion: PEMF can enhance the management of fracture non-unions, especially in cases where a non-surgical intervention is indicated. Treatment with PEMF device augments fracture healing, although the duration of application cannot be related to a definite outcome. Different PEMF protocols limit comparison with existing studies in order to produce a high level of evidence for PEMF.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 29177**

**INTRAOSSSEOUS BLACKTHORN GRANULOMA: A RARE CASE REPORT**

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Introduction: Many cases of blackthorn soft tissue injury has been reported in the literature. We believe, that no case of intraosseous blackthorn granuloma has been reported till now. Case report: A 12 year old boy attended orthopaedic clinic with painful, swollen right wrist for 5 months. He sustained blackthorn injury 6 months back. On examination, there was swelling on the dorsum of wrist. There was no redness. He was tender over the capitate. Wrist movements were restricted. Radiograph showed an osteolytic lesion in the capitate. MRI scan revealed a sharp foreign body in the capitate within the lytic lesion. Exploration surgery revealed a blackthorn of about 1 cm length within the capitate surrounded by inflammatory granuloma. The histological examination confirmed the inflammatory granuloma. At 3 months follow-up, he was asymptomatic. Discussion: Blackthorn is seen all over the UK. Blackthorn injury commonly occurs in the upper limb. But knee and leg can be affected in women and children. This is seen between March and August, which correlates with the hedge cutting time. It can present as chronic monoarticular synovitis or tenosynovitis or soft tissue non-suppurative inflammation. In this patient, because the blackthorn penetrated into the capitate, it took sometime for it to cause the inflammatory reaction. Radiographs are not of much help unless the bone is involved. MRI scan can help to identify the foreign body. Treatment of blackthorn injury is removing the blackthorn fragments. Once the blackthorn is removed, it causes resolution of symptoms, as evidenced in our case scenario.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 29647**

**DEVELOPMENT OF THE FLEXIBLE AXIAL STIMULATION (FAST) INTRAMEDULLARY NAIL**

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Animal studies and clinical trials have suggested that early application of controlled axial micromotion can accelerate healing of long bone fractures compared to rigid fixation. However, experimental investigations of micromotion constructs have been limited to external fixators, which have a higher incidence of complications than intramedullary (IM) nails. Providing the benefits of mechanically-stimulated healing via an IM nail requires knowledge of the resistance to axial movement presented by the interaction between the IM nail and the bone fragments. Therefore the purpose of this study was to measure the forces required to generate interfragmentary micromotion in a tibial osteotomy fracture model with IM fixation. Eight human cadaver tibiae were reamed, osteotomised, and implanted with commercially-available IM nails. Nails were fitted with a custom-designed proximal stem insert that admitted 1.0 mm of controlled axial micromotion. Specimens were subjected to axial loading while interfragmentary motion was measured using an extensometer. The average force required to cause distraction micromotion was  $3.78 \pm 2.21$  kgf based on repeated measures testing of all samples. Correlations between micromotion force, implant size, and reaming clearance from computed tomography (CT) imaging were also assessed. The results of this study support the development of a micromotion-enabled IM nail because the forces required to cause interfragmentary movements are very low. In contrast to current rigid-fixation IM nails, which require significant weight-bearing to induce interfragmentary motion, the micromotion-enabled nail may allow movement in non-weight-bearing patients and during the early healing period when the benefits of mechanical stimulation are most critical.

**Date: 2011-09-09**  
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**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 29859**

**CAN IN-HOSPITAL MEDICATION REVIEWS REDUCE RE-ADMISSIONS, NEW FALLS AND FRACTURES AFTER HIP FRACTURE?**

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Polypharmacy is a risk factor for falls. Hip fracture patients have in average 6 medications, 11 percent of Swedish individuals over 80 years have >10 medications. In a pseudo-randomized study, where hip fracture patients in two wards are included in an intervention group, and the other two wards are control group; medication reviews is performed by a pharmacist and a internal medicine consultant. Dosage and indications are checked, unsuitable drugs are withdrawn. The patient's GP gets written information, as do the patient. Information regarding re-admissions to hospital, new falls and fractures are drawn from the medical records. Information regarding actual medication is drawn from the Swedish Pharmaceutical Register. Patients are followed for 6 months. From December 2009 to December 2010 the intervention group included 220 patients. We aim to include 300 patients before April 1st 2011. Results regards endpoint data will be presented at the meeting for the first 220 patients, compared with control group. Preliminary data shows that in the first 187 patients 740 drug related problems were identified. Most common faults are medication without known indication (i.e. the patient did not know why they took a certain drug, neither could medical records confirm it) or incorrect dosage. Strengths of the study: All consecutive hip patients in two wards were offered medication reviews (except holiday periods), no one denied participation. Malmö is served by only two large hospitals, treating all emergency cases and admissions to hospital. All medical records within these hospitals are scrutinized by the researchers.

**Date: 2011-09-09**  
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**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 29683**

**NEGATIVE PRESSURE WOUND THERAPY IN AN INDIAN SETTING**

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NPWT is a beneficial treatment modality for soft tissue management after high energy trauma as also for chronic wounds. For an average Indian patient the commercially available NPWT system is expensive. They are unable to afford such high costs and the change per dressing. Hence at our institute we have created our own NPWT unit which works out to be economical for our patients. The NPWT unit consists of foam (used for making seat cushion for cars) which is autoclaved. A small corrugated tube is passed between two layers of foam and attached by means of a plastic tube to the suction machine. The machine has been devised by us. It maintains the required pressure along with an auto-timer. The foam is held onto the wound with help of an iodine drape. We have applied this unit to all compound traumas and non-healing wounds admitted in our hospital from the year 2009. We have studied its effect on 80 patients and found it to be more beneficial than a routine dressing in terms of edema control, appearance of faster granulation tissue on the wound bed, elimination of infection and limitation of cross-infection in the hospital environment. It has thus helped in a faster soft tissue coverage for the wound. NPWT is an important adjunct in the management of orthopedic wounds. It can be made a standard hospital protocol anywhere in the world without the fear of unaffordability on the part of the patient as is shown by our ingeniously designed unit.

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**Room: Club C**

**Abstract no.: 28857**

**CAN PATIENT DISCHARGE FROM A TRAUMA UNIT BE IMPROVED BY DEDICATED DISCHARGE NURSES?**

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Introduction: Delayed discharges within a surgical ward are a serious problem, which can lead to a poor outcome in the rehabilitation pathway and ultimately a failure to achieve full functional potential. They also cause a significant cost to the NHS, and can lead to a decrease in availability of acute beds in the trauma unit. This can have serious knock-on effects on the provision of care for emergency admissions. This audit aims to show that Early Discharge Nurses are a valid solution to this problem. Methods: We audited the trauma admissions to a district general hospital Orthopaedic Department over three separate periods: January-March 2006, 2007 and 2008. The first period was prior to the implementation of the Early Discharge Nurses, the second during a trial of their services and the final after the conversion of these posts to full-time. Each trial period was then compared to see if there was a significant decrease in length of stay. The pre audit standard was set at 90% discharge / transfer at seven days and 100% at fourteen days. Results: 2006 - 139 patients in total, average stay 7.1 days, > 7 days 46 (33%), > 14 days 17 (12%) 2007 - 151 patients in total, average stay 4.8 days, > 7 days 29 (19%), > 14 days 6 (4%) 2008 - 193 patients in total, average stay 5 days, > 7 days 32 (17%), > 14 days 7 (4%) Discussion: The implementation of Early Discharge Nurses appears to be an effective strategy in decreasing the occupancy rates of acute beds by inappropriate patients. This should streamline rehabilitation services and improve the standard of care delivered to our patients.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 26974**

**CK-MB/CK RATIO AS AN INDIRECT PREDICTOR FOR SURVIVAL IN PATIENTS WITH POLYTRAUMA**

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Introduction: Accurate assessment of injury severity is critical for decision making related to the prevention, triage and treatment of critically injured patients. Early estimation of mortality risk of severely injured patients is mandatory for adequate therapeutic strategies. Current risk stratification relies on clinical diagnosis and scoring systems. In our study we speculated whether a simple laboratory test: the CK/CKMB ratio could help improving risk prediction in severely traumatized patients. Methods: In a 9 year period, 328 non-selected trauma patients were included in our retrospective study at a Level I trauma center. Inclusion into the present study was according to the following criteria: (1) ISS score above 16 and (2) rescue period under 2 hours. Results: The mean age of our study population was 34.6 years (range from 6.7 to 81), 234 (71.4%) were males and 94 (28.6%) were females. Mean ISS was 29 (range from 17 to 57) with an overall mortality of 78 (23.8%). Negative correlation between ISS (Injury Severity Score) and leukocytes was shown. A positive correlation was detected for liver enzymes and CK-MB. Correlation between ISS and Na<sup>+</sup> was significant. No correlation between ISS and K<sup>+</sup> and Hb/Ht could be observed. Exitus was associated with ISS, alteration in Thrombocytes, CK, CK-MB, CRP, Crea and Na<sup>+</sup>. Conclusion: In our study population, CK-MB levels showed a significant correlation with overall survival in polytrauma patients. In our opinion this might suggest that CK-MB levels could be taken as an indirect predictor for survival.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 28330**

