False Aneurysm of the Profunda Artery Complicating Dynamic Hip Screw Osteosynthesis

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Abstract

The rare case of a false aneurysm of the profunda femoris artery as an iatrogenic complication of dynamic hip screw (DHS) osteosynthesis is described. A review of the literature is given, with special reference to radiologic intervention.

Key Words

Pseudoaneurysm · Profunda femoris · Dynamic hip screw

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Introduction

False aneurysm of the profunda artery following dynamic hip screw (DHS) osteosynthesis is uncommon [1]. Symptoms usually become manifest by a sudden onset of pain and swelling of the upper thigh due to hemorrhage [2–4]. If severe, compartment syndrome could produce signs of vascular and neurologic compromise [5]. Contrast-enhanced CT scan and angiography confirm the diagnosis. In previously reported cases of iatrogenic false aneurysm of the profunda artery, surgical repair (ligation and excision, suture of the arterial defect) has been advocated [1–6]. However, direct treatment at the time of diagnosis by means of embolization would save time and eliminate the risks associated with a possible surgical procedure. The case of a false aneurysm of the profunda femoris artery as an iatrogenic complication of DHS osteosynthesis is described. A review of this complication in DHS surgery is given, with special reference to the therapeutic radiologic intervention.

Case Study

An 84-year-old Caucasian female was admitted to our department in July 1999 due to a pertrochanteric fracture of the left femur. Her medical history revealed essential hypertension, vaginal hysterectomy due to prolapse, and varicose veins. On the day following admission, the fracture was reduced and immobilized with a 115-mm dynamic hip screw. Fluoroscopy at surgery showed an anatomic reduction of the fracture and adequate positioning of the hardware (Figure 1). Full weight-bearing was permissible as soon as the patient could tolerate it. On the second postoperative day, the patient developed a sudden onset of pain in her left thigh whilst lying in bed. Physical examination revealed a swollen left thigh, its measured circumference exceeding that of the right thigh by 10 cm. Her vital signs were normal and stable; there were no signs of vascular or neurologic deficit. A CT scan with intravenous contrast medium was performed. A large hematoma of the left thigh could be visualized, with active bleeding from the profunda femoris artery, at the level of the second screw of the DHS side plate. Consequently, an angiography was performed to establish the diagnosis and treatment by coiling in one sitting. A percutaneous catheterization of the right femoral artery was performed. Upon visualizing the bifurcation of the aorta, the catheter was maneuvered over the

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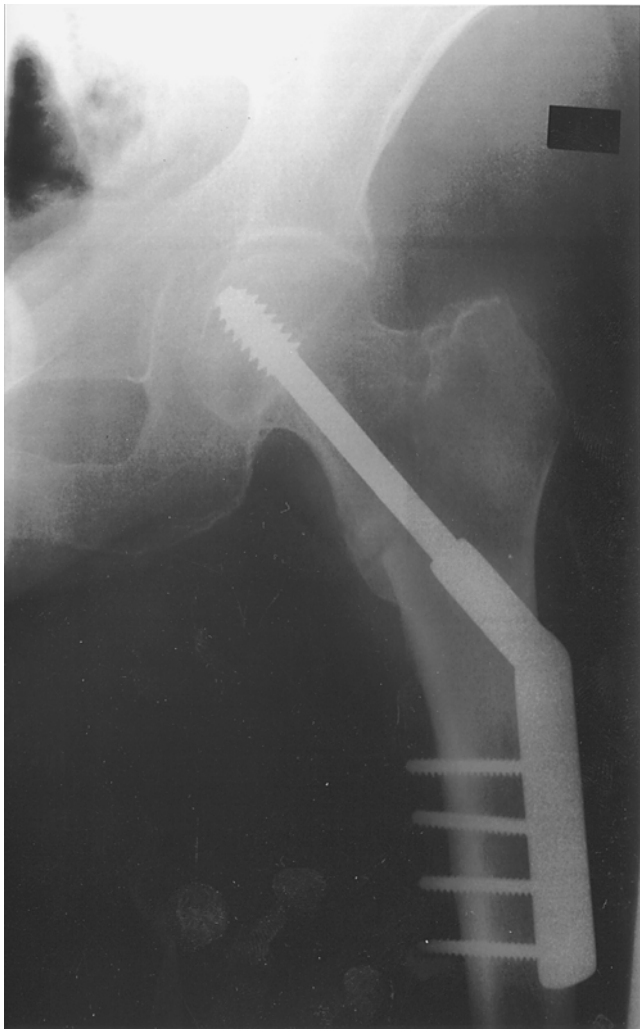

Figure 1
Postoperative radiograph (antero-posterior view) of the left hip showing adequate reduction of the fracture. All four screws of the femoral side plate protrude beyond the medial cortex of the femur.

aortic bifurcation selectively into the left common femoral artery and subsequently into the left profunda femoris artery. A large false aneurysm at the level of the second screw became evident (Figure 2). Four 6-mm fibered platinum coils and 3 5-mm coils were placed distal and proximal, respectively, to the aneurysm upon which a complete stop of the blood flow into the aneurysm was obtained (Figure 3). It was decided not to evacuate the hematoma surgically but to allow it to resolve spontaneously. Control duplex ultrasonography 1 day after embolization showed no signs of active bleeding in the false aneurysm. Three days following embolization, full weight-bearing was tolerated and the patient could be transferred to a

