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Case report

Missed diagnosis of false aneurysm of the superficial femoral artery after closed complex fracture of the distal femur

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ABSTRACT

This case report presents a 38-year-old male patient who developed a false aneurysm of the superficial femoral artery after minimally invasive plate internal fixation of a comminuted articular distal femoral fracture sustained in a motor vehicle accident. Two days after surgery, the patient developed pain, non-pulsatile swelling on the medial side of the knee and anemia. After about six weeks, diagnosis of false aneurysm of the superficial femoral artery was confirmed by duplex ultrasound and computed tomographic angiography. A percutaneous endovascular procedure was performed to treat the false aneurysm without evacuating the blood collection.

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1. Introduction

Surgical methods of treating fracture are nowadays broadly accepted, but may be associated with complications. This case report presents a false aneurysm of the superficial femoral artery after minimally invasive plate fixation for complex distal fracture of the femur. This is a rare but severe complication, and is difficult to diagnose. Better knowledge and understanding of its nature will help surgeons to reduce time to diagnosis and to optimize treatment. To the best of our knowledge, this is the third presentation of a similar case in the recent literature [1–3].

2. Case presentation

A 38-year-old male was involved in a motorbike crash, with the diagnosis of closed multifragment articular fracture of right distal femur, with fracture line extending through the lateral condyle, and a large butterfly fragment (AO classification [4] 33–C3) (Fig. 1). Many years previously, the patient had sustained femoral fracture in almost exactly the same region (Fig. 1). In an emergency setting, the fracture was reduced using direct transcondylar femoral traction. The next day, closed reduction and internal fixation were performed with bridging plate osteosynthesis (NCB® Polyaxial Locking Plate System, Zimmer) (Fig. 2). On the second day after the procedure, the patient complained of episodes of dull undulating pain in the medial side of the knee. Post-operative anemia was

noted (Hgb 7.8 g/dL, Hct 24.3%), thought to be due to internal bleeding. Two units of packed cells were administered, and the patient was discharged a week later with Hb 10.2 g/dL, Hct 31.3%.

Two weeks later the patient was admitted again, with serious undulating pain and swelling of the right knee. Clinically, there was a non-pulsatile mass on the medial side of the knee with no inflammation, normal pulse and distal sensitivity. Routine blood analysis showed decreased values: Hgb 8.9 g/dL, Hct 27.9%. Ultrasound demonstrated the presence of multiple muscle tears and fairly extensive lateral and medial hematomas of the thigh. The largest hematoma (9 × 6 cm) was located in the medial proximal corner of the patella. Presuming damage to the vastus medialis was responsible for the hemorrhage, which was not considered unusual after high-energy impact trauma, no extra measures were taken. The patient was discharged the next day with a compressive bandage and extra painkillers.

One month later the patient was seen in the outpatient clinic for scheduled follow-up. Undulating pain and swelling were still present, but according to the patient there was significant improvement. A second ultrasound scan confirmed the presence of a well-defined hypoanar collection (7 × 4 cm). Doppler ultrasound revealed internal flow consistent with a large false aneurysm, originating from the popliteal artery (PA) or superficial femoral artery (SFA), distally to the Hunter's canal. CT angiography confirmed diagnosis of false aneurysm arising from the SFA-PA junction (Fig. 3). Using the Seldinger technique [5], endovascular stenting (GORE® VIABAHN®) completely resolved symptoms (Fig. 4). Almost two years later, the plate was also removed, with no further residual complaints.

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Fig. 1. X-ray of the distal femur presenting multifragmentary spiral intra-articular distal femoral fracture.

3. Discussion

This case report describes a vascular complication in a context of trauma surgery. Post-operative vascular events are not uncommon in traumatology and orthopedics. Excessive local swelling, compartment syndrome and distal pulsation can be expected and are easy to check at end of surgery or during the rounds. False aneurysm, on the other hand, is a serious complication not frequently seen in traumatology and orthopedic practice and which, left untreated, can cause rupture and acute limb ischemia due to thrombosis or distal embolization. In a search of the recent literature, a few publications concerning the deep femoral artery [6–9], brachial artery [10] and PA [11] could be found. Clinically, if the vessel is severely injured, an acute presentation will be observed, with swelling, compartment syndrome, wound leakage, signs of internal bleeding, acute anemia and weak or absent distal pulse. With minor

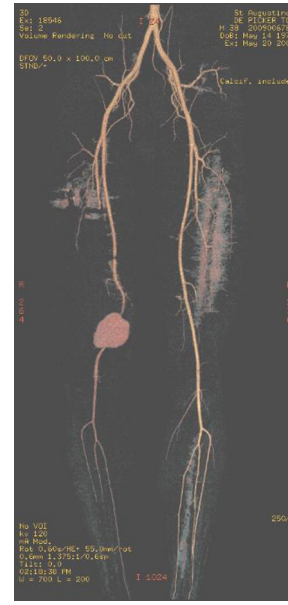


Fig. 3. CT angiography of the lower extremities showing contrast extravasation, confirming the diagnosis of false aneurysm of the superficial femoral artery.

injuries, on the other hand, clinical presentation is delayed and attenuated, mainly comprising swelling, pain and evolving anemia.