**DISTRACTION OSTEOGENESIS AND BONE TRANSPORT BY MONOLATERAL EXTERNAL FIXATOR FOR INFECTED NONUNION OF FEMUR DIAPHYSIS WITH BONE LOSS**

Vinod SHARMA<sup>1</sup>, Sumit BATRA<sup>1</sup>, Aman GOYAL<sup>1</sup>, Vikas GUPTA<sup>1</sup>, Sumit ARORA<sup>2</sup>

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**Methods:** Fifteen adult patients underwent débridement and resection of nonviable bone and bone transport using a monolateral external fixator to treat infected nonunion of femur diaphysis with bone defect. Associated chronic osteomyelitis was classified according to the UTMB staging system as proposed by Cierny et al. Assessment protocol included lengthening index, radiographic consolidation index, functional status of the patient, bone healing, and various problems, obstacles and complications encountered during the treatment. **Results:** The study included 15 patients (13 men and 2 women) with the median age of 28.5 years (range, 18 to 47 years). The patients had had an average of 2.9 surgical procedures (range, one to seven) before presentation. The mean size of defect created after adequate débridement was 7.9 cm (range, 5.5 to 17 cm). They were followed-up for a mean duration of 19 months (range, 15 to 41 months). The mean duration of treatment was 7.3 months (range, 5 to 15 months). The mean lengthening index and radiographic consolidation index were 12.3 and 27.9 days/ cm respectively. The results in terms of functional status were excellent for 5 patients, good for 8 patients, and fair for rest 2 patients. The bone results were excellent for 12 patients and good for rest 3 patients. Eradication of infection as well as bone union was achieved in all the patients. Pain during distraction phase and pin tract infection were the most common problems encountered in the study. None of the patients had neurovascular complications, joint subluxations or refracture of regenerate. **Conclusions:** A monolateral external fixator is a safe and effective method of treatment for infected nonunion of femur diaphysis.

**Date: 2011-09-09**  
**Session: Miscellaneous I**  
**Time: 08:00 - 09:30**  
**Room: Club C**

**Abstract no.: 27702**

**OUTCOME OF HIP FRACTURE PATIENTS WITH RENAL IMPAIRMENT**

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Introduction: The outcome of renal impairment in hip fracture patients was investigated. Materials and methods: A retrospective study was undertaken in 59 consecutive hip fracture patients. Demographic data and clinical data of the patients were obtained including pre-operative and post-operative biochemical blood tests results, and we looked at the mortality rate. Results: There were 59 hip fracture patients. 44 patients (group 1) were alive at 30 days, and 15 patients (group 2) were dead at 30 days. The patients were age-matched with a mean age of 79.3 and 79.7 years in group 1 and 2 respectively. 29 patients underwent hip hemiarthroplasty, and 30 patients had hip fixation. Pre-operative and post-operative mean serum urea were significantly higher in patients who died within 30 days of operation compared with those alive (pre-op 10.2 vs. 6.7 mmol/l [ $p=0.001$ ], post-op 12.1 vs. 6.4 mmol/l [ $p=0.0001$ ]). The concentrations of pre-operative and post-operative mean sodium and potassium levels were not significantly different between the 2 groups. Conclusion: Hip fracture patients with elevated urea are at risk of increased mortality. It is important to have clinical strategies for early identification of these patients, and instigation of cautious management of fluid and electrolytes balance to help improve their outcome.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 28414**

**KNEE JOINT STIFFNESS ELIMINATION USING COMPUTER-ASSISTED ORTHO-SUV FRAME**

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Aim: It's known Ortho-SUV Frame which work is based on the computer navigation (<http://www.rniito.org/download/ortho-suv-frame-eng.pdf>). The advantage of Ortho-SUV Frame is capability of precise reproduction of the mechanics of tibia joint end motion in relation to the joint end of the femur. The aim of the study was to investigate the optimal assembly of Ortho-SUV Frame for increasing of knee ROM and/or knee joint stiffness elimination. Methods: 122 series of graphic modeling, 3 series of mechanic modeling and 6 series of tibia and femur osteosynthesis rigidity testing by Ortho-SUV Frame in comparison with Volkov-Oganesjan device were performed. Results: On the base of experimental data it was revealed that use of the oval supports is reasonable. The angulation of proximal support to the bone must be 120°, of distal - 60°. The proximal support must be placed at the distance 200-210 mm from the knee joint space, distal support must be placed at the distance 120 mm. This assembly provides the knee joint ROM 120°/0°/0°. Use of ring supports allows reaching ROM 70°-90°/0°/0°. The rigidity of investigated assembly of Ortho-SUV Frame exceed the rigidity of tibia and femur fixation by Volkov-Oganesjan device in 1,5 times. Developed assemblies of Ortho-SUV frame were successfully applied in treatment of 6 patients with knee joint pathology. Conclusion: The preliminary data show that Ortho-SUV Frame is prospective in treatment of knee joint stiffness and/or in elimination of the rigid invalid position of the tibia.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 29727**

**DETECTING POST REDUCTION FIBULAR MALROTATION USING CONVENTIONAL FLUOROSCOPY**

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Background: When treating ankle fractures with associated syndesmosis injury failure to anatomically reduce the syndesmosis may lead to poor outcome. While shortening and posterior subluxation of the distal fibula are readily detected by intraoperative fluoroscopy, distraction of up to 3mm can only be detected by CT. The ability of fluoroscopy to detect rotational malreduction of the fibula is unknown and is the subject of this study. Methods: Distal fibula fractures with complete syndesmotic injury were created in three pairs of cadaveric ankles. Two Kirschner wires were used to fix the fibula in neutral, 10°, 20° of external rotation (ER), and 10°, 20° of internal rotation (IR). Thirty pairs of fluoroscopic mortise views of the ankles in the different fibular rotation positions versus the normal contralateral ankle were evaluated by two orthopaedic trauma surgeons. The observers were asked whether the fibula was in neutral, IR or ER using four radiographic criteria: for IR - tibiofibular clear space widening and a spoon shape of the fibula; for ER - divergence of Shenton's lines and point blade shape of the fibula. Results: Overall accuracy for detecting fibular malrotation was 73% with 60% agreement between observers. Accuracy for detecting 20 degrees of IR or ER was 96% with 92% agreement between observers. Overall accuracy was higher for detecting IR (83%) than ER (75%). Conclusions: Using the above mentioned criteria during intraoperative fluoroscopy it is possible to detect a high percentage of 10° and nearly all 20° post reduction malrotations of the fibula.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 29757**

**COMPLICATIONS OF PRE-CONTOURED LOCKING PLATES**

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Treatment of fractures by Open Reduction and Internal Fixation with a locking plate can confer improved fracture stability due to its fixed-angle construct, especially in osteoporotic bone. We present our data over a 8 year period (from 2002 to 2010) highlighting the number of devices used and low complication rate. The various pre-contoured locking plates that were used include the LCP distal femur and proximal tibia, Philos plate, distal tibial plate and calcaneum locking plates. Over 400 cases were identified and complications reviewed. Overall there were no incidences of significant co-morbidity or deep infection. In 70 cases using the LCP proximal tibia plate 2 required revision, and 1 needed total knee arthroplasty due to osteoarthritis. In 80 cases for distal tibial fractures 5 had established non-union. 50 cases were operated with the LCP distal femur with 3 cases having to be revised due to improper fracture reduction at primary application. The Philos plate was used in 150 cases and only several have lead to removal due to impingement. Intra-articular calcaneum fractures have been fixed in 60 cases and only 3 cases have required metalwork removal. No significant complications have been reported with excellent patient outcomes. The use of a pre contoured locking plate is an important device in the fixation of complex fractures especially in osteoporotic bone. Optimised clinical outcomes are achieved with precise knowledge of its use and surgical technique, thus reducing complication rate.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 28496**

**LOCKING COMPRESSION PLATE BREAKAGE AND FRACTURE NON-UNION: A FINITE ELEMENT STUDY OF THREE PATIENT-SPECIFIC CASES**

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Cappagh National Orthopaedic Hospital, Dublin (IRELAND)

The Locking Compression Plate (LCP) system offers a number of advantages in fracture fixation combining angular stability through the use of locking screws with traditional fixation techniques. However, the system is complex, requiring careful attention to biomechanical principles and good surgical technique. From a series of clinical cases, where locking plate fixation was used in fractures of long bones, three were selected. Patient specific geometric information was obtained from AP and lateral plain radiographs, and the Finite Element (FE) models were generated manually. The first case study highlighted the importance of the working length on the construct stability. By increasing the working length the construct became more flexible. The resulting increase in interfragmentary motion promoted indirect healing with the formation of callus. In the second case study, plate breakage occurred as a result of an inappropriate fixation technique. The fixation involved the use of locked screws at the level of the fracture passing the fracture line. This reduced the flexibility of the implant which hindered the micro-motion needed for callus formation. Fatigue failure eventually occurred due to cyclic loading past the yield stress of the LCP. In the third case study the long working length of the construct made it relatively flexible. The larger area of stress distribution on the plate reduced the local strain, resulting in a protective effect against fatigue failure of the implant. In Conclusion, successful application of the LCP demands a good understanding of the biomechanics and careful pre-operative planning.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 28668**

