Posterior Tibial Artery Pseudoaneurysm Following Tibial Fracture

by

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Abstract

The presence of distal pulses is misleading and the severity of the fracture roentgenographically is unrelated to the possibility of a vascular injury. Pseudoaneurysms following long bone injuries being potentially limb threatening demands a high degree of suspicion and the use of angiography for early diagnosis and repair. We report a case of posterior tibial artery pseudoaneurysm with grade III-B open fracture diagnosed after three months.
Introduction

Of all the challenges in orthopaedic surgery, the treatment of fracture remains one of the most difficult, both in terms of bone and soft tissue biomechanics and the avoidance of potential complications.

Loss of a limb is probably the most feared complication, because of usual low threshold for diagnosing compartment syndromes and vascular injuries. Vascular compromise of a limb following a fracture is not always immediately obvious and without a high index of suspicion, the viability of the limb may be threatened. We present a case of high-energy tibial fracture with a late presenting vascular injury.

Case Report

An automobile struck the patient, a 40-year-old male, on March 15, 2002. He was treated outside in an above-knee cast with a window cut for dressing of wound. After one month, the cast was changed to external fixator and dressing continued. The patient presented to us after two month with external fixator in situ and severe soft tissue injury.

The wound was 14cm x 10cm in dimensions with both fracture ends along with the medial side of soleus and gastronemius muscles exposed. On opening the dressing, the patient bled profusely so he was admitted for observation with a suspicion of possible vascular injury. Debridement and dressing was done daily. After four days the patient had a severe uncontrollable episode of fresh bleeding from the wound during night that stopped only after pressure dressing. Two units of blood were transfused to compensate for blood loss. After the episode both distal pulses were well palpable. There was no abnormal swelling in leg and the next day there was no active bleeding. On suspicion of a vascular injury, we had an angiography done. Venography was normal but arteriography showed a saccular type of pseudoaneurysm in the posterior tibial artery opposite the fracture ends of the tibia (Fig. 1)
The Cardio-Thoracic vascular surgeons were consulted, decision taken to ligate the posterior tibial artery, since the collateral circulation was good. We revised the fixator, with fibular osteotomy and freshening of the fracture margins.

After 8 weeks the patient was allowed to walk with partial weight bearing with crutches. Both distal pulses were palpable although the posterior tibial was weaker. The fracture showed no signs of union so a corticotomy was done and an Ilizarov ring fixator applied.

Four months later the fracture was healed with full range of knee motion and no distal neurological deficit.
Discussion

Arterial damage coinciding with lower extremity long bone fractures is relatively rare, though multiple case reports of pseudoaneurysm and AV fistula have been reported [2,7,13] but most were due to war and bullet injuries or due to Ilizarov K-wires. Only few reports are available where the fracture ends itself have lead to a pseudoaneurysm of the posterior tibial artery. The pathogenesis of the vascular injuries is attributed to the penetrating nature of an open feature. During the initial trauma, bone fragments and edges may transect all the three layers of an artery causing hematoma formation around the artery with degradation of the enclosed vessel resulting in a pseudoaneurysm [13]. Approximately 10% of all delayed vascular injuries after trauma are a combined AV fistula and pseudoaneurysm [13]. Traumatic arterial injury can be categorized both anatomically and by their clinical presentation. The vessel insult can take three forms: 1) complete disruption, 2) partial transection and 3) intimal tear [10].

Complete tears may not be followed by haemorrhage because of retraction or thrombosis. Continued bleeding because of the lack of retraction however may follow partially severed vessels and a traumatic A-V fistula or a false aneurysm may result. Intimal tears, usually the result of arterial contusion or traction injury are manifested by thrombosis or intimal hematoma. While complete laceration is usually followed by a loss of distal pulses, a decrease in local skin temperature and pallor, pseudoaneurysms usually have distal pulses intact but slightly diminished. Perry et al [5] showed that 10% of fractures associated with vascular injury would have intact pulses.

Pseudoaneurysms of the posterior tibial artery is one of the recognized, though uncommon, late manifestations of vascular injury associated with tibial fractures. These manifest themselves by thrombosis of the vessels, rupture and hemorrhage or compression of surrounding tissue.
Review of the vascular and orthopaedic literature shows the recognition of the pseudoaneurysm varied from a few days from the onset of clinical presentation to six months post injury [1,3,4,6,9,11,12,14] The ultimate results ranging from full function to amputation predictably are dependent upon early detection. Angiography must be utilized when vascular injury is suspected and distal pulses are intact or there are no distal pulses normally available to test (eg. profunda femoris artery injury). Saletta and Freeark [8] outline their criteria for angiography as:

1. Diminished or absent pulses after fracture reduction.
2. Audible bruits.
3. Unusually large extremity or pulsating hematoma.
4. Severe or recurrent haemorrhage through open wound.

From the case report and review of literature, the following points should be stressed. 1) Presence of distal pulses is not always indicative of intact vascular integrity. 2) Any active bleeding from wound especially after few weeks strongly suggest pseudoaneurysm even in presence of normal peripheral pulses and compartmental pressure so must be considered as a strong indicator for urgent angiogram to evaluate the vascular pattern in the injured limb. An awareness of the signs and symptoms and the pathophysiology of the vascular problem combined with liberal use of angiography should decrease the morbidity and lead to fewer poor results related to omission and procastination.
References