To the best of our knowledge, this is the only third case report in the recent literature of post-traumatic false aneurysm in the distal SFA. Similar cases were reported by Demey [1] in 2008 and Lo [2] in 2011. All three cases share almost the same mechanism and type of injury, means of treatment, clinical presentation and diagnostic studies. Progressive anemia was reported by the other authors, but was also clearly present in reports of false aneurysm in other locations [9,11,12]. In our opinion, it constitutes an important sign of ongoing blood leakage.

Concerning the etiology and time of the arterial wall lesion, a number of factors are implicated in the literature and can be roughly divided into iatrogenic and non-iatrogenic. The former includes sharp objects such as drill bits, screws, saw blades and



Fig. 2. After minimally invasive plate fixation.



Fig. 4. X-ray of the distal femur demonstrating endovascular stent graft, osteosynthesis plate still in place.



Fig. 5. A CT slice of the distal femur taken after plate osteosynthesis visualising two holes with sclerotic rim from a previous intramedullary femur nailing.

reduction clamps, and the latter bone spikes and scar tissue. Demey [1] reported secondary displacement of a large butterfly fragment in the late post-operative period, suggesting that the sharp bone edge injured the arterial wall. Lo [2] likewise reported that a sharp distal fragment was responsible for the damage. We would add that this may be in combination with damage by scar tissue. Above all, because the fractures were not openly manipulated, there were no sharp instruments such as reduction clamps or drills applied in the region. Scrutinizing the CT slides found two holes with sclerotic rims, resulting from previous intramedullary femur nailing, but no recent ones (Fig. 5).

The treatment options were slightly different in the various reports. In the cases reported by Demey [1] and by Lo [2], open surgery was associated to refixation. In the present case, there was no secondary displacement or prominent sharp structures, so that orthopedic revision was not needed and treatment consisted in a percutaneous endovascular procedure.

4. Conclusion

A false aneurysm of the SFA is a rare complication in the trauma setting with a subtle presentation posing a diagnostic challenge. Seen in high energy accidents with a clinical presentation of non-pulsatile swelling, pain and decreasing Hb and Hct levels. Compression and elastic bandage can be used as an initial approach, while awaiting more complicated investigations. Great dose of suspicion, a better understanding of the etiology and clinical presentation can help surgeons to recognize it promptly and refer the patient to a vascular surgeon.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

- [1] Demey K, Haeck L, Sioen W. False aneurysm of the superficial femoral artery following minimally invasive plate osteosynthesis of a femoral shaft fracture. *Acta Orthop Belg* 2008;74:700–3.
- [2] Lo SP, Hsieh CC, Yang CY, Lin CJ, Chang CW. Delayed superficial femoral artery pseudoaneurysm following distal femoral shaft fracture: a case report. *Kaohsiung J Med Sci* 2011;27:242–6.
- [3] Corriere MA, Guzman RJ. True and false aneurysms of the femoral artery. *Semin Vasc Surg* 2005;18(216):e23.
- [4] Müller ME, Nazarian S, Koch P, et al. *The Comprehensive Classification of Fractures of Long Bones*. Berlin, Germany: Springer-Verlag; 1990.
- [5] Seldinger SI. Catheter replacement of the needle in percutaneous arteriography; a new technique. *Acta Radiologica* 1953;39:368–76.
- [6] Canbaz S, Acipayam M, Gurbuz H, Duran E. False aneurysm of perforating branch of the profunda femoris artery after external fixation for a complicated femur fracture. *J Cardiovasc Surg* 2002;43:519–21.
- [7] Hanna GB, Holdsworth RJ, McCollum PT. Profunda femoris artery pseudoaneurysm following orthopaedic procedures. *Injury* 1994;25:477–9.
- [8] Unay K, Poyanli O, Akan K, Poyanli A. Profunda femoris artery pseudoaneurysm after surgery and trauma. *Strategies Trauma Limb Reconstr* 2008;3:127–9.
- [9] Valli F, Teli MG, Innocenti M, Vercelli R, Prestamburgo D. Profunda femoris artery pseudoaneurysm following revision for femoral shaft fracture nonunion. *World J Orthop* 2013;4(18):154–6.
- [10] Modi CS, Nnene CO, Godsiff SP, Esler CN. Axillary artery injury secondary to displaced proximal humeral fractures: a report of two cases. *J Orthop Surg (Hong Kong)* 2008;16:243–6.
- [11] Agarwala SR, Mohrir GS, Dotivala SJ. Post-traumatic pseudoaneurysm of popliteal artery following total knee arthroplasty. *Indian J Orthop* 2013;47:101–3.
- [12] Cowley A, Williams D, Butler M, Edwards A, Parsons S. Pseudo-aneurysm of the profunda femoris artery as a late complication of hip fracture in a patient with myelodysplasia. *Ann R Coll Surg Engl* 2007;89:W4–6.