**COMMONLY MISSED INJURIES OF CLINICAL SIGNIFICANCE IN  
POLYTRAUMA PATIENTS**

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The incidence of polytrauma is rising day by day due to various factors like rapid urbanisation, industrialisation, natural disasters etc. Every death leaves at least ten major injured patients. Not much data is available on missed injuries but it is seen that missing of injuries is not random it follows a definite pattern. This is a study on 2000 patients studied over a period of 5 years. It is seen that in the initial survey 30 to 40 % of injuries are missed this comes down to 15 % by secondary & 10 % by tertiary survey. Two patients expired due to missed injuries to vital organs. In 7 patients injuries were serious enough to cause death, in 57 injuries were serious enough to cause permanent disability & morbidity if neglected & in remaining were minor of not much importance. One can use any method to treat but missing an injury can cause havoc for treating surgeon, institution & also for the patient himself. This paper highlights how such incidences can be avoided to avoid the suffering of the patient.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 28795**

**ROLE OF LOCKING COMPRESSION PLATE IN THE MANAGEMENT OF NON UNION OF DIAPHYSEAL FRACTURES**

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Sancheti Institute for Orthopaedics and Rehabilitation, Pune (INDIA)

Introduction: Non-union of long bones still remains a challenge in terms of difficulties faced in management. The basic locked internal fixation technique aims at flexible elastic fixation to initiate spontaneous healing, including its induction of callus formation. This locking minimizes the compressive forces exerted by the plate on bone. Locking compression plate is an internally placed external fixator, offering better construct in surface fixing modality by stable fixation and early mobilisation, making healthy healing environment around the bone, thus fracture healing. This created a hope to step and to study the success rate of locking compression Plate in stabilizing the non union fractures of long bone and its functional outcome. Materials and Methods: This is a prospective study. 36 diaphyseal aseptic non unions were operated with LCP and iliac crest bone grafting. On follow up all patients were examined clinically and follow up radiological examination and proforma (SF 36 score) were completed on each visit. The outcomes were studied with respect to various factors like age, gender, region of nonunion, duration of nonunion, type of nonunion. Results: All 36 cases united with average time of  $4.13 \pm 0.79$  months, the average SF -36 score at final follow up was  $87 \pm 7.7$ . The age of the patient and duration of nonunion had statistically significant difference ( $p < 0.05$ ) on union time but none of the factors influenced the final SF – 36 scores. Conclusion: Locking Compression Plate with bone grafting is an excellent method for achieving union in non union diaphyseal fractures when used in selected patients. Age of the patient and duration of non union significantly affect the duration for achieving union however this did not have any significant effect on the final functional outcome.

**Date: 2011-09-09**  
**Session: Miscellaneous II**  
**Time: 10:00 - 11:30**  
**Room: Club C**

**Abstract no.: 29385**

**ORTHOPAEDIC CARE IN A SOUTHWESTERN NIGERIAN SECONDARY LEVEL HOSPITAL: ARE PATIENTS' SURGICAL NEEDS BEING MET?**

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Background and objectives: Musculoskeletal conditions are a major cause of morbidity the world over but only a few orthopaedic surgeons are available to treat 40 million people worldwide with disabilities treatable by surgery. Over a one year period, we analyzed patients at the orthopaedic unit of a public general hospital in a developing country highlighting the spectrum and peculiarities of diseases, their surgical management and limitations. Materials and methods: The demographic data, clinical features and diagnoses of 914 patients, as well as therapeutic modalities and complications of operated patients were analyzed. Results: The mean age was  $38.5 \pm 23.8$  years and 440 were males (48.1%). Trauma accounted for 327 (35.8%) cases. The mean age of trauma patients was  $33.4 \pm 22.3$  years while orthopaedic patients were about 8 years older ( $p < 0.001$ ). The average duration of symptoms before presentation was 106.4 days. Of the 15.5% who required operative treatment, only 7.3% had the required operations done. Children who needed surgery were more likely to get it done than adults ( $p = 0.002$ ). The commonest operative procedure was fracture fixation. There were four moderately-severe complications (6.0%). Conclusion: The study showed that there was a considerable patient-load with inadequate facilities for treatment when compared with contemporary practice worldwide. Although the results of surgical treatment were acceptable, there was a need for timely access and quality care to people with musculoskeletal problems.

**Date: 2011-09-09**

**Session: Miscellaneous II**

**Time: 10:00 - 11:30**

**Room: Club C**

**Abstract no.: 29590**

**USE OF GIS APP AS TOOL FOR MONITORING TRAUMA CASES**

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Road traffic injuries belong to the ten leading causes of death and disability worldwide, and have emerged as a serious public health concern. Identifying human, technical, and environmental factors that contribute to the incidence and severity of accidents and their health-related consequences is mandatory to establish effective prevention strategies. App or applications is the word of the year and its use on smart phones has grown by leaps and bounds. GIS is the abbreviation for geographic information system. Originally developed for urban and facilities management. GIS depicts and analyzes the spatial features of, and the location and chronology of events occurring in the area of interest. In this study, various features of 180 road crashes were linked to a GIS generated digital map of an area close to a national highway in India using an APP developed by local software firm. By overlay tools, clusters of accidents were identified, and color-coded according to accident mechanisms and injury patterns. Results: Spatial analysis revealed a cluster with a high incidence of motorbike injuries resulting in fractures. Examination of the spot demonstrated the risky combination of a speed breaker and a broken traffic light. After fixing the light, no further accidents occurred at the site. Conclusion: GIS is a promising technology for geo-referencing accident data, and may be a valuable tool to identify areas of priority for injury prevention.

**Date: 2011-09-09**

**Session: World Orthopaedic Concern: Infections**

**Time: 10:00 - 11:30**

**Room: Club D**

**Abstract no.: 30311**

**CONSERVATIVE, NON OPERATIVE MANAGEMENT OF FRACTURES**

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Fractures can be treated using many different ways, broadly conservative or surgical. Recently there has been a remarkable change in the treatment of fractures and dislocations from non-operative to operative thanks to advances in anesthesia, improvements in sterile technique, and advances in the technology of internal fixation. The availability of these facilities is however not universally guaranteed. In developing countries, lack of well-trained surgeons and other health care providers, lack of appropriate and affordable equipment and implants, and of reliably clean surgical environments increases the risks of surgical complications of orthopedic procedures often to unacceptable levels. Conservative management remains a viable and very often the only option for 'relative cost-sensitive' management of fractures in these countries. Today's Orthopaedic surgeons must be as skilled in nonoperative as they are in operative techniques; for sound knowledge of nonoperative techniques makes the use of operative techniques more effective and safer. Moreover there are many absolute indications for nonoperative care of fractures and dislocations. The combined risks of devascularization, slower and weaker bone union, and operative complications must be considered when operative treatment is being offered on a relative indication basis. The purpose of this paper is to demonstrate how we in Kenya as well as do similar neighbouring developing African Nations continue to often rely on nonoperative treatment of fractures. The choice of the method employed considers several factors including: surgeon's experience, availability of implants modalities of imaging and other equipment, cost, desired anatomical and functional outcomes and complication rates. Closed treatment requires as much thoughtfulness, technical expertise, and attention to detail as does surgery.

**Date: 2011-09-09**

**Session: World Orthopaedic Concern: Infections**

**Time: 10:00 - 11:30**

**Room: Club D**

**Abstract no.: 29990**

**DEWORMING THE PATIENTS REDUCES SURGICAL SITE INFECTIONS  
IN A DEVELOPING COUNTRY**

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According to a WHO report about 25% of world population is suffering from worm infestations. The incidence of round worms, hook worms, tapeworms, amoebiasis, giardiasis and filarial infestations is very high in developing countries. The parasites not only steal the nutrients from the host but they also cause immuno-suppression for their own survival and predispose the host for bacterial infections. Two groups of 2000 patients each undergoing elective orthopaedic operations were studied for the incidence of surgical site infection (SSI). In group-1 the patients were only given analgesics and prophylactic antibiotics. No attention was paid to parasites. Most of the surgeons do it as no orthopaedic book mentions about deworming. In group-2 the patients were thoroughly investigated for any parasitic infestation eg. stool for ova and cyst and blood for microfilariae and other parasites. Patients were dewormed before surgery and their nutrition was also improved by giving calcium, vitamins, iron, protein and blood transfusions where necessary. The two groups were almost similar in other parameters like age, sex, type of operations done and treated in the same operation theatre and ward by senior consultants. The Incidence of SSI was 13% in the un-dewormed cases and only 0.2% in the dewormed group ( $p < 0.05$ ). It is concluded that in the developing countries surgeons should see the patients as a whole and not through a hole. Deworming reduces the rate of surgical site infections in the developing countries, especially tropical countries where parasitic infestations are very high.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 28119**

**PATHOLOGICAL FRACTURES OF THE PROXIMAL FEMUR: A REVIEW OF 143 CASES**

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We report on the 143 cases of pathological metastatic fractures of the proximal femur with a minimum follow-up for the survivors of three years. 2.5% of all hip fractures were pathological. The average age was 72 years, 61% were females. 47% of fractures were intracapsular, 28% trochanteric and 25% subtrochanteric. The most common sites for the primary tumor were breast (36%), prostate (23%) and lung (17%). Mean survival following operation was 270 days (range 2 to 3053 days), being longest for those with myeloma (662 days), lymphoma (> 312 days) and breast tumours (492 days) and lowest for lung tumours (110 days). 99% of the fractures were treated surgically. Mean hospital stay was 19 days. The commonest fracture healing complication was further fracture of the femur around or immediately below the implant which occurred in 9/143 (6.3%) of operations. This complication appeared to be reduced with a change to cemented arthroplasties and long intramedullary nails.

