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# Laceration of a branch of the profunda femoris artery caused by a spike of the displaced lesser trochanter in an inter-trochanteric femoral fracture. A case report



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## ABSTRACT

**INTRODUCTION:** Injury of femoral vessels is an extremely rare complication in intertrochanteric femoral fractures. In most cases reported, the vascular lesion involves the superficial femoral artery, whereas in very few cases does it involve the profunda femoris artery.

**Presentation of case:** We report a case of acute bleeding due to laceration of a perforating branch of the profunda femoris artery caused by a sharp fragment of the displaced lesser trochanter in an intertrochanteric femoral fracture; the lesion was treated by transcatheter embolization.

**DISCUSSION:** The arterial injury may be iatrogenic, occurring during intramedullary internal fixation, or less frequently, the injury may be due to the fracture itself, caused by a sharp bone fragment that damages the profunda femoris artery or one of its perforating branches.

**CONCLUSION:** We believe that intertrochanteric femoral fractures with avulsed lesser trochanter are at risk for femoral vessel injuries caused by the displaced bone spike, and we advise meticulous clinical and laboratory monitoring pre- and post-operatively to prevent serious complications.

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## 1. Introduction

Injury of femoral vessels is an extremely rare complication in intertrochanteric femoral fractures (0.2% incidence) [1–3]. In most cases reported, the vascular lesion involves the superficial femoral artery, whereas in very few cases does the vascular lesion involve the profunda femoris artery or one of its perforating branches.

The arterial injury may be iatrogenic, occurring during intramedullary internal fixation of an intertrochanteric fracture, caused by either the drill or the distal locking screw protruding beyond the medial border of the femur [1,2,4,5–7]. Less frequently, the injury may be due to the fracture itself, caused by a sharp bone fragment that damages the profunda femoris artery or one of its perforating branches [2,3,8,9–11].

The lesion of the artery may be acute with immediate bleeding or, more frequently, chronic, in which case a gradual erosion of the vessel involved causes the progressive formation of a false aneurysm, that may be diagnosed only later on [2,4,5,6,9,11,12]. In the rare cases in which a laceration of a femoral artery causes acute

bleeding, general signs of anemia such as tachycardia, hypotension, swelling of the thigh and a rapid decrease in the haemoglobin value are present [3,7,8,10].

We report a well documented case of acute bleeding due to laceration of a perforating branch of the profunda femoris artery caused by a sharp fragment of the displaced lesser trochanter in an intertrochanteric femoral fracture; the lesion was treated by transcatheter embolization.

## 2. Presentation of case

An 81 year-old man in good health was admitted to our hospital for a severe pain in the right hip associated with functional impairment after a fall at home. The X-rays of the painful hip showed an intertrochanteric fracture with medial dislocation of a sharp lesser trochanter fragment (Fig. 1). At admission, laboratory tests showed a haemoglobin value of 9.4 g/dl and normal values for the patient's age of the other laboratory parameters. The patient reported that one month before the trauma, laboratory tests showed that the haemoglobin was 12.4 g/dl. Preoperatively, the patient received daily antithromboembolic prophylactic therapy. Ten hours after admission, the hip fracture was surgically treated by closed reduction and internal fixation with a standard Gamma 3 nail locked distally. The surgical procedure was performed without

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**Fig. 1.** Displaced intertrochanteric femoral fractures on the right side with medial dislocation of a sharp lesser trochanter fragment in an 81 year-old man.



**Fig. 2.** The intraoperative X-ray of the hip showed a stable fixation of the fracture.

intraoperative complications and without further displacement of the lesser trochanter that remained in the same position (Fig. 2). During the operation, the haemoglobin value showed a significant reduction (Hb 7.4 g/dl) and an intraoperative transfusion of one unit of packed red cells was performed. Postoperatively, the patient was well and he did not report any significant clinical problems. Six hours after surgery, the haemoglobin was 7.2 and a second blood transfusion was done. Twenty-four hours postoperatively, the patient presented typical clinical signs of bleeding with tachycardia, hypotension, and generalized weakness; we observed a noticeable swelling of the thigh and scrotal region associated with a large ecchymotic effusion which extended to the right hemipelvic and hemithoracic areas, although the distal pulses were present and similar to the contralateral side. The Hb value dropped to

