

Case Report: An Iatrogenic Bleeding of the Deep Femoral Artery

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INTRODUCTION

Vascular complications in orthopedic surgery seldomly occur. Parvizi *et al*^[1] reported an 0,1% vascular incidence rate of 13517 patients undergoing total joint arthroplasty. Orthopaedic operations most commonly associated with vascular complications are knee arthroplasty, hip arthroplasty, spinal surgery, and knee arthroscopy. The popliteal artery is most often involved, followed by tibial, superficial femoral, iliac, common and profunda femoral arteries^[2]. This case report describes the management of a massive bleeding of the deep femoral artery during an elective orthopaedic procedure.

CASE REPORT

A 79-year-old male underwent an elective operation as two broken screws of an external fixator required removal (Figure 1). The external fixator was previously placed around the right knee joint as an arthrodesis following loosening, revision and infection of total knee arthroplasty.

The distal tibia screw was successfully removed. Subsequently, the proximally placed femur screw was palpable. However, its exact location was determined by a mobile X-ray system demonstrating that the screw was deeply located posteriorly to the first femoral cortex. A regular pair of pliers was unsuitable for removal so the surgeon proceeded to using a trephine drill that was placed around the end of the broken screw. Depth of the drilling direction towards the second cortex was determined by X-ray guidance. When the screw was removed, a profuse arterial bleeding became evident. A consultant vascular surgeon enlarged the incision at the anterolateral side of the femur but the bleeding artery could not be located. A

ABSTRACT

Vascular complications in orthopedic surgery are rare but potentially life threatening. A 79-year-old man sustained an iatrogenic bleeding of the deep femoral artery during removal of a broken femoral screw of an external fixator. Removal of a portion of the femur eventually allowed vascular control of the bleeding site. This case report discusses potential risk factors of vascular complications during orthopedic surgery.

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second incision at the medial aspect of the leg also did not allow for identification of the bleeding site. As the patient went into shock, the two incisions were connected and the quadriceps muscles were cut. The profunda branch of the femoral artery is situated dorsal to the femur and was therefore still inaccessible. An attempt to clip the vessel also failed. At their wit's end, the surgeons decided to cut out a 5 cm segment of femur using an oscillating saw. The bleeding artery was now identified as a branch of the profunda branch of the femoral artery. The arterial defect was closed using 5.0 Prolene followed by application of floseal[®] (a thrombin-gelatin hemostatic matrix). The segment of the femoral bone was repositioned and fixed using a plate and screws (Figure 2). Total blood loss approximated 10 L that was compensated using 10 units of packed cells. Postoperative, pulsations of pedal arteries were present. Patient was discharged after 30 days in an acceptable clinical condition.

Unfortunately however, the patient required additional treatment as the plate that was used for bone fixation started to loosen. The plate was therefore replaced with a long T2 femoral nail that ended just distal to the knee joint. Five months later, this nail was replaced by an even longer nail as consolidation of the bone interposition had not yet occurred whereas the arthrodesis of the knee joint was incomplete. An osteotomy of the tibia allowed intramedullary fitting of the new femoral nail. A bacterial culture demonstrated growth of *Enterobacter cloacae* that was treated with a one-month course of oral antibiotics. One year later, the femoral nail was removed as the distal locking screws caused pain. At this stage, all fractures had healed and the knee arthrodesis was complete (Figure 3). The patient currently mobilizes with the aid of a walking stick.

DISCUSSION

Iatrogenic traumatic lesions of vessels are classified as bleeding, ischemia, emboli, pseudoaneurysm, arteriovenous fistula, thrombosis or swelling^[3]. The majority of arterial injuries are due to arterial thrombosis or occlusion (78%) whereas only 11% is a result from a vessel laceration or avulsion. Pseudoaneurysms occur in 11% of the cases. Furthermore, just 4% of the arterial injuries are located at the level of the deep femoral artery^[4]. In the current case, a major bleeding of the deep femoral artery resulted following drilling. Most iatrogenic vascular complications in orthopedic surgery are associated with scar tissue and changed anatomic patterns and occur during secondary surgery. Another risk factor is the presence of atherosclerotic disease^[3,4].

The present patient had also undergone previous surgery in the affected area. Furthermore, it is possible that the initial placement of the most proximal femoral screw had caused a pseudoaneurysm of the deep femoral artery. Subsequent removal of the broken screw may have provoked rupture of this iatrogenic pseudoaneurysm. A pseudoaneurysm can present itself clearly as a pulsating mass in a palpable artery, but it is less obvious in deep arteries^[3]. Iatrogenic pseudoaneurysms of the femoral artery are rare and painless in most cases which contributes to late detection^[5]. A CT scan, a preferential imaging modality of such aneurysms, however was not performed prior to surgery. While exerting pressure on the hole in the anterolateral cortex of the femur, no bleeding occurred at the posterior side of the femur. This finding suggests that a portion of the vascular wall (or aneurysm) was hit by the trephine drill.

Endovascular coiling is a valid option for controlling hemorrhage^[6]. However, this technique was not preferred by the vascular surgeon considering the massive nature of the bleeding and the progressive deteriorating condition of the patient. Another option was to explore



Figure 2 Post-operative X-ray of the fixed femoral bone segment.



Figure 1 Long leg axis X-ray showing two broken screws from an external fixator, positioned in the tibia and femur.

and block the femoral artery at the level of the common femoral artery in the groin in order to try and stabilize the patient's condition. However, unimpeded collaterals would have resulted in ongoing blood loss. As a result, the authors argued that a double osteotomy of the femur allowed for a secure method to identify the source of the bleeding. Nevertheless, manual compression of the groin region should always be used as a supportive measure to reduce blood loss while exploring the bleeding site.

In a less demanding and urgent situation, a single osteotomy would have provided the patient with a better chance of fracture healing afterwards. Moreover, the plate that was used to fixate the osseous segment was retrospectively judged too short. A larger plate would have decreased the risk of loosening but also potentially would have increased blood loss in the already instable patient. The infection that



Figure 3 Consolidation of the bone segment twenty months after the complication.

developed during follow-up was probably nosocomial associated with repeated surgery.

CONCLUSION

The present case report illustrates that vascular injuries of the

femoral artery may be life-threatening during orthopedic surgery. If a iatrogenic vascular injury does occur, obtaining surgical support by a vascular surgeon is the number one priority. Temporarily removing a portion of a bone segment can be life saving as this approach may allow for the identification of the bleeding site.

CONFLICT OF INTERESTS

There are no conflicts of interest with regard to the present study.

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