**Date: 2011-09-09**  
**Session: Trauma - Proximal Femur II**  
**Time: 08:00 - 09:30**  
**Room: Club E**

**Abstract no.: 27703**

**HIP FRACTURE PATIENTS ON WARFARIN – CAN WE MINIMISE DELAY TO SURGERY?**

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Hip fracture patients on warfarin require careful preparation for surgery. Whether surgery should be accelerated with use of low dose vitamin K or fresh frozen plasma is unclear. We performed a retrospective audit to assess the management of hip fracture patients on warfarin admitted to our trauma unit over 1 year. Our local guideline was warfarin reversal with 1 mg of Vitamin K intravenously administered based on patient's thromboembolic risk stratification. We identified 11 patients from 1/4/09 to 1/4/10. Their medical records were scrutinised. The indication for warfarin was as follows: 7 cases of atrial fibrillation, 1 case with prosthetic heart valve, 2 cases with DVT, 1 case with both AF and DVT. The INR on admission ranged 1.3–7.4 with a mean of 2.8. Patients were given on average 2.2 mg of Vitamin K for warfarin reversal (range 1 - 5 mg). The mean INR at surgery was 1.5, ranging from 1-1.8. The mean delay to surgery was 1.9 days. The mean length of stay of the patients was 25 days. 2 patients needed blood transfusion post-operatively, and there was no surgery related complications. We had no mortality at 30 days. With a mean of 2.2 mg of vitamin K administered, patients had their surgery within 48 hours. We have now developed new departmental guidelines, and altered the dose of vitamin K administered for warfarin reversal to reflect this change to avoid unnecessary delay to surgery.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 27804**

**TO STUDY THE DYNAMIC MRI CURVE PATTERNS OF HIP IN PATIENTS WITH INTRACAPSULAR FRACTURE NECK OF FEMUR PREOPERATIVELY AND 6 MONTHS POSTOPERATIVELY**

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**OBJECTIVE:** The vascular status of femoral heads in the post-traumatic period of intracapsular femoral neck fracture (ICFNF) remains uncertain until the patient actually develops avascular necrosis (AVN). Several methods for predicting the viability of femoral head have been reported, that are not effective or widely used because of unreliability, potential complications, and technical difficulties. The present study involved the use of Dynamic MRI (DMRI) in assessing femoral head vascularity to predict AVN. **MATERIALS AND METHODS:** The role of DMRI was studied prospectively in 25 patients with 25 ICFNF. Fractures were divided in to three types (Type A, B, or C) based on the femoral head vascularity shown by dynamic curve patterns on MRI evaluation. Type A has preserved vascularity, Type B has some decrease in vascularity but still viable while Type C has significantly reduced vascularity. The DMRI was done Pre-Operatively and Post-operatively after 6 months after cancellous screw fixation. **RESULTS:** We compared The DMRI Pre- and postoperatively and found that the vascular status as evidenced by a type A curve remained vascular after surgery except in one case where it was reduced by one grade although this case united after 6 months. The complication rates in terms of nonunion and avascular necrosis were higher in type B or type C curve. **CONCLUSION:** DMRI is a reliable tool to evaluate vascularity of femoral heads and thus reduces the uncertainty of outcome of treatment of ICFNFs. DMRI can be a useful tool to formulate a treatment algorithm in management of ICFNF.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 30085**

**TREATMENT OF DISPLACED FEMORAL HEAD FRACTURES: RESULTS AND COMPLICATIONS**

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Aim: To specify the indications for the correct choice of approach, to analyze the clinical results and complications. Material and Method: For a period of 9 years we treated 14 patients with displaced fractures of the femoral head. The fractures were distributed according to classification of Pipkin: Type I- 3, Type II- 5, Type IIIA- 1, Type IIIB-1 and Type IV-5. One patient had bilateral fractures of the femoral head. Smith-Peterson (distal part) approach was used for 6 fractures Pipkin I,II, and for fractures Pipkin III (primary hip arthroplasty) Hardinge approach, and for fractures Type Pipkin IV was chosen Kocher – Langebeck (4 cases) and 1 with “Flip osteotomy”. Results: All patients were followed up (2-8 years). From 14 patients with 15 fractures of the femoral head assessed by HHS, we obtained 8 excellent and good, 4 fair and 3 poor results. The distribution of the results according to the type of the fracture is as follows: Pipkin I – 2 excellent and 1 fair, Pipkin II- 2 excellent, 1 good, 1 fair and 1 poor, Pipkin III – 1 excellent, 1 fair and Pipkin IV- 1 excellent, 1 good, 1 fair and 2 poor. With iatrogenic temporary nerve dysfunction (n. ischiadicus) was 1 patient, 3 achieved avascular necrosis of the femoral head, Type I,II (Brooker) ectopic ossifications developed 3 patients and 1 with severe osteoarthritis. Conclusion: From modern principles of treatment of the displaced femoral head fracture we can expect better but still not excellent and good results.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 29187**

**THE EFFECT OF FRACTURE PATTERN AND IMPLANT TYPE ON STABILITY OF TYPE 31-A2 PROXIMAL FEMUR FRACTURES**

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Introduction: Internal fixation of type 31-A2 proximal femoral fractures can be done with either a compression hip screw and side plate (CHSP) or a intramedullary hip screw (IMHS). There is an ongoing discussion as to which is the best implant for their fixation. The purpose of this study was to define the degree of stability of different 31-A2 fracture patterns and their influence on the different fixation constructs. Methods: Simple intertrochanteric fractures were made in 12 cadaver proximal femurs. Six fractures were fixed with a CHSP and 6 with an IMHS. Both implants were instrumented with strain gages at the lag screw - nail/plate interface to allow assessment of implant load bearing (ILB). The specimens were subjected to non-destructive loading after which 3 subsequent horizontal cuts in 1 cm increments were made across the posteromedial cortex. Loading was repeated after each cut. Results: After making the initial intertrochanteric fracture ILB was  $52.2 \pm 19.4\%$  ( $49.8 \pm 4.2\%$  for CHSP,  $53.6 \pm 25.4\%$  for IMHS). ILB after the first 1cm cut increased to  $83.4 \pm 26.9\%$  ( $70.8 \pm 18.9\%$  for CHSP,  $93.4 \pm 29.9$  for IMHS) -  $p=0.0009$ , and after the second cut increased to  $90.0 \pm 20.6\%$  ( $82.6 \pm 6.3\%$  for CHSP,  $96.0 \pm 26.9$  for IMHS) -  $p=0.209$ . Conclusions: Type 31-A2 becomes increasingly unstable with increased posteromedial comminution (or lesser trochanter fragment size). This study supports the use of IMHS devices for the more unstable fractures.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 29195**

**EFFECT OF VARUS AND VALGUS ALIGNMENT ON IMPLANT LOADING AFTER PROXIMAL FEMUR FRACTURE FIXATION**

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University of California San Francisco, San Francisco (UNITED STATES)

Introduction: Fixation of proximal femur (PF) fractures in varus has been shown to correlate with an increased rate of implant failure. This study examined the influence of varus and valgus alignment on implant loading. Methods: An unstable PF fracture model was made in 12 cadaver PFs. Six fractures were fixed with a compression hip screw and side plate (CHSP) and six with an intramedullary hip screw (IMHS). Both implants were instrumented with strain gages to allow assessment of implant load bearing (ILB). ILB was expressed as percent of the measured load at neutral, varus and valgus alignment. Results: ILB was 103±5% (IMHS-103±5%, CHSP-114±15) of neutral load in 5 degrees of varus (p=0.057), 130±26% (IMHS-111±2, CHSP-142±28) in 10 degrees of varus (p=0.009) and 144±41% (IMHS-110±7%, CHSP-164±40%) in 15 degrees of varus (p=.048). When loading the implants in valgus, ILB was 83±9% (IMHS-81±3%, CHSP-85±12%) of neutral load in 5 degrees of valgus (p=0.003), 69±15% (IMHS-74±9%, CHSP-64±19%) in 10 degrees of valgus and 51±17% (IMHS-61±10%, CHSP-43±19) in 15 degrees of valgus (p=0.0002). Conclusions: PF fractures reduced in varus lead to significantly increased load on the fixation implant. Reducing the fracture in valgus reduces the load on the implant. Compression hip screws seem to be more affected by varus/valgus malalignment than intramedullary hip screws.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 30017**

**A SYSTEMATIC EVALUATION OF 250 CASES OF FRACTURE PROXIMAL THIRD FEMUR STABILIZED WITH BI-AXIAL FIXATION (HIP SCREW WITH A DE-ROTATION SCREW)**

