

CASE REPORT

Superficial Femoral Artery Thrombosis After Midshaft Femoral Fracture Fixation With an Intramedullary Nail: A Case Report

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ABSTRACT

Intramedullary nailing is the preferred method of closed shaft fracture fixation of long bones. One of the most dreaded complications to occur following internal fixation of a lower limb fracture is pseudo- or false aneurysm which can lead to the loss of the limb due to acute ischemia. This diagnosis is made by contrast angiogram of the limb. Pointers to the diagnosis include absent distal limb pulsation as well as other signs of acute ischemia post trauma or surgery. We present a case of development of pseudo-aneurysm in an elderly patient following open reduction and internal fixation of a femoral fracture. This case report outlines a prompt multidisciplinary approach of management in a rare case of pseudoaneurysm post fixation of long bone.

Keywords: Pseudo-aneurysm, Femur, Fracture, Thrombosis, Delay

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INTRODUCTION

The most common internal fixation method applied for fracture shaft of femur is intramedullary nailing (1). The initial complications associated with this technique are acute pudendal nerve palsy, fat embolism syndrome, infection, compartment syndrome and sometimes even vascular injury (1). In particular, iatrogenic vascular injuries are not a common occurrence post-mid-shaft femur surgical fixation (2). The majority of vascular injuries will usually cause pseudo-aneurysms of the profunda femoris artery, while the superficial femoral artery (SFA) injury occurs less frequently (2).

In a study of iatrogenic vascular trauma, Duparc et al (1994) distinguished thrombotic lesions that were caused by compression (tourniquets, forceps, retractors) and haemorrhagic lesions caused by sharp surgical instruments (pins, blades, screw tips, drill bits) (4). Prompt diagnosis and treatment are essential in order to have any chance of salvaging the patient's limb. We present a prompt multidisciplinary approach of management in a rare case of development of pseudoaneurysm of the lower limb post intramedullary fixation of femur.

CASE REPORT

We report on a 75-year-old woman with no known

underlying illness who presented to the emergency department with right lower limb pain, deformity and inability to walk following a motor vehicle accident approximately 3 months prior to admission. Due to adverse social circumstances, she was unable to seek treatment at a hospital and instead, received complementary and alternative treatment from a village traditional practitioner. She was bed bound during this period but still could sit on rattan chair at home as they had no wheelchair facilities. As her symptoms worsened, she was brought to our centre.

Clinically, her leg was deformed with no neurovascular compromise. Laboratory investigations were also unremarkable. X-ray of the femur revealed a mid-shaft fracture of the right femur with presence of callus and mal-alignment of the femur (Figure 1). The patient was placed on skin traction pending surgical fixation.

An intramedullary nailing internal fixation was performed on day 98 post-trauma (Figure 1) on a fracture table in the supine position. Open reduction was performed as she was well and surgically fit otherwise. Intraoperatively, an abundance of callus and fibrous tissue were noted, which prevented closed reduction on a traction table. The fibrous tissue and callus were removed to facilitate open reduction of the fracture.

Post-operatively, on examination, the distal pulses were absent on the operated limb and capillary refilling time was prolonged. Ankle and toe dorsiflexion was also weak with associated sensory loss over the dorsum of the foot. Furthermore, Doppler ultrasound examination



Figure 1: Pre- & Post-operative X-ray

was unable to detect the dorsal pedis artery pulse, however, both the popliteal and posterior tibial pulses showed a biphasic signal. Based on tell-tale signs, a serious vascular injury was provisionally suspected. An emergency angiographic study confirmed the blood flow absence beyond the fracture site at the superficial femoral artery (SFA) (Figure 2). The collateral flow was still patent, keeping the leg viable. A diagnosis of thrombosis of the SFA with an associated intimal tear secondary to excessive traction and reduction was considered.

