Pseudoaneurysm of the superficial femoral artery after retrograde intramedullary nailing for a supracondylar femoral fracture

Ryosuke Hirota^{1,5}, Makoto Emori^{1,5}, Toshiro Ito², Kota Watanabe⁵, Akira Hirano^{1,5}, Tomoaki Kamiya^{1,5}, Yoshinori Terashima^{1,5}, Toshihiko Yamashita⁵

¹Department of Orthopaedic Surgery, Takikawa Municipal Hospital, Takikawa, Hokkaido, Japan

²Department of Thoracic and Cardiovascular Surgery, Sapporo Medical University School of Medicine, Sapporo, Hokkaido, Japan

³Department of Orthopaedic Surgery, Sapporo Medical University School of Medicine, Sapporo, Hokkaido, Japan

ABSTRACT

Vascular complications of distal femoral fractures are rare but can have disastrous consequences if not recognised and treated promptly. We present the case of a 55-year-old woman who developed a pseudoaneurysm of the superficial femoral artery after osteosynthesis to repair a supracondylar femoral fracture. Eight weeks after surgery, swelling of the right thigh persisted and was accompanied by severe pain. Enhanced computed tomography revealed a pseudoaneurysm in the medial aspect of the affected thigh. Open surgical repair was performed by direct arterial suture. Although the true aetiology of the development of the pseudoaneurysm is unknown, a bony fragment from the reduction manoeuvre may have damaged the adventitia of the superficial femoral artery. In cases of continuous thigh swelling after osteosynthesis to repair a supracondylar femoral fracture, a diagnosis of pseudoaneurysm should be considered and treatment should be initiated immediately.

KEYWORDS

Pseudoaneurysm – Superficial femoral artery – Distal femoral fracture

Accepted 20 August 2013; published online XXX

CORRESPONDENCE TO

Makoto Emori, Department of Orthopaedic Surgery, Takikawa Municipal Hospital, 2-2-34 Omachi, Takikawa 073-0022, Hokkaido, Japan
T: +81 (0)125 22 4311, F: +81 (0)125 24 6010; E: emrmkt@yahoo.co.jp

Many cases of pseudoaneurysms of the femoral artery after osteosynthesis of femoral fractures have been reported in the literature. The aetiology of many of these defects has been determined to be iatrogenic and involving procedures performed using sharp items (pins, drills bits, screw tips etc) but a bony fragment has also occasionally been reported to be the causative factor.¹ Most of these pseudoaneurysms develop in the region of an intertrochanteric lesion^{2–5} or, less frequently, in a distal femoral lesion.⁶ We report the development of a pseudoaneurysm of the superficial femoral artery (SFA), caused by something other than an iatrogenic sharp item, after osteosynthesis to repair a supracondylar femoral fracture. The aetiology and clinical aspects of the pseudoaneurysm development are also discussed.

Case History

A 55-year-old woman was admitted to the emergency room with severe pain in her right knee after a fall. A physical

examination on admission revealed a deformity in and swelling of her thigh, with normal neurovascular function. Radiography revealed a right supracondylar femoral fracture (AO Foundation type 33-A2) (Fig 1).

The patient was not taking anticoagulant medication and osteosynthesis was performed three days after the injury. Closed reduction of the distal femoral fracture was achieved by temporary placement of Schanz pins while she was supine on a radiolucent table. A retrograde intramedullary nail with spiral blade locking (Distal Femoral Nail; Synthes, West Chester, PA, US) was inserted (Fig 2). The patient did not receive postoperative antithromboembolic agents such as low-molecular weight heparin. Range of motion exercises, as well as quadriceps and hamstring exercises, were initiated on the second postoperative day, allowing only touch-down weight bearing; partial weight bearing was allowed six weeks after surgery.

The swelling of the right medial aspect of the patient's thigh persisted postoperatively and she experienced daily

muscle spasms in the quadriceps. As her vital signs were stable, and she was not anaemic and did not suffer any type of neurological compromise, leg oedema or distal ischaemia, the symptoms were believed to be caused by the haematoma at the fracture site. The haematoma was followed closely without treatment. However, eight weeks after surgery, swelling of the right thigh persisted and was accompanied by severe pain.

Figure 1 Radiography showing a supracondylar fracture of the right femur

Figure 2 Postoperative radiography of the right retrograde intramedullary nail

Enhanced computed tomography (CT) showed a massive haematoma in the vastus medialis and a pseudoaneurysm of the SFA but not at the level of the screw site (Fig 3). Vascular surgery revealed disruption of the SFA adventitia (Fig 4). The lesion was managed by direct arterial suturing and the haematoma was evacuated. One month after the vascular surgery, the patient was able to walk with a T-cane and enhanced CT showed no evidence of the pseudoaneurysm or haematoma.