Milind MODAK

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Purpose: Fractures of proximal third of femur are increasing in incidence due to a high incidence of osteoporosis and increase in life expectancy. Achieving a stable fixation with a satisfactory outcome is an orthopedic challenge. The biaxial implant is an indigenously developed implant in Pune, India which aids in achieving stability as well as dynamic compression. Methods: 250 patients from Deenanath Mangeshkar Hospital and Yogesh hospital, Pune were evaluated between January 2002 and December 2010 for the management of fracture proximal third femur. Patients' profiles were reviewed for surgical fixation. Surgeries were performed by a single orthopedic surgeon. The proximal third fracture femur was stabilized with biaxial fixation; diameter of screws being 9 mm (hip screw) and 6.5 mm (de-rotation screw). During fixation, augmentation was done with a tension band wiring. For osteoporotic cases, synthetic bone grafts were used. Results: 250 patients were included in the study. 56% of the patients were males (140) and 44% were female patients (110). The age of patients included in the study was above 65 years. The median follow up period was 4 years ranging from 2 months to 8 years. The cases were evaluated for stability and a periodical functional assessment was performed. Patients demonstrated a significant improvement in the functional parameters with an overall improvement in the quality of life. The complication rate (implant failure, implant breakage and proximal migration) was less than 2%. Conclusions: The biaxial implant appears to be effective in the management of proximal third fractures of femur.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 28523**

**INTERNATIONAL SURVEY OF TRAUMA AND ORTHOPAEDIC SURGEONS ON OPERATIVE MANAGEMENT OF EXTRACAPASULAR HIP FRACTURES**

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**BACKGROUND:** The incidence of hip fractures is rising worldwide. There is controversy with regard to the surgical treatment of unstable proximal hip fractures. We sought to identify surgeons' preferences and decision making criteria when considering the use of an extramedullary implant or intramedullary implant for extracapsular hip fractures. **METHODS:** We used an ongoing cross-sectional survey design to examine surgeons' preferences in the treatment of extracapsular hip fractures (stable, unstable, reverse oblique and subtrochanteric fracture patterns). An electronic survey was emailed to trauma and orthopaedic surgeons worldwide. **RESULTS:** There were 177 respondents. The typical respondent was in Trauma & Orthopaedic practice for 13 years, supervised trainees/residents, and treated on average 80 hip fractures per year. Half the respondents were in academic practice. Most surgeons chose extramedullary implant for stable extracapsular hip fractures. For patients with unstable proximal hip fractures, 65% preferred intramedullary implant compared to 35% who preferred extramedullary implants. The majority preferred intramedullary implant for reverse oblique and subtrochanteric fracture patterns (84% and 93% respectively). Many surgeons agreed that fixation complications (62%) and re-operation (65%) rates were not higher with intramedullary implant compared to extramedullary implant. Surgeons also revealed variable preferences in their choice of implant. **CONCLUSIONS:** This survey reflects current practice and helps to clarify current opinion with regard to the operative treatment of these fractures. While surgeons prefer an extramedullary implant for stable fracture pattern, and intramedullary implant for reverse oblique and subtrochanteric fracture patterns, there is disparity in surgical treatment of patients with unstable extracapsular hip fractures.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 29843**

**INCIDENCE OF HIP FRACTURE IN SOUTHEASTERN NORWAY:  
A FOLLOW-UP STUDY**

Sam POLESIE, Ulf SIGURDSEN, Kristian BJORGUL

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**INTRODUCTION:** Recent reports have suggested that the incidence of hip fracture has stopped rising, and some reports have even suggested a decrease. In a previous report, we found that age and gender specific incidence in southeastern Norway in the period 1998-2003 was comparable to that of other Scandinavian countries. In this study, we aimed to determine the incidence of hip fracture for the years 2008 – 2010 in order to ascertain any trends in the incidence of hip fracture. **METHODS AND MATERIAL:** We determined the number of fractures in the time period as well as the age and gender of each patient for the geographical area of Ostfold County (270,000 inhabitants). The number of patients at risk in each age bracket was extracted from public databases of Statistics Norway. Thus the age and gender specific incidence including 95 % confidence intervals was calculated. **RESULTS:** The incidence of hip fracture for men aged 50 – 74 and above 75 was 120/100,000 (100 – 141) and 1305 (1237-1372), respectively. For women 50 – 74 years, the incidence was 184/100,000 (158-209), and 2521/100,000 (2426 – 2615) for women older than 75 years. The incidence did not significantly differ from the previous time period in any of the four groups studied. **DISCUSSION:** In this study, we cannot confirm reports of decreasing incidence of hip fracture. Drugs to treat osteoporosis have been used during both time periods, but have apparently not yet caused a downturn in the incidence of hip fracture in Norway.

**Date: 2011-09-09**

**Session: Trauma - Proximal Femur II**

**Time: 08:00 - 09:30**

**Room: Club E**

**Abstract no.: 28810**

**IMPLEMENTATION OF AN EVIDENCE BASED DEPARTMENTAL PROTOCOL FOR HIP HEMIARTHROPLASTY IMPROVES CLINICAL OUTCOME AND IS COST EFFECTIVE**

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Ipswich Hospital, Ipswich (UNITED KINGDOM)

890,000 proximal femoral fractures occurred across Europe throughout 2000, costing the European health economy £21 billion (€ 32 billion). This is expected to rise to £51 billion (€ 76 billion) by 2050. It is vital European healthcare providers maximise their cost-effectiveness whilst continuously improving clinical outcome. Before March 2009, our orthopaedic unit used two prostheses to treat displaced femoral neck fractures: the uncemented Austin-Moore hemiarthroplasty and the cemented bipolar CPT prosthesis. No formally agreed departmental protocol on prosthesis use existed. This led to variation in patient care and was neither evidence-based nor cost effective. In March 2009, our department implemented an evidence-based protocol which used a cemented modular hemiarthroplasty (CMH) in all ambulant patients with a displaced intra-capsular femoral neck fracture. Aim: To measure the cost-effectiveness and clinical outcome after implementation of evidence based prosthesis selection after displaced intracapsular femoral neck fracture. Methods: We identified all patients who underwent hemiarthroplasty from March 2009 to March 2010 and recorded type of prosthesis used. Clinical outcomes measured included deep infection, dislocation, length of stay and overall mortality rates. This was then compared to data from the preceding two years. Results: In 2008/2009 209 hemiarthroplasties were performed costing £118 072 (€141 721). The Austin Moore (£104/€124) was used in 101 cases and the CPT (£996/€ 1195) was used in 108 cases. After protocol implementation, 212 hemiarthroplasties were performed costing £55 564 (€66 693). The Austin Moore was used in 41 cases and the cemented modular hemiarthroplasty (£300 (€360) per case) was used in 171 cases. All clinical outcomes measured duration of admission were favourable compared to published data. Conclusion: Rational use of an evidenced based protocol for cemented hemiarthroplasty led to a saving of over £62 500 (€ 75 028) per annum, produced favourable clinical outcomes, and reduced length of hospital admission.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 28619**

**A DISCUSSION: NON-CARDIAC SURGERY (DYNAMIC HIP SCREW: DHS) IN SAME SITTING AS A CABG IN A PATIENT SUFFERING FROM ACUTE MYOCARDIAL INFARCTION**

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As per the current guidelines in literature, any patient undergoing major cardiac surgery for acute myocardial infarction should not be subjected to any non-cardiac surgery for at least 4 weeks. This is due to the fact that during these 4 weeks after a cardiac procedure, there is high risk for morbidity or mortality from increased stress on the cardiorespiratory system. However, delaying surgical treatment in fractures of neck of femur, especially in displaced fractures, leads to much higher incidence of malunion, nonunion, avascular necrosis and thromboembolism. Conservative management is associated with much higher rates of morbidity and mortality as compared to operative management. Also a prolonged recumbent position is detrimental for the cardiorespiratory status of the patient. This lead us to take a 'calculated risk' by taking up a patient suffering from an intertrochanteric fracture with an acute myocardial infarction for Dynamic Hip Screw (DHS) immediately following a carotid artery bypass grafting procedure (CABG). We report a successful outcome in this scenario, and propose that such surgery for a hip fracture immediately following even a major cardiac procedure such as CABG offers no increased risks. It offers all the advantages of early surgery, which is in fact indicated in such a fracture. This case report aims at eliminating the common and long-held belief that any non-cardiac surgery following a major cardiac procedure should be put off for at least 4 weeks.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 29111**

**OSTEOPOROTIC HIP FRACTURES SHOULD BE FIXED SURGICALLY IN THE VERY OLD**

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<sup>1</sup>Singapore General Hospital, Singapore (SINGAPORE), <sup>2</sup>Singapore General Hospital, Singapore (SINGAPORE)

**Objective:** We examine the demographics, mortality and outcome of osteoporotic hip fractures in extremely elderly patients comparing them to elderly patients. **Methodology:** This is a 1-year follow-up study comparing 87 consecutive nonagenarian (>90 years) hip fracture patients to 87 geriatric (>65 to >90 years) patients from 2007 to 2009. Demographic information pertaining to gender and co-morbidities is compared. Peri-operative details including length of hospitalisation, mortality at 6-months and 1-year post-surgery and ambulatory status were analysed. **Results:** The average age of our nonagenarian population was 93 years compared to our geriatric population of 78 years. There were more males in the geriatric population than nonagenarian population (31.0% compared to 17.2%). The average number of co-morbidities in the geriatric and nonagenarian patients was 1.46 and 1.86 respectively. Majority of nonagenarian patients had one co-morbidity (30.0%) compared to two in geriatric patients (21.9%). Length of hospitalisation, days for pre-operative optimization, post-surgery stay for geriatric and nonagenarian patients were similar at 16, 5 and 11 days respectively. Cox regression comparing survival of geriatric and nonagenarian populations at 6-months (90.7%, 90.6%) and 1-year (90.7%, 88.2%) showed no difference. **Conclusion:** Males are less represented in the nonagenarian than geriatric population for hip fractures because females live longer. Nonagenarian patients are healthier compared to geriatric patients resulting in no difference in length of stay and duration for pre-operative optimization. Active intervention for hip fractures should be based on physiological and not chronological age in the very elderly.

