Fracture of Centraliser in Exeter Total Hip Arthroplasty

by

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Introduction

The geometry of cement mantle and the position of the prosthesis within the femur influence aseptic loosening of cemented hip replacements. Areas of thin cement or complete perforation of the mantle by the prosthesis seems to play a central role in the initiation of implant loosening [2,6]. Realisation of the importance of the minimum thickness of cement led to development of methods to control the position of the prosthesis within the femoral canal. The most popular of these methods consist of the attachment of centraliser.

The hollow centraliser introduced in 1986 is an important factor in the success of Exeter hip system. The hollow centraliser allows the stem to move distally within the cement mantle
after implantation, ensuring that the cement is always under radial compression while at the same time preventing end-bearing of the stem directly onto the cement [3,5].

Case Report

52 years old woman underwent right Exeter total hip arthroplasty with impaction bone grafting of acetabulum. First postoperative radiograph showed a circumferential radiolucent area about two cm proximal to the tip of the prosthesis (Figure 1).

Figure 1: Immediate postoperative A-P and lateral view showing radiolucent area about 2 cm proximal to tip of the prosthesis.

There was no radiolucent shadow at the normal site of centraliser at the distal end of the prosthesis (Figure 2). At the time of insertion of the prosthesis, probably the centraliser was stuck and the tip of the prosthesis went through the hollow and fractured it. At the time of
insertion, there was no excessive resistance and no abnormal sound was heard. The intramedullary canal was narrow and accommodated 10 mm cement restricter. Size 2 Exeter stem with centraliser was used.

Figure 2: Postoperative radiograph showing the normal position of a Centraliser.

At 3.5 years follow-up, the hip function was excellent. The radiograph of the hip (Figure 3) showed the similar radiological picture. There was no sign of subsidence of the femoral stem.
Discussion

With advancement of technology, the results of cemented total hip arthroplasty have improved with few exceptions. Cementing technique has a profound influence on the incidence of aseptic loosening. Two specific measures that seem to have greatest impact on the longevity of the cemented femoral stems are pressurization of cement and control of mantle thickness, typically with modular centralising devices attached to the tip of the prosthesis [1,4,6,7].

Despite their popularity, some complications have been associated with these devices, including fracture of the centraliser and accumulation of voids around the distal tip of the
prosthesis. The long term consequences of these radiographic observations have yet to be determined [1,4,6,7].

Goldenberg et al in a long-term review of 100 cemented total hip arthroplasty (Precision Hip System, Howmedica Inc., Rutherford, NJ) reported radiographic fractures of the distal centraliser in six. Although fractures of the distal centraliser frequently were associated with suboptimal alignment of the prosthesis and a deficient distal cement mantle, these patients did not have a lower clinical score and had no signs of radiological or mechanical loosening at 4 to 8 years follow up. There are no previous reports in the literature on fracture of the centraliser in association with Exeter Total Hip Arthroplasty.

In Exeter total hip arthroplasty the distal centraliser besides maintaining the alignment of the prosthesis, allows subsidence of the stem in to the hollow. As the centraliser is fractured the prosthesis tip lies end on the cement and it does not allow subsidence. Thus it prevents loading of the cement in radial compression which reduces shear at stem-cement and cement-bone interfaces and may play a significant role in long term survival.

Normally the postoperative X-ray of the Centraliser reveals a radiolucency in the cement mantle at the distal end of the prosthesis (Figure 2). But in this case the radiolucency was about two centimeters proximal to the tip of the prosthesis due to fracture of the centraliser.

The incidence of centraliser fractures may be reduced through changes to the design of the device, or possibly through use of a central metal post or through the development of a circumferential design that is reinforced by the prosthesis.

References


3. Exeter total hip system – Building on the past to enhance the future, standing the test of time (1997) Howmedica Inc., UK.