Discussion

A pseudoaneurysm is a pulsatile haematoma not contained in the vessel wall layers but in a fibrous capsule. This structure is formed when there is a disruption of one or more layers of an arterial wall. Iatrogenic pseudoaneurysms are most commonly produced during cardiac catheterisation, and other diagnostic and interventional procedures.⁷ Pseudoaneurysms in the thigh are rare but are recognised complications of orthopaedic procedures. They have been reported after osteosynthesis of intertrochanteric^{2-4,8} and intracapsular femoral neck fractures,⁵ femoral shaft fractures,⁹ distal femoral fractures⁶ with antegrade and retrograde intramedullary nailing,

Figure 3 Computed tomography angiography demonstrating a pseudoaneurysm of the superficial femoral artery and massive haematoma, not close to the screw tip (arrow head)

Figure 4 Disruption of the adventitia of the superficial femoral artery (arrow head)

and dynamic hip screw and internal plate fixation. These injuries occur primarily because of a drill bit or screw passing through an artery, but they are also uncommonly caused by displaced ends of the bone at the fracture site during injury or subsequent surgical manipulation.

Clinical signs such as thigh swelling, hip pain, persistent or recurrent anaemia caused by continued haemorrhage, neurological compromise and distal ischaemia due to impaired blood flow or microembolisation should suggest the possibility of a pseudoaneurysm. However, the thigh has a large capacity to store blood after an injury, as shown by the rare development of compartment syndrome after a femoral shaft fracture.⁹ A pseudoaneurysm in the thigh is therefore usually masked and a high index of clinical suspicion plays a major role in achieving the diagnosis.

The natural history of a pseudoaneurysm is often uncertain. In the past, early surgical repair was recommended for treatment of all pseudoaneurysms. Conversely, modern treatment options may be classified as either non-invasive or invasive.⁷ Non-invasive treatment modalities include observation and compression therapy whereas invasive treatment includes open surgical repair and percutaneous techniques. The percutaneous techniques comprise thrombin injection,

coil embolisation and solid body thrombosis. In the present case, open surgical repair was selected because of the patient's severe pain, the limited value of compression therapy and the persistence of the swelling over a two-month period.

As the pseudoaneurysm was not close to the screw tip, and considering the intramuscular location of the hematoma and the foci of the extravasation in the CT angiography, this patient's pseudoaneurysm likely developed at the time of injury or during the operative repair. The swelling of the affected thigh continued for approximately two months, even after the start of weight bearing movement. This case therefore suggests that the presence of continued swelling after osteosynthesis of a femoral distal fracture even with a retrograde intramedullary nail should lead to the suspicion of development of a pseudoaneurysm.

Conclusions

In the presence of persisting thigh swelling and sudden thigh pain after osteosynthesis to repair a femoral distal fracture, a diagnosis of pseudoaneurysm of the SFA should be considered.

References

1. Keel JD, Eyres KS. Vascular injury by an intertrochanteric fracture fragment. *Injury* 1993; **24**: 350–352.
2. Yang KH, Park HW, Park SJ. Pseudoaneurysm of the superficial femoral artery after closed hip nailing with a Gamma nail: report of a case. *J Orthop Trauma* 2002; **16**: 124–127.
3. Cowley A, Williams D, Butler M *et al*. 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–W6.
4. Karkos CD, Hughes R, Prasad V, D'Souza SP. Thigh compartment syndrome as a result of a false aneurysm of the profunda femoris artery complicating fixation of an intertrochanteric fracture. *J Trauma* 1999; **47**: 393–395.
5. Davda K, Pollard TC, Graham AJ. Delayed presentation of lateral femoral circumflex artery injury post cannulated hip screw surgery – a case report. *Ann R Coll Surg Engl* 2009; **91**: W3–W5.
6. Lo SP, Hsieh CC, Yang CY *et al*. Delayed superficial femoral artery pseudoaneurysm following distal femoral shaft fracture: a case report. *Kaohsiung J Med Sci* 2011; **27**: 242–246.
7. Franklin JA, Brigham D, Bogey WM, Powell CS. Treatment of iatrogenic false aneurysms. *J Am Coll Surg* 2003; **197**: 293–301.
8. Bose D, Hauptfleisch J, McNally M. Delayed pseudoaneurysm caused by distal locking screw of a femoral intramedullary nail: a case report. *J Orthop Trauma* 2006; **20**: 584–586.
9. Coupe KJ, Beaver RL. Arterial injury during retrograde femoral nailing: a case report of injury to a branch of the profunda femoris artery. *J Orthop Trauma* 2001; **15**: 140–143.