



Case Report

Pseudo-aneurysm of the lateral circumflex femoral artery after femoral neck fracture – A case report

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ABSTRACT

Only one case of injury of the lateral circumflex femoral artery secondary to a femoral neck fracture has been reported. We present a second case of this rare injury.

A 59-year-old gentleman fell from an embankment, from approximately two meters in height, while landscaping and landed onto his left side. He suffered immediate pain in his left hip and was unable to weight bear. X-ray demonstrated a Garden II left femoral neck fracture. Within 24 of the injury, he underwent percutaneous internal fixation of his left hip using partially threaded cannulated screws.

Two days post operatively, the patient described pain in his groin. X-ray was satisfactory and the pain was attributed to the fracture and subsequent surgery. However, this pain persisted, worsened and warranted further investigation. A doppler ultrasound, followed by a CT angiogram, confirmed a pseudoaneurysm of the lateral circumflex femoral artery which was treated with embolisation by the vascular surgery service. This relieved the patient's discomfort immediately.

This is the second reported case of pseudo-aneurysm of the lateral circumflex femoral artery secondary to a femoral neck fracture.

Introduction

Vascular injury as a result of a hip fracture and subsequent internal fixation is a rare event [1]. Vascular injury during the course of internal fixation in proximal femoral fractures can be potentially limb and life threatening [2[1]].

It is of utmost importance to recognize a vascular injury if one is present. A careful history and physical examination pre- and post-operatively is critical to help recognize this rare event. Physical signs of a vascular injury can be negative despite having a vascular injury and therefore having a low threshold for diagnostic imaging is important if there is a suspicion of such an injury being present. This is as important post-operatively as pre-operatively. This case report highlights the importance of taking a thorough history from the patient post-operatively and the importance of acting on any suspicion of a vascular injury with further imaging.

The blood supply of the femoral neck is from the profunda femoris artery, the obturator artery and the superior and inferior gluteal arteries [3]. The medial femoral circumflex artery is the major blood supply to the adult femoral head a major contributor to the extracapsular ring/anastomosis. The lateral circumflex femoral artery (LCFA) has a less significant blood supply to the adult femoral head but is also a major contributor to the extracapsular ring/anastomosis (Fig. 1). Kakarala et al. [1] described the only known LCFA injury secondary to an undisplaced hip fracture. The region of injury in their case report and this case report is at the infero-medial aspect of the femoral neck [1].

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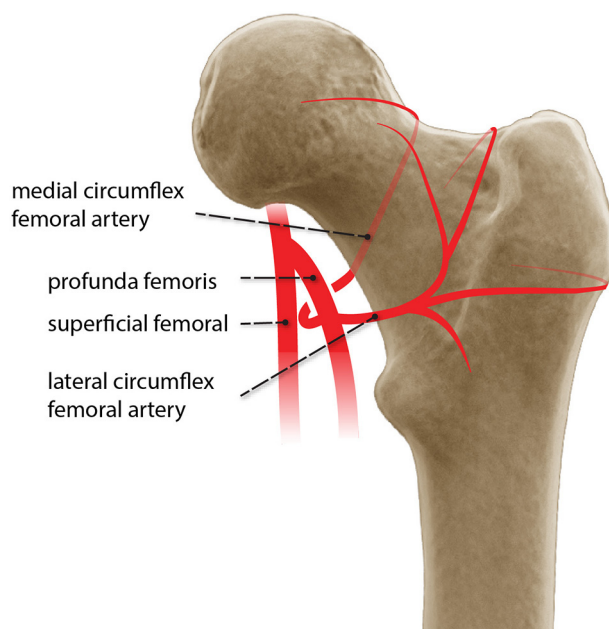


Fig. 1. Illustration of the anatomy of the femoral neck including the lateral circumflex femoral artery which was damaged at the time of intracapsular neck fracture.

A pseudo-aneurysm of the LCFA secondary to a femoral neck fracture has been reported three times in the literature, with iatrogenic causes identified in two of those cases [4–7]. We report a second case of pseudo-aneurysm of the LCFA secondary to a femoral neck fracture.