**Date: 2011-09-09**  
**Session: Arthroplasty - Hemiarthroplasty**  
**Time: 10:00 - 11:30**  
**Room: Club E**

**Abstract no.: 29495**

**STRATEGIES TO IMPROVE THE MANAGEMENT OF HIP FRACTURES  
WITHIN A LARGE TEACHING HOSPITAL**

Simon GRAHAM, Adam PECKHAM-COOPER, James JOEL, Tom GOFF,  
Nicholas FREW

Leeds General Infirmary, Leeds (UNITED KINGDOM)

Introduction: The recently published British Orthopaedic Association Standards for Trauma (BOAST) state patients over the age of 60 years with hip fractures should have surgery performed within 48 hours of admission, unless there are clear reversible medical conditions. An audit of patients admitted to our institution with hip fractures in 2008 highlighted a significant problem in meeting these guidelines. Several changes were implemented, including a daily dedicated hip fracture trauma list, extra Saturday dedicated hip lists and the introduction of a management pathway. The purpose of this study therefore was to evaluate whether the implementation of the above changes led to an improvement in the management of these patients. Patients & Methods: Completed audit cycle of hip fracture patients over the age of 60 admitted to our unit over a 4 week period in November/December 2008 (24 patients) and November/December 2009 (26 patients). Results: Over the 4 week period in 2008, 46% of patients (11/24) were operated on within 48 hours of admission. Re-audit in November/December 2009 showed 77% of patients (20/26) were operated on within 48 hours of admission ( $p=0.01$ ). Only 5% of patients (2/26) waited longer than 48 hours without a medical reason ( $p=0.01$ ). Conclusion: Implementation of dedicated hip fracture trauma lists and a standardized hospital Fracture Neck of Femur Pathway have proved to be an effective means of meeting the BOAST guidelines and have significantly improved the management of hip fractures in the older person in our unit.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 29287**

**MID-TERM OUTCOME OF HIP FRACTURE PATIENTS: A STUDY ON MORTALITY AND MORBIDITY**

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Objective: A mid-term outcome study documenting mortality rates of hip-fracture patients and their quality of life (QOL) 5-years post-fracture. Methods: Data prospectively collected from 70 consecutive patients admitted to our hospital following either a cervical (neck) or trochanteric femoral fracture from February to May 2004. Pathological fractures were excluded. Patients' progress was reviewed 1-year and 5- years post-fracture. 5- year mortality was derived from hospital records, phone calls, home visits and letters to overseas patients. Mortality excess was calculated by control-matching our young –old patients against non-hip fracture patients. Functional status based on the EuroQOL was used to assess patients' quality of life. Results: The follow-up rate for the 70 patients described in this report is 100%. Survival rate at 5- years is 55.7% (95% CI: 44.1% to 67.3%). Mortality plateaus 1.5 year post-fracture as seen on the Kaplan-Meier curve. At 5-year follow-up, 52.8% of patients were ambulating well compared to 42.0% 1-year post-fracture. The average self-scoring system (EuroQOL) yielded an average of 70.4/100 five-year post- fracture, compared to 66.6/100 at 1-year follow-up. Conclusion: Hip fractures increase one's risk of dying especially one-year after traumatic fall. Although a minority achieve pre-fracture ambulatory status, survivors show improvement in ambulatory status and QOL scores at 5-year compared to 1-year post-fracture. Surveillance and aggressive rehabilitation to improve patient independence one-year post-fracture is crucial although primary prevention of osteoporotic hip fractures is still paramount in view of increased mortality.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 29899**

**RISK FACTORS FOR REOPERATION AFTER HEMIARTHROPLASTY. ANALYSIS OF 21,346 PROCEDURES IN THE SWEDISH HIP ARTHROPLASTY REGISTER 2005-2009**

Cecilia ROGMARK<sup>1</sup>, Olof LEONARDSSON<sup>1</sup>, Johan KÄRRHOLM<sup>2</sup>, Göran GARELLICK<sup>3</sup>

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Elderly hip fractures patients are often given hemiarthroplasties, nevertheless these implants are rarely included in arthroplasty registers. In 2005 national hemiarthroplasty registration was established in the Swedish Hip Arthroplasty Register (SHAR). Now 96% of all hemiarthroplasties in Sweden are registered with surgical and patient details and re-operations. 21.346 hemiarthroplasties were analysed. Acute fracture as reason for surgery increased from 91.3 to 94.3 percent. Lubinus SP II and Exeter stems accounted for 68.3 percent of the implants. 743 patients (3,6%) underwent reoperations, mostly due to dislocation. The strongest risk factors for reoperation (Cox regression analysis) were hemiarthroplasty due to failed internal fixation (rr 2.1, 95%CI 1.7-2.7) and uncemented stem (2.0, CI 1.5-2.6). When only modern uncemented implants are analyzed there is increased risk of re-operation (1.8, CI 1.3-2.5) and particularly periprosthetic fracture (3.8, CI 2.0-7.1). Bipolar hemiarthroplasty heads also increased the risk, especially dislocation (1.4, CI 1.1-1.8). Anterolateral surgical approach (Gammer, Hardinge) decreased the risk of dislocation re-operation (0.63, CI 0,53-0.83). Other risk factors are male gender and age <75 years. Uncemented implants decreased from 10.4 to 3.0 percent in 2005-2009 and anterolateral approach increased from 46.7 to 55.9 percent. Important changes have been seen in implants and fixation. Results from SHAR have a large impact on the methods and implants chosen by Swedish orthopaedic surgeons as a tool for improving patient care.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 27326**

**UNIPOLAR VERSUS BIPOLAR HEMIARTHROPLASTY FOR DISPLACED FEMORAL NECK FRACTURES IN THE ELDERLY: IS THERE A DIFFERENCE?**

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Background: Hip hemiarthroplasties are commonly performed for displaced femoral neck fractures. Considerable differences of opinion exist regarding the choice between unipolar and bipolar designs. The main theoretical advantage of a bipolar over a unipolar prosthesis is the reduction of acetabular erosion due to movement taking place within the implant rather than at the acetabular implant interface. It is thus hypothesized that bipolar prostheses lead to better long term functional outcomes with less complications. Purposes To compare unipolar (Moore's) and bipolar hemiarthroplasty looking specifically for differences in (1) Pain and functional hip scores (2) Rates of acetabular erosion, component migration and revision surgery (3) Rates of postoperative morbidity. Patients and Methods: Inclusion criteria were (a) age more than or equal to 65 years, (b) displaced femoral neck fracture of non-pathologic origin, (c) normal cognitive function, (d) ambulatory with or without assistive devices prior to the fracture, and (e) treated with a primary prosthetic replacement. 193 patients were available for review; 118 in the Moore's group and 75 in the bipolar group. Postoperatively, patients were assessed with regards to pain, satisfaction, Modified Harris hip score and Oxford hip score. Standard anteroposterior pelvis and lateral hip radiographs were obtained at regular intervals. These were analysed specifically with regards to acetabular erosion and component migration. Results: No significant difference between a Moore's and a bipolar prosthesis regarding hip pain, functional hip scores, rates of acetabular erosion, component migration, revision surgery and complications rates.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 28856**

**UNCEMENTED THOMPSON'S HEMIARTHROPLASTY IN ELDERLY PATIENTS WITH HIP FRACTURES; ARE THEY APPROPRIATE?**

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Current evidence suggests that we should be moving away from Thompson's hemiarthroplasties for patients with intracapsular hip fractures. Furthermore, the use of cement when inserting these prostheses is controversial. This study aims to show the Inverness experience. We performed a retrospective review of all NHS Highland patients who underwent a hemiarthroplasty for an intracapsular neck of femur fracture over the last 15 years. Demographics and the use of cement were documented. Further analysis of this group was performed to identify any of these patients who required revision of their prosthesis. Patients requiring revision had their case-notes reviewed to identify the cause for further surgery. From 1996 until present 2221 patients from the Highland area had a hemiarthroplasty for an intracapsular neck of femur fracture. 1708 were female (77%) and 513 male (23%). The ages ranged from 28 years to 104 years (mean 80 years, median 81). 2180 of this group had their operations in Raigmore Hospital with the remaining 41 at various centres throughout Scotland. 623 (28%) had a cemented hemiarthroplasty, with the remaining 1578 (72%) having an uncemented Thompson's hemiarthroplasty. The revision rate for the cemented group was 2% (13 of 623 patients). In the uncemented group it was 0.4% (6 of 1578). Reasons from revision included dislocation, periprosthetic fracture, infection and pain. Current evidence from some joint registers regarding the use of Thompson's hemiarthroplasty in the elderly is discouraging. The use of bone cement in this group with multiple co-morbidities is not without its risks. Our data suggests that uncemented Thompson's hemiarthroplasties in low demand elderly patients with multiple co-morbidities can yield excellent results with less risk to the patients.

