Unusual Presentation of a Profunda Femoris Pseudoaneurysm following Osteosynthesis of Proximal Femur Fracture

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Abstract

Profunda femoris artery injury following osteosynthesis of the proximal femur fracture is a rare complication and is usually caused by iatrogenic trauma or rarely due to bony spikes. Presentation can be delayed because of nonspecific features such as pain, swelling, anemia, fever, and hematoma. We report a case of posttraumatic profunda femoris aneurysm which presented more than a year after surgery with near-complete resorption of proximal femur and failure of implant requiring evacuation of huge layered thrombus, ligation of profunda femoris, and reconstruction of proximal femur with tumor megaprosthesis. Literature has not described a similar case.

Keywords: Megaprosthesis, profunda femoris, pseudoaneurysm, trochanteric fracture

INTRODUCTION

Injury to the common femoral artery or one of its branches is a rare but recognized complication following proximal femoral fracture (occurring in up to 0.21% of cases).[1] Clinical signs of arterial injury may occur at the time of trauma with acute hemorrhage or present later following the development of a pseudoaneurysm. The injury that penetrates the arterial wall may result in the formation of a pulsatile hematoma and a pseudoaneurysm.[2-4] Pseudoaneurysm of profunda femoris artery after hip fracture fixation was first noted in 1964 and has been reported sporadically since then.[5-9] Literature suggests that such pseudoaneurysms could clinically present following fracture fixation from anywhere within a week to up to 14 years.[10] It could present as an indolent thigh swelling in an anemic patient with distal pressure effects mimicking a soft tissue sarcoma to a painful pulsatile thigh mass, with an audible bruit classical of a pseudoaneurysm. The few available case reports in literature have described similar spectrum of presentation within 4–12 weeks of the injury. We present a case of this uncommon complication managed 18 months after internal fixation of an intertrochanteric fracture, which presented with resorption of proximal femur and failure of implant.

CASE REPORT

A 70-year-old man presented to the emergency department of our hospital with left hip pain and an inability to weight bear for 4 weeks. He had sustained proximal femur fracture 2 years back in a traffic accident and underwent fracture fixation; postoperatively, he was ambulant on walker for 5 months following which he underwent revision surgery for implant failure when fracture fixation was revised using a dynamic hip screw (DHS). Since then, he remained ambulant on walker and was relatively symptom-free apart from mild swelling in his thigh and leg for 1 year. For the past 6 months, he had gradual increase in pain over the left hip and had restricted mobility. For the last 1 month, he was almost bed-bound and could not put any weight over his left hip when he reported to our hospital. He was obese (body mass index 40) and had type II diabetes on oral hypoglycemic. He underwent bilateral total knee replacement (TKR) surgery in 2009. On examination, his left leg was shortened and externally rotated. There was edema of both lower limbs left more than right. There was...
diffuse nonpulsatile swelling over the left thigh with palpable implant under a well-healed operative scar with no local signs of infection. He had a well-healed scar of TKR over both knees. Distal pulsations were palpable but feeble due to edema. Plain radiograph revealed cut out of barrel plate of the DHS with broken screws and nonunion of trochanteric fracture with resorption of lesser trochanteric segment of the proximal femur. The lag screw was still holding in the head of femur [Figure 1a]. Previous medical records were missing; however, old radiographs revealed that the index surgery done was an internal fixation for posttraumatic intertrochanteric fracture. There was no indication of a pathological fracture [Figure 1b and c]. The revision surgery done 6 months later was for nonunion with failure of osteosynthesis [Figure 1d]. The records did not suggest either a pathological fracture or postoperative infection. Radiographs of second surgery were not available for review. Preoperative blood workup revealed mild anemia (Hb of 10.6 gm%). His white blood cell and differential counts including C-reactive protein were within normal range. Vascular consult was obtained with color Doppler study of both lower limbs which revealed poor venous flow over left lower limb with calf edema and possibility of deep vein thrombosis (DVT). The vascular surgeon ruled out significant DVT and the cause of limb edema was diagnosed to be due to lymphedema. D-dimer assay was asked for, which was raised. With a possibility of acute on chronic DVT, the patient was started on low-molecular-weight heparin and surgery was planned. He was also evaluated by cardiologist and pulmonologist for risk stratification. He had no cardiac comorbidity, and due to his obesity, he had a risk of obstructive sleep apnea, for which noninvasive ventilation was planned if required postoperatively. After discussion with the patient and his family, consent was taken for prosthetic replacement of his left hip using either a long uncemented femoral stem or a proximal femur replacement (megaprosthesi) to be decided depending on available bone stock of proximal femur. On acetabular side, in view of his age and dislocation risks, we planned to use a dual-mobility cup or a simple bipolar shell.