Case presentation

A 59-year-old gentleman fell from an embankment, approximately 2 m in height, while landscaping and landed onto his left side. He was brought to the hospital by ambulance and diagnosed with a Garden Stage II femoral neck fracture [8] (Fig. 2 A and B).

He has a background history of non-insulin dependant diabetes mellitus, increased body mass index, obstructive sleep apnoea and a myocardial infarction treated medically in 1992.

On admission to hospital, he was neurovascularly intact. He was managed according to the NICE guidelines for hip fracture management [9]. His pre-operative Haemoglobin was 13.2 g/dl. The patient underwent percutaneous internal fixation within 24 h of admission to the hospital.

Intra-operatively, the patient was carefully placed on a traction table. The fracture was undisplaced and therefore percutaneous fixation was performed using two partially threaded cannulated stainless steel 8 mm screws and one 6.5 mm screw (ASNIS III, Stryker, Michigan, United States of America). Of note, once the guidewire entered the lateral femoral cortex, it stayed within bone throughout the procedure, as each wire was only inserted once.

Post-operatively, the patient described continued pain of his left hip. Clinically, no abnormality was detected in his hip and thigh

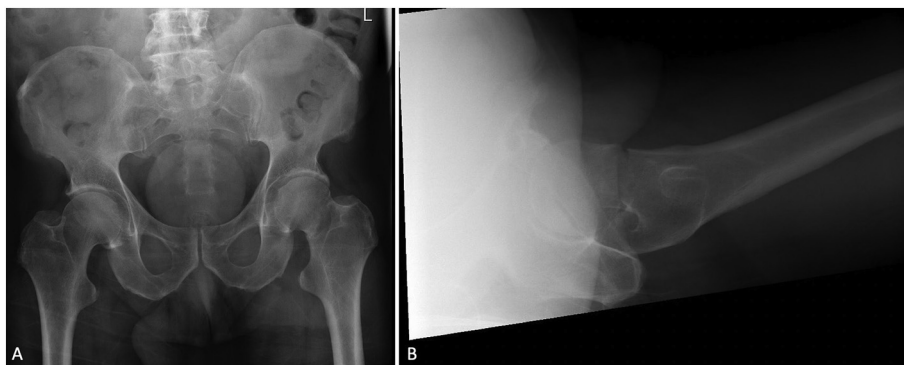


Fig. 2. A - Pre-operative antero-posterior pelvis x-ray demonstrating a left Garden II intracapsular hip fracture. B - A horizontal beam lateral x-ray demonstrating a left Garden II intracapsular hip fracture.

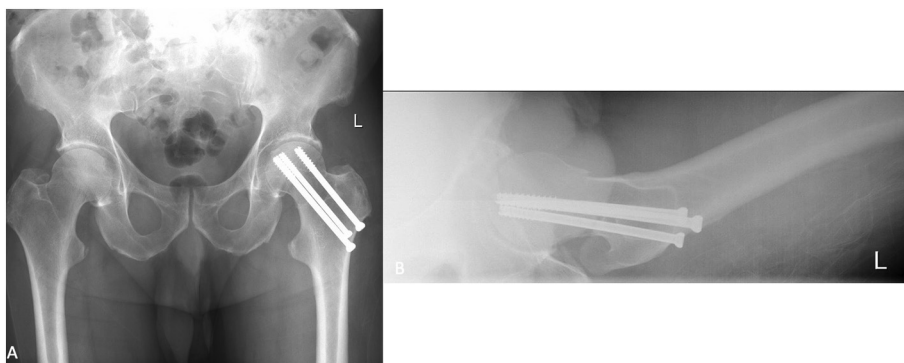


Fig. 3. A - Post-operative antero-posterior pelvis x-ray demonstrating internal fixation of an intracapsular hip fracture with partially threaded cannulated screws.