**Date: 2011-09-09**

**Session: Arthroplasty - Hemiarthroplasty**

**Time: 10:00 - 11:30**

**Room: Club E**

**Abstract no.: 29906**

**MONOBLOCK HEMIARTHROPLASTIES FOR FEMORAL NECK FRACTURES: A PART OF ORTHOPAEDIC HISTORY?**

Cecilia ROGMARK<sup>1</sup>, Johan KÄRRHOLM<sup>2</sup>, Olof LEONARDSSON<sup>1</sup>, Göran GARELLICK<sup>1</sup>

<sup>1</sup>Dept. of Orthopedic Surgery, Skane University Hospital / Swedish Hip Arthroplasty Register, Malmö / Göteborg (SWEDEN), <sup>2</sup>Dept. of Orthopedic Surgery, Sahlgrenska University Hospital / Swedish Hip Arthroplasty Register, Göteborg (SWEDEN)

Monoblock implants are still used world-wide for femoral neck fractures. In 2005 national hemiarthroplasty registration was established in the Swedish Hip Arthroplasty Register (SHAR). Now 96% of all hemiarthroplasties in Sweden are registered with surgical and patient details together with re-operations. 20391 hemiarthroplasties performed due to hip fractures and through standard approaches (i.e. no mini-invasive surgery) 2005-2009 were analysed, resulting in 616 uncemented Austin-Moore implants, cemented 752 Thompson and 364 ETS Endo implants compared with various modular implants (n=18659). More elderly and demented patients were treated with Austin-Moore stems compared modular implant. The former group also had the highest mortality, 227 deceased after one year (37%). Austin-Moore implants had the highest reoperation rate (6.7%). Thompson®/ETS® led to 2.4% reoperations and modular implants to 3.5%. In a Cox regression analysis, the risk of reoperation was increased twice for the Austin-Moore prosthesis (2.0; CI 1.5-2.8) mainly due to dislocation and periprosthetic fracture. The use of Thompson/ETS prosthesis did not influence to risk of reoperation compared to modular implants. Uncemented Austin-Moore monoblock hemiarthroplasties have an increased risk of reoperations, due to periprosthetic fractures and dislocation, and should not be used in modern orthopaedic care. Cemented monoblock implants (Thompson, ETS Endo) have good results regarding reoperations when used in the oldest hip fracture patients. To give definite recommendations whether to use this implant type or not, patient reported outcomes including pain, function and health-related quality of life must be analysed as well.

**Date: 2011-09-09**

**Session: Foot & Ankle - Miscellaneous III**

**Time: 10:00 - 11:30**

**Room: Club H**

**Abstract no.: 29941**

**ARTHRODESIS OF LOWER EXTREMITIES WITH BLOCKING INTRAMEDULLARY NAIL**

Victor VOLOSHIN, Konstantin SHEVYRIEV, Vladimir ZUBIKOV, Anatoliy EREMIN

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**Aim:** To evaluate the treatment results after arthrodesis of ankle and knee joints with intramedullary blocking nails. **Materials and methods:** Data of 23 patients (11 ankle, 12 knee joints), from 42 to 72 years old, who underwent the arthrodesis of knee and ankle joint with intramedullary blocking nails were analyzed. Arthrodesis of knee joint was done for the following conditions: 1. Post traumatic arthrosis of knee joint, in where the total knee replacement is contraindicated. 2. Supra condylar pseudoarthrosis in combination with fibrous ankylosis of knee joint. 3. Deep endoprosthetic infection of knee joint. In 2 cases, arthrodesis of knee joint and autologus bone graft is combined with intramedullary osteosynthesis of femur and with the same nail. Combination of ankle joint arthrosis and degenerative or post-traumatic lesions of subtalar joints were the indications for arthodesis of ankle joint. **Summary:** At the present time, we have the follow-up for 3 years. Four patients are under observation with good radiologically confirmed formation of ankylosis. All the other patients who has more than 5 month follow-up had already formed ankylosis. According to the results, intramedullary blocking nail allows to get ankylosis of joint from 2-6 months. In some cases, IM nail allowed not only achieve bony ankylosis and also helpful in achieving union of bone lesions. Usage of IM nail gives the possibility to allow early weight bearing and high quality of life soon after the first day of surgery.

**Date: 2011-09-09**

**Session: Foot & Ankle - Miscellaneous III**

**Time: 10:00 - 11:30**

**Room: Club H**

**Abstract no.: 29056**

**BIOMECHANICAL COMPARISON OF CYCLIC STABILITY AND LOAD TO FAILURE OF ACHILLES TENDON REPAIR WITH NINE DIFFERENT SUTURES**

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Biomechanical studies investigating suture techniques for Achilles tendon repair used single load to failure tests in order to evaluate the maximal load capacity of the repaired construct. During early rehabilitation the repair is repetitively loaded such as exercise or daily living activities like walking. Cyclic loading seems to duplicate the physiological loading conditions more closely than single cycle failure tests. Aim of this study was to test nine sutures most commonly used Achilles tendon repair (Cuneo-Bunnell, Kessler-Tajima, Krackow-2, Krackow-4, Krackow-4 with two filaments, Krackow-6, Krackow-6 with two filaments, CLC and MGH). Following tenotomy fresh Bos Taurus tendons were sutured either with one of techniques with Ethibond#1. After repair, cyclic loading tests were performed with a uniaxial biomechanical testing machine Walter+Bai AG. The load to failure was  $83,4\pm 3,2\text{N}$  for Cuneo-Bunnell,  $88,4\pm 10,8\text{N}$  for Kessler-Tajima,  $272,8\pm 39,3\text{N}$  for Krackow-2,  $298,4\pm 17,4\text{N}$  for Krackow-4,  $408,4\pm 45,4\text{N}$  for Krackow-4 with two filaments,  $292,2\pm 15,5\text{N}$  for Krackow-6,  $406,8\pm 27,4\text{N}$  for Krackow-6 with two filaments,  $383,8\pm 28,6\text{N}$  for CLC and  $401,8\pm 41,2\text{N}$  for MGH. Cyclic stability was measured as elongation after 2500 cycle loading with 50N, 125N and 200N. The best suture of ruptured Achilles tendon is Krackow-4 with two filaments that showed best biomechanical properties.

**Date: 2011-09-09**

**Session: Foot & Ankle - Miscellaneous III**

**Time: 10:00 - 11:30**

**Room: Club H**

**Abstract no.: 29399**

**RESULTS AND FUNCTIONAL OUTCOME OF TRAUMATIC SECONDARY ARTHROSIS OF THE ANKLE JOINT TREATED BY INTERNAL ARTHRODESIS**

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Introduction: Secondary osteoarthritis of the ankle joint (SOAA) represents a common complication after ankle/tibial pilon fracture. Arthrodesis remains the gold standard including intramedullary nail (IMA) and screw fixation (SFA). The purpose was to evaluate results and functional outcome in patients with SOAA receiving IMA or SFA. Method: A prospective analysis was undertaken on a matched case-control-cohort of 32 patients. Outcomes consisted of complications and functional ability (walking distance, pain, AOFAS score). Results: 25 males and 7 females had a mean age of 52 years (range 33–77) and BMI of 29.9 (range 22.5–40.4). Primary injury was 10 tibial pilon and 22 ankle fractures. Time to arthrodesis averaged 11 years. 17 IMA and 15 SFA were performed. Six patients had normal walking distance and 12 had no-to-mild pain. AOFAS averaged 55.97 and was similar between treatment groups ( $p=0.384$ ) and was inferior compared to normative ( $t=16.559$ ,  $p<0.001$ ). AOFAS was related to walking distance ( $r=-0.642$ ) and pain ( $r=-0.480$ ) with significance at  $p<0.01$ . Complications included 29 secondary osteoarthritis, 5 disturbed wound healing, 5 hardware loosening, 3 infections, 2 nonunions, and 2 malalignment. Healing disturbances were related to IMA ( $\rho=-0.404$ ,  $p=0.022$ ). Conclusion: Ankle joint osteoarthritis is a common sequelae after ankle or pilon fracture. Even after successful internal arthrodesis significant functional impairment remains. Nail and screw fixation techniques showed equal fusion rates and functional ability. However, nail fixation is prone to more complications.

