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## CLINICAL REPORT

# Superficial femoral artery injury resulting from intertrochanteric hip fracture fixation by a locked intramedullary nail

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### KEYWORDS

Pseudoaneurysm;  
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Hip fracture;  
Intramedullary nailing;  
Vascular injury

**Summary** Iatrogenic vascular injuries are uncommon during the course of proximal femur surgical procedures. We report the case of an 85-year-old female presenting with an intertrochanteric fracture, treated by antegrade (cephalocondylic) intramedullary nailing (Stryker gamma 3<sup>TM</sup> nail) and complicated by a superficial femoral artery laceration at the level of the distal locking screw. Lower limb traction in adduction and internal rotation on the operating table might put at risk the superficial femoral artery during distal screw drilling and insertion. We therefore recommend returning to the neutral position and reducing lower extremity traction after femoral head screw placing and before final distal screw insertion. This technical precaution should limit the risk of superficial femoral artery injury associated with short-nail antegrade intramedullary nailing.

*Type of study:* Level IV retrospective.

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## Introduction

Iatrogenic vascular accidents are rare in proximal femur surgery [1]. Pseudoaneurysm is regularly reported in the *profunda femoris* artery [2–5], but superficial femoral artery (SFA) injury is less frequent [6].

Duparc [1], in an anatomoclinical study of iatrogenic vascular trauma, distinguished hemorrhagic lesions caused by sharp items (pins, drill bits, screw tips, blades, etc.) and thrombotic lesions caused by compression (retractors, forceps, tourniquets, etc.).

We here report an SFA lesion facing the distal locking screw, sustained during antegrade intramedullary nailing with a Stryker gamma 3<sup>TM</sup> nail for intertrochanteric fracture. We recommend a two-step maneuver to distance and restore the mobility of the vascular axis of the upper third of the femur, so as to avoid injuring the SFA during distal locking of a short antegrade nail.

## Observation

An 85-year-old woman, previously in good health, was admitted following a mechanical fall. X-ray diagnosed a grade 31 A2-1 comminuted left intertrochanteric fracture according to the AO classification (Fig. 1), indicating closed antegrade intramedullary nailing (short gamma 3 nail).

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**Figure 1** Preoperative AP pelvic X-ray: grade 31 A2 comminuted left intertrochanteric fracture according to the AO classification.

The patient was operated on under spinal anesthesia. She was installed with the hip in adduction and internal rotation, under traction applied by a traction table along the axis, and the nail was introduced with no particular difficulty (Fig. 2). Although the fracture was stabilized by the cephalic screw, it was not thought necessary to put the lower limb back in neutral position for distal locking. No peroperative blood-pressure drop or heart rhythm disturbance was noted.

Postoperatively, low molecular weight heparin (Enoxaparin 40, 1 subcutaneous injection per day) was administered to prevent thromboembolic accident.

At 24 hours postoperatively, the patient complained of pain on the anteromedial side of her thigh, followed by tumefaction visible under grazing light. Echo-Doppler at



**Figure 2** Postoperative AP left hip X-ray: reduction is satisfactory, especially in the lesser trochanter.

48 hours revealed a  $6 \times 3.58 \times 4.72$  cm anteromedial mid-thigh circulating hematoma and (probably post-traumatic) SFA wound. Fifteen minutes' echo-guided compression provided no benefit, the hematoma remaining circulating. Vascular surgery was therefore decided upon, and found a 2 mm SFA lesion facing the distal locking screw. The lesion was managed by direct arterial suture, the SFA being supple and mediocalcosis free. There was no visible projection of the screw able to cause a remote vascular friction lesion. The distal locking screw was therefore left in place.

The 1-month postoperative ultrasound check-up found no pseudoaneurysm or thrombotic hematoma, with normal three-phase arterial flow.

Evolution, first in the department then in the rehabilitation center, was satisfactory and the patient recovered her preoperative autonomy.

## Discussion

In closed or direct-approach osteosynthesis for trochanteric fracture, iatrogenic vascular accidents can occur during screw-hole drilling or screwing or when too long a screw is used, especially in the profunda femoris or superficial femoral arteries [2–6]. Patient installation on the operating table for intertrochanteric fracture fixation impacts SFA lesion risk in several ways. Firstly, the soft tissue of the medial and proximal thigh is compressed between the femur and perineal support. Faure and Merloz [7] further pointed out that the SFA is more anterior and medial than the *profunda femoris* in the proximal third of the thigh. Secondly, excessive traction may prevent the vascular axis moving out of the way of the lesion-causing agent [8]. Thirdly, Yang et al. [9] found that, for some patients presenting intertrochanteric fractures, the SFA is positioned close (<10 mm) to the medial femur when the lower limb is installed in internal rotation and adduction.

The hypothesis in the present case is that sharp SFA trauma is probably a consequence of drilling, as the locking screw was of the right length (Fig. 2). Drilling partially sectioned the SFA, with external hemorrhage.

Soft tissue compression between femur and perineal support, traction along the axis and lower-limb positioning in adduction and internal rotation appear as iatrogenic SFA lesion risk factors. We therefore recommend two maneuvers when the cephalic screw has stabilized the fracture: firstly, returning to neutral position to distance the vessels from the medial side of the femur; and secondly, reducing lower-limb traction, partly to reduce soft-tissue compression between the femur and the perineal support, and also to increase SFA mobility.

## Conflict of interest

None.

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