Femoral artery bypass with a saphenous vein graft was performed almost immediately by the vascular team. Approximately 6cm of the thrombosed area involving the SFA (Figure 3) was removed and grafting with a reverse saphenous vein from the contralateral limb was performed (Figure 4). Following repair, immediate restoration of the distal pulses was achieved and confirmed by Doppler. This patient progressed well with no evidence of graft failure during the post-operative period and on follow-ups. The patient was

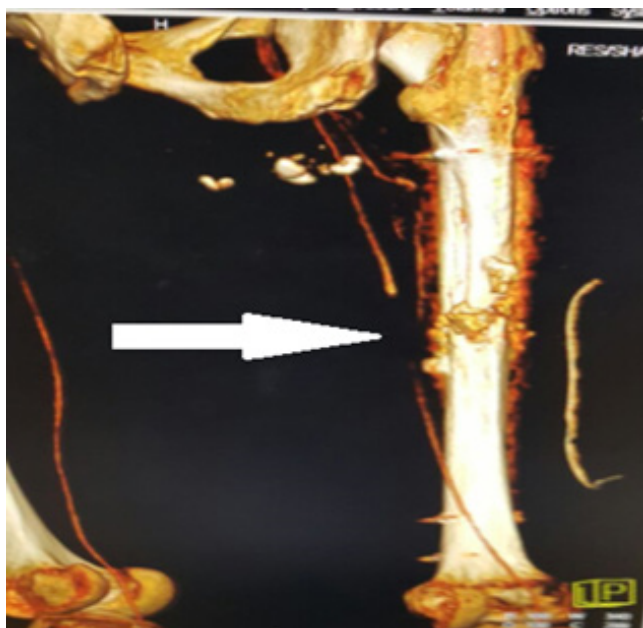


Figure 2: Filling defect on the SFA on CT angiogram

wheelchair bound for the first 3 months followed by aided ambulation with a walking frame by 6 months. At 1-year postoperative review, the patient could ambulate unaided with a walking stick.

DISCUSSION

Iatrogenic vascular injuries are rare in femur fixation surgery. Injury to the SFA following intramedullary nailing for mid-shaft femoral fracture has not been previously reported in the literature. In either closed



Figure 3: Thrombosis of a short segment of the SFA around the fracture site



Figure 4: Post saphenous vein grafting with no evidence of leakage and good pulsatile flow

or open internal fixation surgery for femur fracture, iatrogenic vascular injuries can occur due to various reasons (2). These include faulty screw-hole drilling or when a longer than needed screw is used, impacting either the profunda femoris artery or the SFA (2). Thrombosis to femoral vessels following a midshaft femur fixation is well described in literature as a rare and uncommon complication.(1) In an open reduction and internal fixation, the surgical approach is through the lateral thigh to the fracture site. The femoral vessels are not exposed and identified on the deep medial aspect of the thigh.

Faulty patient positioning or excessive traction applied while on the traction table may also impact the SFA by many mechanisms. This may result in compression of the soft tissue of the proximal and medial thigh between the tight space of the perineum and femur. In addition, the excessive traction as in this case may increase the risk of a vascular injury by limiting the movement of the vascular axis.

In this report, delayed treatment and lack of ambulation due to patient factors could have been a contributing factor to the development of the underlying thrombosis. Fibrosis and callus surrounding the fracture site may have impeded the blood flow of SFA and further reduction attempts likely caused intimal injury and led to worsening of the thrombosis. Another confounding factor is that excessive traction possibly caused intimal damage or spasm to the vessel, leading to a newly formed limb threatening thrombosis.

Issues to be highlighted in this report are implant selection, reduction method and surgical technique. These are important factors to consider in view of the many adverse circumstances in this case which included the fact that the patient presented late, had underlying osteoporosis and was also elderly. Stabilization with open reduction and interlocking nail after a short interval of traction was an accurate choice as described in a previous literature by Jan WF et al (5). Secondly, meticulous dissection during open reduction due to the presence of callus and fibrous tissue should be the utmost priority. Thirdly, shortening of the femur during open reduction could have reduced the risk of vascular injury as it avoids, stretching and kinking of the vessels and relaxes the vessel's musculature.

Despite the presence of pulses from Doppler Ultrasonography and good collateral flow from CT angiogram, the decision to explore and revascularize was made to avoid ischemic contracture as well as ischemic pain once patient commenced ambulation and to avoid the risk of late pseudoaneurysm formation. In this case, due to quick decisive action by the treating surgeon, the loss of a lower limb was avoided.

CONCLUSION

In conclusion, the outcome could have differed if shortening of the femur at fracture site was performed during the initial fixation. Meticulous care and handling of the surrounding soft tissue during reduction is of utmost importance. Vigilant post-operative evaluation of the distal circulation should be performed to detect any possible vascular injuries early.

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