Surgery was performed on the 3rd day following his admission. Due to obesity, only spinal anesthesia (SA) with 3 ml of 0.5% bupivacaine was given and epidural catheter could not be placed for prolonging anesthesia or postoperative analgesia. He was placed in the right lateral position. Hip was exposed with a posterolateral approach and the barrel plate was removed. On approaching the hip, we encountered a soft multilayered yellowish-brown cauliflower-like tissue, which was covered by a thickened capsule. The initial impression was a soft tissue tumor or a layered thrombus [Figure 2]. The remaining proximal femoral bone was extremely porotic and almost completely resorbed. We removed the femoral head with the lag screw to reach the acetabulum. On removing almost bowl full of suspicious tissue, we encountered profuse bleeding, we applied local compression with packs, and we summoned for the vascular surgeon. He diagnosed it to be a large layered thrombus formed within the pseudocapsule of a profunda femoris pseudoaneurysm. We removed a 15 cm × 20 cm large layered thrombus [Figure 3]. It was difficult to reach the profunda femoris from the posterolateral approach with the patient in lateral position, to facilitate the exposure 2 cm of the femoral stump was excised, and the opening into the pseudoaneurysm from the profunda femoris was identified and clamped. We could also identify the distal opening of the aneurysm, which had a good back bleed. The profunda femoris was ligated after establishing patency of the superficial femoral artery (SFA) using a portable handheld Doppler wrapped in a sterile cover. The lesser trochanter segment of the proximal femur was completely resorbed and the greater trochanter remained with a thin shell of bone. The end of the femoral stump, which was engulfed by the pseudotumor, was very porotic and brittle. We excised 4 cm of the stump to reach healthy bone and reconstructed the proximal femur with a

Figure 1: Plain radiograph showing (a) failed dynamic hip screw with trochanteric nonunion and resorption of proximal femur, (b) displaced intertrochanteric fracture done at the time of initial injury, (c) well-fixed intertrochanteric fracture using dynamic hip screw and a long screw to fix lesser trochanteric fragment at the time of index surgery, and (d) revision of trochanteric fracture fixation for nonunion

Figure 2: Operative photograph showing yellowish-layered tissue, which was the thrombus
megaprosthesis (Stryker; GMRS). With gradual wearing off of the SA, with patient in lateral position and with compromised pulmonary function, we wanted to avoid general anesthesia, so we abandoned the plan of using a dual-mobility cup which would have required additional tissue dissection to expose the acetabulum and additional blood loss from acetabular reaming. We used a bipolar cup assembly reduced the hip and closed in layers under suction drain. In immediate postoperative period, computed tomography (CT) angiography was performed demonstrating ligation of profunda femoris. Plain radiograph taken postoperative showed reconstruction of left hip with tumor megaprosthesis in acceptable position and hip was congruous [Figure 4]. The specimen was sent for histopathological evaluation which confirms the diagnosis of pseudoaneurysm. The patient underwent delayed rehabilitation with 2–3 weeks of movements in bed followed by supported ambulation on walker and is doing well.

**Discussion**

Pseudoaneurysm following hip surgery is a rare complication. While a superficial pseudoaneurysm may present as a palpable pulsatile mass, a deep pseudoaneurysm may only be detected with high degree of clinical suspicion and further imaging. Previous cases of pseudoaneurysm have been reported following both fractures of the neck of the femur and subsequent internal fixation, for example, by DHS fixation. It may be more common if the lesser trochanter is displaced. There are literature reports of delayed presentation of the profunda femoris aneurysm, following proximal femur fracture fixation managed with open or endovascular ligation of the feeding artery. In our case, it is not clear as to when the pseudoaneurysm initially occurred. However, few old radiographs indicate that the culprit may be a long screw used to fix the lesser trochanter [Figure 1c]. Previous papers have identified some technical risk factors specific to DHS fixation. It has been suggested that proper placement of the retractor, using a shorter drill or drill guard, accurate screw length, and a shorter side-plate DHS should be used to reduce the risk of iatrogenic pseudoaneurysm formation. In our case, the presentation was delayed more than 18 months after fracture fixation. Probably, it was due to a small rent in the vessel which leads to gradual formation of the aneurysm with accompanying large layered thrombus along with pseudocapsule, which kept eroding and resorbing the surrounding bone and created pressure effects in the form of local and distal limb swelling. When we carefully reviewed the preoperative digital plain radiographs available later, we could delineate a soft tissue mass, which must have eroded the proximal femur [Figure 1a]. The patient only presented when the implant failed with near-total resorption of proximal femur and cut out of barrel plate of the DHS. Similar presentation has not been described in the literature. Due to extremely rare occurrence, the diagnosis was missed preoperatively. Causes of resorption of proximal femur, which were considered, were pathological fracture and low-grade infection. Both were ruled out based on history, clinical examination, and available investigations. With bilateral limb edema, history of repeated surgery, a period of recumbency, and palpable distal pulses, color Doppler study of the lower limbs was asked to rule out DVT; hence, the radiologist did not evaluate the arterial system in detail, and the pseudoaneurysm was missed. The long-standing pseudoaneurysm led to formation of a large layered thrombus, which gradually eroded the proximal femur. The increased vascularity of the region might have also contributed to bony resorption, which led to eventual failure of implant when the patient presented to us. Additional radiological preoperative investigations such as CT angiography would have clinched the diagnosis. If the pseudoaneurysm and the associated huge thrombus were detected preoperatively, it could have been subjected to endovascular therapy following which we would have approached the thrombus, removed it carefully, and proceeded
with proximal femur reconstruction, instead of being caught unaware.

**Conclusion**
A pseudoaneurysm is a rare complication of proximal femur fracture fixation. It may present early or late, even months to years after the surgery. Due to the rarity of this complication and the fact that it could have such a delayed presentation, it may be easily missed or diagnosed late, as in our case. When a patient of proximal femur fracture who underwent fracture fixation presents with thigh swelling, anemia, delayed fracture healing with early resorption of bone and distal pressure effects, pseudoaneurysm of profunda femoris should be a part of differential diagnosis, to prevent such disastrous late complication requiring limb salvage with tumor megaprosthesis. In these cases, a multidisciplinary approach involving orthopedic, vascular, and interventional radiology teams is needed to arrive at a correct diagnosis and initiate prompt and appropriate treatment.

**Declaration of patient consent**
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**
There are no conflicts of interest.

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