B - Post-operative lateral beam x-ray demonstrating internal fixation of an intracapsular hip fracture with partially threaded cannulated screws.

region and he was neurovascularly intact. Departmental x-rays were performed which showed satisfactory position of the fracture and screws (Figs. 3 A and B). Despite analgesia, his pain did not dissipate over the following days. One week post operatively, he complained of increasing severe left hip pain radiating to his groin. Routine bloods were taken, and he was re-imaged. His haemoglobin was 12.0 g/dl on day two post operatively and was now 10.2 g/dl. Although he was neurovascularly intact and clinically his thigh was not enlarged compared to the contralateral limb, the persistent pain and the drop in haemoglobin raised a suspicion of bleeding.

Further imaging was performed to look for any local bleeding at the site of injury. A duplex ultrasound scan diagnosed a pseudoaneurysm measuring 6.1 cm, which was confirmed with CT angiography (Fig. 4 A and B). The vascular surgery department were consulted and performed embolisation of the LCFA using an intravascular coil (Fig. 5 A and B).

The patient's pain completely resolved almost immediately after embolisation. He has done extremely well post operatively. 5 years since his injury he is asymptomatic, continues to work in landscaping and radiographically he has no evidence of avascular necrosis of the femoral head.

Discussion

The incidence of serious vascular injury at the time of hip fracture is extremely rare. It is quoted to occur in only 0.21% of proximal femoral fractures [1]. Although there are many cases of vascular injury in proximal femoral fractures reported, very few are of the LCFA [4]. Only three cases after femoral neck fracture have reported a pseudoaneurysm of the LCFA. Only one case has reported the pseudoaneurysm to be attributable to the fracture [4].

The first case of a pseudoaneurysm in the LCFA secondary to the femoral neck fracture was reported in 2006 [5]. This case is similar to our own in presentation. An elderly male of 75 years suffered a low injury fall and a neck of femur fracture treated with cannulated screws. Pre, peri and in the immediate post-operative period this patient did well. In fact, this patient was discharged on day six, only to return to hospital one week later. He presented with a swollen thigh and fainting episodes. His Hb had dropped to 7.3 g/dl from 13.2 g/dl pre-operatively. The diagnosis was made, and he was embolized using an intravascular coil.

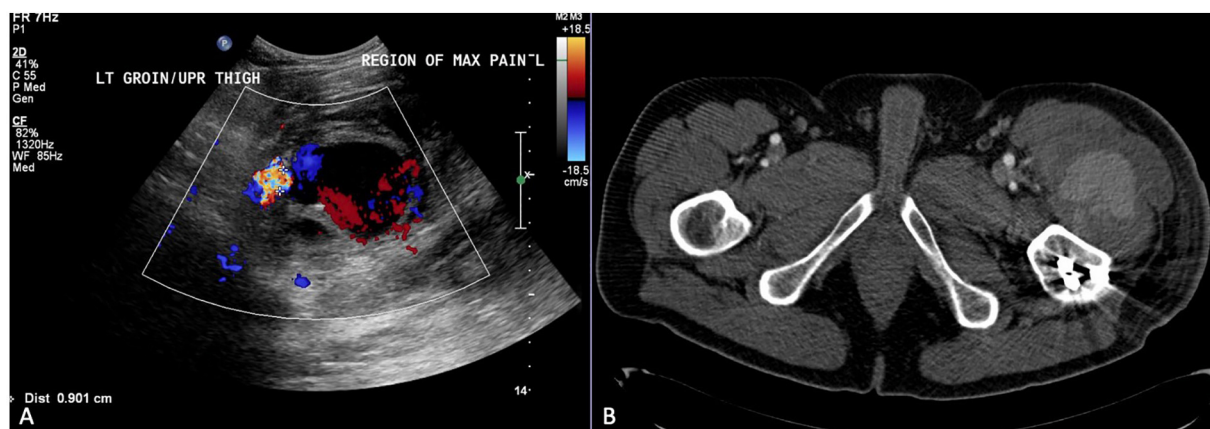


Fig. 4. A - A doppler ultrasound still image which demonstrates a pseudoaneurysm of the lateral circumflex femoral artery.

B - CT Angiogram which demonstrates a pseudoaneurysm of the lateral circumflex femoral artery.