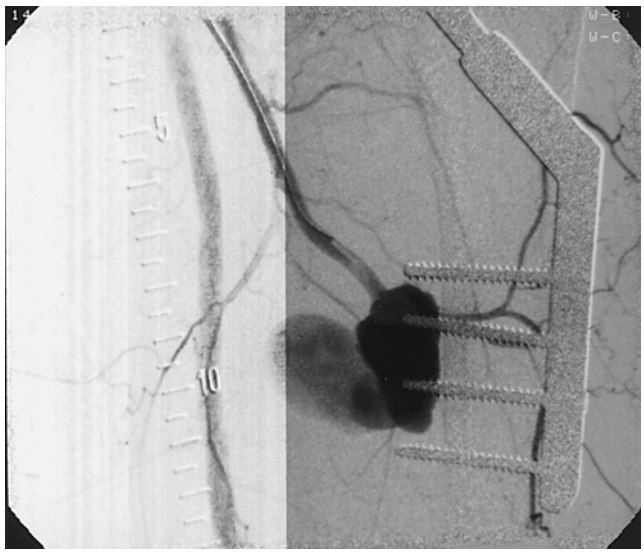

Figure 2
Angiograph demonstrating a large false aneurysm arising from the profunda femoris artery.

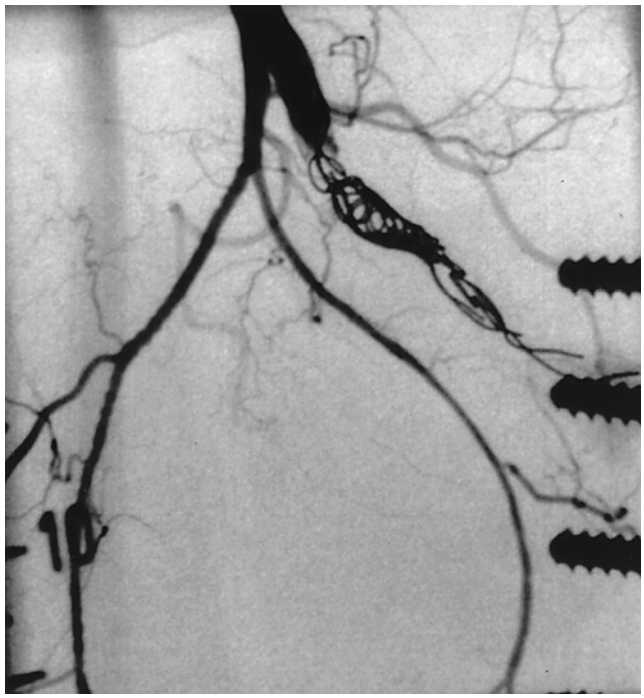

Figure 3
Angiograph post embolization with coils in situ. There is a complete stop of blood flow into the false aneurysm.

rehabilitation center. The hematoma had completely resolved 3 months postoperatively. One year after the event she is fully mobilized and doing well with no complaints of her leg.

Discussion

The profunda femoris, the largest branch of the femoral artery, arises about 4 cm distal to the inguinal ligament, curving behind the femoral artery and descending posterior to the adductor longus in close proximity to the medial aspect of the femur. This relationship makes it difficult to visualize at surgery and yet vulnerable to injury during manipulation and fixation of a femoral fracture. It is likely that many iatrogenic injuries to the profunda femoris artery are subclinical and remain undetected. If left untreated, however, symptomatic pseudoaneurysm of the profunda femoris artery could result in:

- Massive bleeding which might be fatal if myocardial oxygenation becomes compromised due to severe hypovolemia and acute anemia.
- Nonunion of fractures of the proximal femur due to loss of adequate vascular supply from the profunda artery, which is the major source of blood supply to the hip and thigh. A nutrient vessel to the femur branches off from either the second or third perforating artery, which in turn arises from the profunda femoris artery.
- Compartment syndrome with the potential for limb loss especially in cases of preexistent peripheral atherosclerotic disease.
- Morbidity associated with pain, swelling, and a protracted course of rehabilitation and possible development of an infected hematoma.

Various injury mechanisms have been suggested in the literature [2, 4, 6]: perforation caused by drills shooting too far beyond the medial cortex, or traction and compression forces applied by retractors positioned blindly within the posteromedial aspect of the proximal femur. Prominent screws are more likely to cause damage by directly and repeatedly impinging on the vessel causing gradual erosion during motion postoperatively. The same mechanism may apply in cases of displaced hardware and fracture fragments. This is perhaps the most important injury mechanism in cases of delayed presentation. Sclerotic vessels of the elderly are more prone to injury during torsional manipulation at surgery.

In our case, we believe that the injury, a full thickness laceration of the vessel, was caused by the drill bit with progressive leak of blood in the surrounding tissues forming a perivascular hematoma. Although such a process should be limited in size by clotting and tamponade from the surrounding tissues, the initiation of oral anticoagulant therapy, as often done after surgery for hip fractures, could precipitate an actively bleeding pseudoaneurysm. Our choice of treatment was effective and does offer several advantages. Coiling can be completed in several minutes, it avoids surgical intervention and can be performed even in patients who are on oral anticoagulation therapy. The risk of infection and wound healing problems associated with a reintervention can be avoided. A potential drawback of applying embolization is ischemia. This depends on the extent of the dissection and the adequacy of collateral circulation to the adductor muscles and the cruciate anastomosis [1].

In conclusion, injury to the profunda femoris artery should be suspected in any patient developing an acute onset of pain and swelling in the upper thigh following DHS osteosynthesis. A combined diagnostic and therapeutic approach in one session should always be considered. Care should be taken not to completely occlude the major vessel of the profunda femoris especially in the elderly where peripheral atherosclerotic disease may be present.

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