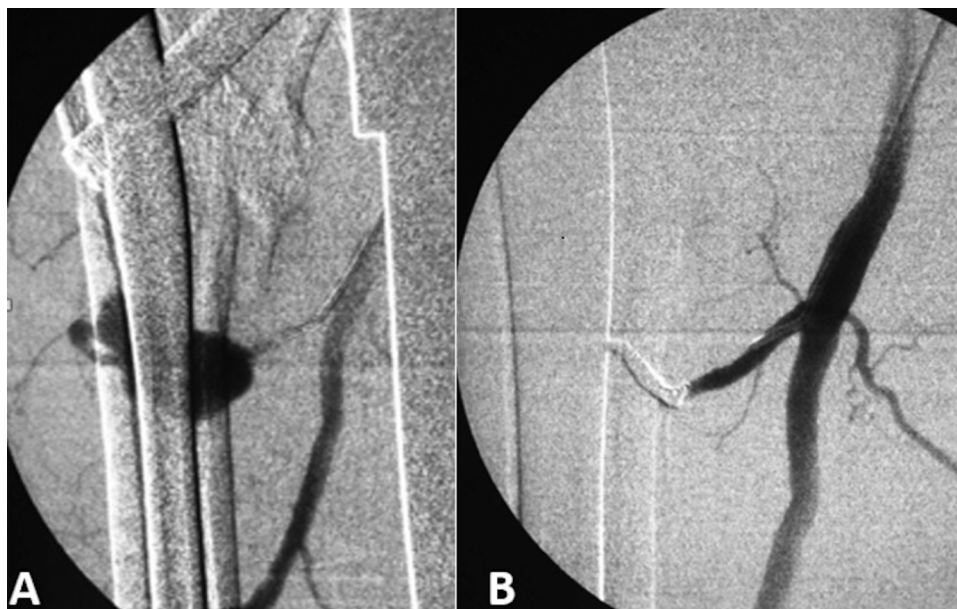


**Fig. 3.** The angio-CT with 3D reconstruction of the operated thigh, performed 42 h after surgery for persistent signs of acute bleeding, showed an active extravasation from a complete rupture of a branch of the profunda femoris artery adjacent to the spike of the displaced lesser trochanter.

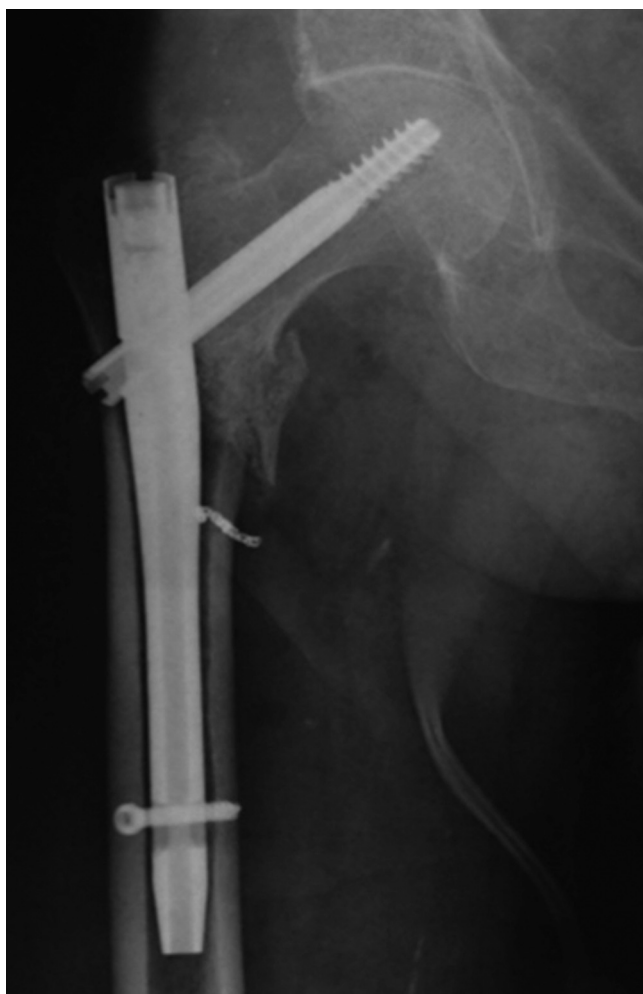
6.4 g/dl, and two units of packed red cells were transfused. Six hours later, the Hb value had increased to 8.6 g/dl but after another 12 h the value had decreased to 6.8 g/dl. Therefore, we stopped the antithrombotic therapy and the patient had an angio-CT with 3D reconstruction that showed an active extravasation from a complete rupture of a branch of the profunda femoris artery adjacent to the spike of the displaced lesser trochanter (Fig. 3). The vascular lesion was immediately treated in the interventional radiology room by transcatheter embolization. The endovascular procedure blocked the bleeding completely (Fig. 4A and B) and the patient had rapid clinical improvement, with a stable value of haemoglobin that rose to normal values in a few weeks. The patient was followed up regularly for 6 months until complete clinical and radiographic healing of the fracture (Fig. 5).