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**Session: Foot & Ankle - Miscellaneous III**

**Time: 10:00 - 11:30**

**Room: Club H**

**Abstract no.: 27368**

**TOTAL ANKLE REPLACEMENT – LONG-TERM SURVIVAL ANALYSIS**

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Introduction: The purpose of this study was to assess the long term clinical and radiographic outcome of the Buechel-Pappas Total Ankle Replacement System with a mean follow up of 5.1 years (1-13 years). Methods and materials: A total of 30 primary total ankle arthroplasties in 29 patients were performed in our hospital between June, 1996 and June, 2009. 20 (69%) of the patients were males and 9 (31%) were females. The average age of the patients was 66.7 +/- 7.95 years. Patients were assessed clinically and radiologically at 3 month intervals for 1 year and annually subsequently. Post operative pain and function assessment was performed using AOFAS ankle and hind-foot score. Kaplan-Meier analysis, life expectancy calculation and Cox regression analysis were performed on the survival data to calculate the effect of age as a continuous variable on the hazard of failure of the prostheses. Results: 3 out of the 30 (10%) total ankle arthroplasties underwent reoperation at a mean of 12.9 months. The mean AOFAS score was 81. Cumulative survival function (95% confidence interval) at 23.3 months was 87.6% +/- 37.2%. Life expectancy of the prosthesis was approximately 10 years (99.87 – 138.94 months). Cox regression analysis revealed a hazard ratio of 0.80 (0.65 – 0.99) (p <0.05), showing a 20% relative decrease in the hazard of failure with each one-year increase in corresponding age. Our results are comparable in terms of survival of the total ankle arthroplasties.

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**IS LAG SCREW FIXATION CRUCIAL IN LATERAL MALLEOLUS FRACTURE FIXATION?**

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Displaced fractures of the lateral malleolus are usually treated by plating, with or without the use of a preliminary lag screw, and then a period of plaster immobilisation. The need for this lag screw is conventionally based upon the obliquity and the degree of comminution of the fracture. A non-comminuted oblique or spiral fracture is considered ideal for lag screw fixation. This study questions the need for this screw. A total of 200 consecutive ankle fractures that were operatively fixed over a 3 year period were reviewed. Fifty two fractures which were unsuitable for lag screw fixation were eliminated from the study. This left 95 fractures which were fixed with lag screw and plate, and 53 patients who had plate fixation alone. In most of the latter group, an easier technique was used, whereby a temporary K-wire held the fracture out to length; this was removed when plating was complete. Therefore 148 patients were available for this retrospective study. Follow-up ranged from 12 to 36 months. The success of fixation, complications, resultant mobility and patient satisfaction were accessed by radiographic findings and the clinic notes. X-rays showed that of the 95 patients with lag screws, 25 had screws that were misdirected and ineffectual. We found no appreciable difference between outcomes of the two groups. This study suggests that in practice, lag screw fixation as a supplement to fibular plating is an unnecessary intervention; the use of a temporary K wire is quicker and effective.

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**INDICATION OF ARTHROSCOPIC DRILLING AND RETROGRADE CANCELLOUS BONE TRANSPLANTATION FOR THE TREATMENT OF OSTEOCHONDRAL LESIONS OF THE ANKLE ACCORDING TO SUBCHONDRAL BONE CONDITION**

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We performed different surgical procedures; arthroscopic drilling (AD) and retrograde autologous cancellous bone plug transplantation from the patient's pelvis (RCT), according to MRI diagnosis for subchondral bone condition, and clarified the clinical and morphological results of AD and RCT. If the diameter of the subchondral lesion was lesser than 10 mm, AD was performed. If it was equal to or greater than 10 mm, RCT was performed. Between April 2006 and July 2008, there were 17 cases of Group AD and 15 cases of Group RC. AD was performed trans-malleolarly. In performing RCT, a cancellous bone plug of the ipsilateral iliac crest was harvested using a 6.0 mm OATS at the exposed iliac crest and was inserted to the subchondral lesion retrogradely. The AOFAS score at pre-operation and 2 years after the surgery, and ICRS visual repair assessment score with second-look ankle arthroscopy at 1 year after the surgery were evaluated. There were 17 cases of talar lesion in Group AD, and 13 cases of talar lesion and 2 cases of tibial lesion in Group RCT. Six cases had subchondral cyst in Group RCT. The mean AOFAS score was 57.8 at pre-operation and 94.4 at 2 years after surgery in group AD, and 59.2 at pre-operation and 95.2 at 2 years after surgery in group RC. In group RCT, the subchondral-lesion disappeared in 73.3%, and decreased in 26.7%. The mean ICRS score at 2nd look arthroscopy was 9.5 in Group AD and 10.3 in Group RCT. In Group RCT, all cases were categorized into nearly normal; comparing with 15 cases into nearly normal, 2 cases into abnormal in Group AD. In conclusion, we recommend using the different surgical procedures according to subchondral bone condition in treating OCL of the ankle.

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**Room: Club H**

**Abstract no.: 28686**

**OPEN REDUCTION AND INTERNAL FIXATION IN INTRAARTICULAR CALCANEAL FRACTURES: TECHNICAL PITFALLS, CONTROVERSIES AND SOLUTION TO THE PROBLEMS**

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ORIF is the treatment of choice in the calcaneal fractures with posterior joint facet impression aggregated with step or gap more than 2-3 mm, decreasing Bohler angle to 0°, calcaneal broadening or shortening to 1/3. Eighty one patients with one hundred ten intraarticular calcaneal fractures were managed in Republic Scientific Practical Center of Traumatology and Orthopedics between March 2005 and July 2010. The mean age was 33,4±4,57. There were 66 men and 15 women. Joint depression type – 64, tongue type – 46. According to Sanders there were type1 – 5 cases, type 2A - 4 cases, 2B - 18 cases, 2C – 9 cases, 3AB - 31 cases, 3AC – 27 cases, 3BC – 10 cases, type 4- – 6 cases. ORIF using plates and screws through extended lateral approach was performed in 44 cases (39 patients), or 40%. Difficulties in obtaining appropriate access to the fracture fragments were noticed in 3 cases and connected with incision location too close to the lateral malleolus. Percentage of the imperfect open reduction run up to 22,7% (10 cases from 44). Analysis of the results disclosed the next main causes of the failed open reduction: attempt to reduce multifragmental fractures (4 cases), delay in surgery up to 14-16 day (5 cases), wrong steps order in performing reduction, underestimation the role of the key fragments (6 cases), disuse reduction devices, distractors (3 cases), inadequate intraoperative control quality of reduction (5 cases).

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**HOW VALID ARE FOOT AND ANKLE OUTCOMES MEASURES AND INSTRUMENTS?**

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Background: Clinicians wishing to use a scoring method for musculoskeletal outcomes are faced with a bewildering number of choices. Aims: To investigate if published foot and ankle outcomes measures have been validated for clinical use along the dimensions of content, construct and criterion. Methods: Using a previously collected database, 71 foot and ankle outcomes measures and instruments were identified and examined. Of the scoring systems examined, 42% were designed for the foot (30/71) and 58% for the ankle (41/71). Results: An outcome measure was deemed to be valid if a subsequent published study evaluated the instrument's content, construct and criterion validity. Although 63% of outcomes measures are validated (45/71), this is weighted in favor of foot instruments (27/30 foot, 18/41 ankle). Regarding instrument type, 44% of the outcomes measures evaluated are patient-reported (31/71) and 56% are clinician-based (40/71). While 90% of patient-reported outcomes are validated (28/31), just 42% of clinician-based outcomes are (17/40). Of the 45 validated outcomes measures, 7 are validated for content only (2 ankle, 5 foot). A further 7 outcomes scores (3 ankle, 4 foot) are validated for content only or for specific conditions (eg, the Foot and Ankle Disability Index (FADI) for acute lateral ankle sprains). Therefore, a total of 44% of all instruments examined are valid without caveats (31/71). Conclusions: It is advisable for clinicians wishing to use a published foot or ankle outcomes measure to investigate if it has been validated.

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**SAFETY PROFILE OF SURAL NERVE IN POSTEROLATERAL APPROACH TO THE ANKLE JOINT – MRI STUDY**

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**INTRODUCTION:** The posterolateral approach to ankle joint is well suited for ORIF of posterior malleolar fractures. There are no major neurovascular structures endangering this approach other than the sural nerve. The sural nerve is often used as an autologous I nerve graft and provides sensation to lateral aspect of the foot. Hence every attempt must be made to protect the sural nerve. The aim of this paper is to measure the precise distance of the sural nerve from surrounding soft tissue structures. **METHODS:** This is a retrospective image review study including patients with MRI of ankle from January 09 - Nov 2010. We identified 78 MRI scans out of which 64 were deemed eligible for assessment. All measurements were made from Axial T1 slices. Measurements were made from the lateral aspect of the TA to the central of the sural nerve, central of sural nerve to posterior aspect of the peronei muscles and central of the sural nerve to the posterior aspect of fibula. Data were collected on a Microsoft Excel spreadsheet and the descriptive statistics calculated. **RESULTS:** The key findings of the paper is the safety window for the sural nerve from the lateral border of TA is 7mm, 1.3cm and 2cm at 3 cm above ankle joint, at the ankle joint and at the distal tip of fibula respectively. Similarly the safety window for the nerve from the posterior aspect of fibula is 2cm, 1.6cm, 1.6cm at 3cm above ankle, at the ankle joint and the distal tip of fibula respectively. **CONCLUSION:** Our study demonstrates the close relationship of the nerve in relation to tendoachilles, peronei and fibula in terms of exact measurements. The safety margins established in this study should enable the surgeon in preventing endangerment of the sural nerve encountered in this approach.