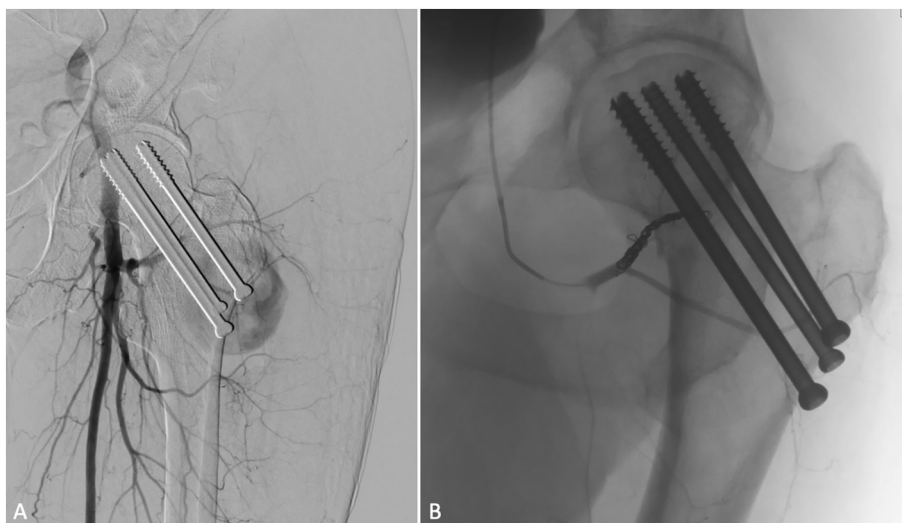


Fig. 5. A - Pre-embolisation image under fluoroscopy of the lateral circumflex femoral artery.
B - Post-embolisation image under fluoroscopy of the lateral circumflex femoral artery after coiled embolisation.

The second and third cases were reported as iatrogenic injury to the LCFA [6,7]. In the second case an 86-year-old woman suffered an undisplaced subcapital pseudo-aneurysm and the pre-*peri* and immediate post-operative periods went successfully without complication. However, the patient collapsed and was unable to lift her leg on day nine post operatively. Immediate work up was done for a pulmonary embolus and deep vein thrombosis. A pseudoaneurysm due to injury to the LCFA was identified and treated with embolization using three vascular occlusion coils. Due to the site of the bleeding and the fact that the sharp tip of a guidewire had been used as a 'version' wire during surgery, it was suspected that this injury was iatrogenic in nature.

The third case involved a 70-year-old woman who had an unwitnessed fall at home. Again, the pre, *peri* and immediate post-operative period went well. This patient was discharged at day six post-operatively. On the eighth day post-operatively, this patient re-presented to the hospital due to excruciating pain. She was subsequently diagnosed with anterior thigh compartment syndrome secondary to a pseudoaneurysm in the LCFA and underwent haematoma evacuation and open ligation of the vessel. This patient did well after this event.

We have described the second case of pseudoaneurysm of the LFCA after femoral neck fracture in the literature. Unfortunately, the classic signs of vascular injury such as pulse deficit, bruit, arterial bleeding and expanding or pulsatile haematoma may be absent despite significant injury to the vessel wall [4]. A high index of suspicion for vascular injury is warranted when post-operative pain is not explained, worsening and there is a drop in haemoglobin. A standard pain score chart for all post-operative hip fracture patients has been recommended and we believe it should be routinely performed and any outlier should be reviewed by a senior physician to identify a cause [6]. A low threshold for higher order imaging is required when a pseudoaneurysm is suspected with CT angiogram being the definitive imaging of arterial trauma [10].

Conclusions

We have described the second case of a pseudoaneurysm of the LCFA secondary to hip fracture in the literature. Surgeons need to have a cautious approach to the patient's post-operative rehabilitation and discharge. It is imperative for the surgeon to clinically assess the patient post-operatively and have a low threshold to investigate any abnormal symptoms or signs. Surgeons and physicians should be aware of the possibility of pseudoaneurysm of the LFCA after hip fracture when a patient complains of unexplained pain and should investigate promptly and treat accordingly.

CRedit authorship contribution statement

Patrick Carroll: Investigation, Writing – Original draft preparation, Robert Flavin: Conceptualisation, Writing – Review & Editing, Supervision.

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