### 3. Discussion

Femoral vessel injuries in hip fractures are uncommon [4,7,9,12]. In most cases reported, these vascular injuries are iatrogenic, involve the superficial femoral artery and are caused by a protruding screw of an intra- or extramedullary implant used to treat intertrochanteric fractures [1,2,5,7,13,14]. The tip of the screw protruding beyond the medial border of the femur generally causes chronic bleeding due to a gradual erosion of the vessels, with the development of a pseudoaneurysm that may be discovered several weeks or even years after the operation [5,7]. Less frequently, the vascular injury is caused by the fracture itself. In this case, a bone spike from a displaced lesser trochanteric fragment generally damages the profunda femoris artery or one of its perforating branches, causing in some cases acute bleeding owing to complete



**Fig. 4.** The arteriography performed during the endovascular procedure, confirmed the active bleeding from the branch of the profunda femoral artery (A). After transcatheter embolization, the bleeding was completely blocked (B).



**Fig. 5.** Six months after the operation, the X-rays of the hip showed complete healing of the fracture. The endovascular device was quite visible below the lesser trochanter.

laceration of the vessel and in other cases a false aneurysm with chronic bleeding and late presentation. Very few well documented cases that describe this mechanism of vascular injury have been reported in the literature [2,3,4,8–11].

In our case a bone spike from the avulsed lesser trochanter, as well documented by the angio-CT with 3D reconstruction, caused complete laceration of an adjacent perforating branch of the profunda femoris artery with noticeable acute bleeding that caused a progressive hematocrit decrease, with clear clinical signs of active extravasation. The vascular lesion was diagnosed 42 h after surgery, and it was treated by transcatheter embolization in the interventional radiology room. This endovascular procedure blocked the bleeding, and the patient had rapid clinical improvement.

We believe that early diagnosis of this vascular lesion is highly important to prevent or minimize serious complications that in extreme cases may cause the death of the patient. For this reason, a careful monitoring of the Hb value is mandatory in these cases.

Murphy et al. [4] reported that in dislocated intertrochanteric hip fractures arterial injuries occur frequently, but they auto-resolve thanks to a spontaneous thrombosis. However, in elderly patients spontaneous thrombosis might not occur with incoercible bleeding because of atherosclerosis.

We do not know if the vascular lesion in our case occurred at the time of the fracture or during the surgical maneuvers. Therefore, we recommend extreme caution during the operation so as to avoid further dislocation of the avulsed lesser trochanter, causing vascular injury.

In conclusion, we believe that intertrochanteric femoral fractures with avulsed lesser trochanter are at risk for femoral vessel injuries caused by the displaced bone spike, and we advise meticulous clinical and laboratory monitoring pre- and post-operatively to prevent serious complications.

#### Conflict of interest

We certify that no benefits in any form have been received or will be received from a commercial party related to the subject of this article. No funds were received in support of this study.

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None.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

**Author contribution**

V. Potenza: Author of manuscript.  
 F. Catellani: Acquisition of data; drafting of manuscript.  
 U. Saputo: Study conception; acquisition of data.  
 P. Farsetti: Review and correction of manuscript.  
 R. Caterini: Review and correction of manuscript.

**Guarantor**

Dr. Vito Potenza, M.D. Dr. Francesco Catellani, M.D (corresponding author).

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