

Iatrogenic Pseudo-aneurysm of Profunda Femoris Artery Following Fixation of Intertrochanteric Femur Fracture – A Case Report and Review of Literature

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ABSTRACT

The Profunda Femoris is a common site for arterial pseudo-aneurysms and these have been described in literature following fractures as well as orthopaedic procedures of the femur and hip region. These are an uncommon complication and a high index of suspicion is required for correct diagnosis and prompt management. We present a case of pseudo-aneurysm of the Profunda Femoris in an operated case of Intertrochanteric femur fracture with acute presentation. The case was managed successfully by angiographic coil embolization.

Keywords: Angiographic coil embolization, Angiography, Anaemia

CASE REPORT

A 55-year-old female presented with a right-sided intertrochanteric femur fracture following a fall while walking. The patient was posted for fixation with dynamic hip screw and barrel plate [Table/Fig-1] on third day following trauma. While drilling hole for the second shaft screw, there was an inadvertent over-drilling of the medial cortex followed by immediate sudden bleeding from the medial soft tissues. Packing was done with sterile mops and the bleeding stopped spontaneously. Further procedure was uneventful. Postoperative vitals were stable. On day four postoperatively, sudden bleeding along suture line was noted with appearance of thigh swelling and pain. Blood tests revealed severe anaemia with a fall in haemoglobin from 10.2mg/dl preoperatively to 5.9mg/dl on the fourth Postoperative day. Local ultrasonography was performed which revealed a pseudo-aneurysm arising from Profunda Femoris Artery (PFA). Angiography confirmed the diagnosis of pseudo-aneurysm and the PFA was embolized using 2 coil wires in the same setting [Table/Fig-2]. The patient was given three pints of packed cells and closely monitored. At three weeks the patient showed no signs of active bleeding or distal vascular deficit with eventual uneventful recovery.

DISCUSSION

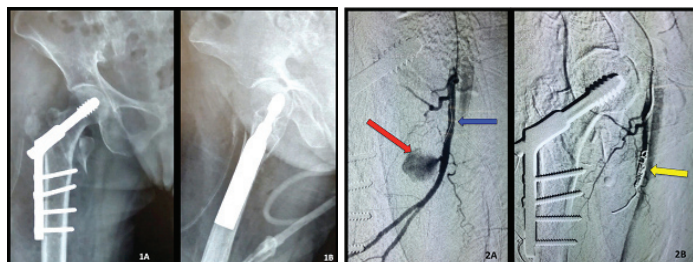
Occurrence of pseudo-aneurysms of the proximal femoral artery after orthopaedic procedures in the peri-trochanteric region and the proximal femur is rarely described in literature. Many such cases might be sub-clinical and therefore might be missed. Diagnosis of

this condition following either trauma or orthopaedic procedures needs high degree of clinical suspicion as well as sound awareness about the condition.

The triad of swelling, bleeding from the incision site and anaemia or decreasing trend of haemoglobin has been classically described to be associated with the occurrence of pseudo-aneurysms especially of the profunda femoris and its branches [1]. Our patient showed postoperative soakage and high operative site daily drain output pointing clinically towards the possibility of a pseudo-aneurysm.

The location of profunda femoris is such that it is protected by the vastus medialis from external trauma. It is vulnerable to injury in the subtrochanteric region [2]. Pseudo-aneurysms have been described by various authors to have occurred following blunt and penetrating trauma to the thigh and also following various orthopaedic procedures. Various procedures described in literature associated with the occurrence of pseudo-aneurysm are external fixation of femur, core decompression and internal fixation of the proximal femoral fractures. The mechanism of occurrence of pseudo-aneurysm is usually due to a spike of fractured bone, protruding cortical screw tip, Gamma-nail or over-penetration by a drill-bit leading to injury and disruption of the arterial wall [3]. Due to the force of the arterial blood flow the tissues of the damaged arteries get dissected and a sac or pseudo-aneurysm gets formed which has a luminal connection to the artery. This sac is surrounded by soft tissue structures present around the vessel or more often the media or adventitial layer of the vessel itself [4].

Pseudo-aneurysm may present early as in our case but even delayed presentation up to several weeks or years has been described. Chong C et al., described the occurrence of pseudo-aneurysm following traumatic proximal femur fracture and external fixation of femur which was managed by embolization and wire coiling of the false aneurysm [1]. A similar case was reported by Canbaz S et al., but this case was managed by ligation and excision of the aneurysmal sac via a medial approach [5]. Yang KH has reported a case of pseudo-aneurysm of the superficial femoral artery following closed nailing of a femur fracture possibly due to excess adduction and internal rotation of the limb [6]. Smejkal K et al., have described another case of pseudo-aneurysm of the profunda femoris following initial external fixation and subsequent un-reamed nailing of a femur fracture that was eventually managed by embolization [3]. Occurrence of pseudo-aneurysms has also



[Table/Fig-1a,b]: Four part Intertrochanteric femur fracture fixed with 135 DHS and fixed angle barrel plate. 1a: Postoperative AP view. 1b: Postoperative lateral view.

[Table/Fig-2]: (a) Pre-embolization image showing a pseudoaneurysm arising from the Profunda Femoris artery. (Red arrow showing the Pseudoaneurysm & Blue arrow showing the Profunda Femoris) (b) Post-embolization image showing embolization of pseudoaneurysm using a coil (Yellow arrow showing the coil). The bleeding from pseudoaneurysm has stopped.

been reported following core decompression of femoral head in separate instances by Lazarides MK et al., and Unay K et al., [7,8]. A case of pseudo-aneurysm of the profunda femoris has also been reported after total hip arthroplasty by Nozawa M et al., [9]. Patelis N, Cowley A, Entwistle JJ and Chandrasen J have individually reported the occurrence of pseudo-aneurysms after DHS fixation in cases of inter-trochanteric femur fracture but each due to different causes [10-13]. A strong clinical index of suspicion supported by appropriate radiological imaging such as ultrasonography, computed tomography (CT) and angiography plays a major role in reaching a diagnosis. Experience and knowledge regarding treatment of pseudo-aneurysms of PFA is still limited. Patients with asymptomatic small (2-3 cm) pseudo-aneurysms may be observed as many will thrombose and obliterate spontaneously [5]. Treatment options for larger and symptomatic ones includes open surgical repair, ultrasound-guided compression, ultrasound-guided thrombin injection and endovascular repair using coil embolization or stent- graft insertion. The standard approach for most procedures of profunda femoris reconstruction is the medial approach to whole trunk. Alternatively the lateral approach to the profunda femoris as described by Naraynsingh V et al., may also be used with the advantage of better exposure up to the origin of the vessel [14]. These approaches are used for open surgical

repair and/or ligation of the pseudo-aneurysm. Recent avenues of treatment of pseudo-aneurysm include embolization with coils or the use of endovascular stents. However selective embolization has been increasingly considered as the most effective treatment for such cases. The profunda femoris artery usually has a well-developed collateral supply, therefore, it is pertinent to embolize both proximal and distal to the pseudo-aneurysm to completely exclude it from the circulation by preventing backflow from the collateral circulation.

[Table/Fig-3] gives a comprehensive overview of cases reported in literature of pseudo-aneurysms of the profunda femoris artery related to orthopaedic procedures.

CONCLUSION

Pseudo-aneurysms of the Profunda femoris artery following orthopaedic procedures are a rare occurrence. It is important to note that these patients usually present late and the presence of a pulsatile mass and distal ischemia is not always present. A high index of suspicion is required to correctly diagnose the condition. Ultrasonographic evaluation will usually establish diagnosis and an angiographic intervention should be considered early to reduce the morbidity associated with this condition.

Sr. No.	Author	No. of cases	Initial diagnosis	Procedure performed	Cause of aneurysm	No. of days post-op/post-trauma	Presentation of pseudo-aneurysm	Treatment
1.	Nozawa M [9]	1	Osteoarthritis Hip	Total Hip Arthroplasty	Bone Spur/ Acetabular reaming	1 month	Thigh swelling and massive bleeding	Angiographic embolization using Tornado coils
2.	Patelis N [10]	1 case	Intertrochanteric femur fracture	Dynamic hip screw fixation	Protruding shaft screw tip	2 months	Slow hemorrhage with gradually growing thigh swelling	Angiographic coil embolization
3.	Hanna GB [2]	2 case	A) Intertrochanteric femur fracture	Pugh nail	-----	1 week	Swelling with active bleeding	Angiographic coil embolization
			B) Open comminuted femur fracture	AO intramedullary nail	Drill or Lower proximal locking screw	2 weeks	Pulsatile swelling with audible bruit	Repair of the arterial defect
4.	Cowley A [11]	1 case	Intertrochanteric femur fracture	Dynamic hip screw fixation	Displaced fragment of lesser trochanter	6 weeks	Drop in hemoglobin and bleeding	Angiographic coil embolization
5.	Canbaz S [5]	1 case	Open femur fracture	External fixation	Fracture fragment	---	Thigh swelling, hemorrhage and fall in Hb	Surgical ligation of profunda femoris and excision of sac
6.	Entwistle JJ [12]	2 cases	A) Intertrochanteric femur fracture	Dynamic Hip Screw fixation	Drill bit/ Shaft screw	24 hours	Painful and swollen Thigh	Angiographic coil embolization
			B) Intertrochanteric femur fracture	Dynamic Hip Screw fixation	Drill bit / Shaft screw	Day 5	Thigh swelling with fall in Hemoglobin	Angiographic coil embolization
7.	Chong KC [1]	2 cases	A) Open femur fracture	External fixation with fasciotomy	Not specified	2 weeks	Tense and thigh swelling with fresh bleeding and fall in Hbhypotension(unsafe)	Angiographic embolization
			B) Closed comminuted femur fracture	Intramedullary nailing	Not specified	Day 13	Thigh swelling with fresh bleeding and fall in Hb	Angiographic embolization
8.	Unay K et al., [8]	2 cases	A) Avascular necrosis	Core decompression	Deep insertion of lancet	Day 4	Thigh swelling with fresh bleeding and rapid fall in Hb	Angiographic embolization with coil
			B) Subtrochanteric Femur fracture	Closed Gamma nailing	Bone spike at fracture site	Day 7	Profuse bleeding with thigh swelling and fall in Hb	Angiographic embolization with N-butyl-2-cyanoacrylate
9.	Smejkal K et al., [3]	1 case	Open Femurfracture	External fixation	Bone spike/ Fixator pin	6 weeks	Long standing thigh swelling	Angiographic embolization
10.	Chandrasen J [13]	1 case	Intertrochanteric femur fracture	DHS fixation	Not specified	Day 9	Pulsatile Swelling and fall in Hb	Angiographic embolization
11.	Dillon JP [15]	1 case	Intertrochanteric femur fracture	DHS fixation	Not specified	7 months	Pulsatile thigh swelling and pain	Open surgical repair (failed embolization)

[Table/Fig-3]: Review of Iatrogenic Pseudo-aneurysms of Profunda Femoris associated with Orthopaedic procedures.

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