



## Iatrogenic blunt arterial injury during a hip fracture surgery

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**Iatrogenic non-penetrating arterial injuries have been reported following primary and revision hip arthroplasties.**

**We report a patient who developed acute limb ischaemia after dynamic hip screw fixation was performed for an unstable intertrochanteric fracture. We discuss a previously unreported mechanism of traction creating tension on the atherosclerosed vessels and medial retraction tenting and breaking the vessel wall lining. This case highlights a serious complication in one of the most commonly performed hip surgeries.**

**Keywords :** intertrochanteric fracture ; internal fixation ; arterial injury.

### INTRODUCTION

Arterial injury is one of the most serious complications of a hip surgery, with a reported incidence of 0.1% to 0.25% (2, 6). An understanding of the possible mechanisms of injury is important as at least some of these injuries can be avoided (3, 6). We present a case of a comminuted intertrochanteric fracture where dynamic hip screw fixation was carried out and the patient developed limb ischaemia postoperatively and later died. There are no previous reports, to our knowledge, of indirect arterial injuries following osteosynthesis of a hip fracture.

### CASE REPORT

A 92-year-old lady, normally mobile with aid of a stick, sustained a fall and presented with an intertrochanteric fracture. Her medical ailments included chronic atrial fibrillation and a history of two episodes of myocardial infarction in the past. She was a smoker but there was no history to suggest peripheral vascular disease. A preoperative echocardiography confirmed an ejection fraction of 42%. She was not on any long term anticoagulation therapy. She was however started on enoxaparin prophylaxis on admission.

On initial examination bilateral femoral, dorsalis pedis and posterior tibial pulses were present but feeble. The temperature over both the extremities was equal and the capillary refill was normal. Radiographs confirmed an unstable three-part intertrochanteric fracture of the left hip. The iliac and femoral vessels were calcified and visible on the plain radiographs (fig 1). She was taken to

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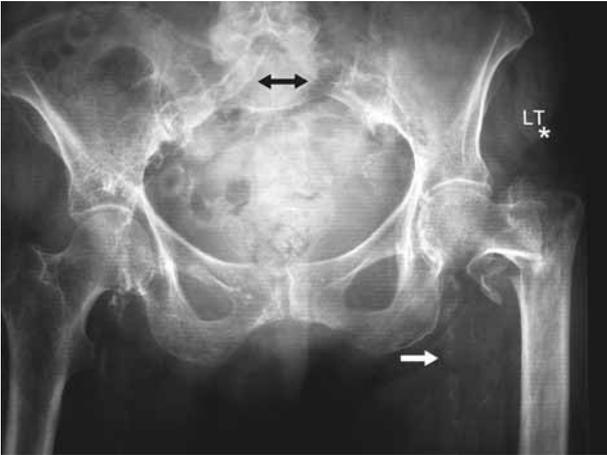
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**Fig. 1.** — The preoperative radiograph illustrating a displaced intertrochanteric fracture with calcified iliac and femoral arteries (arrowheads).



**Fig. 2.** — The postoperative radiograph showing restoration of normal anatomy with satisfactory fixation.

theatre the next day, for a dynamic hip screw fixation. There was significant posterior sagging of the distal fragment. A Hey Groves clamp was placed vertically to hold the fracture reduction against the barrel plate while the screws were passed in the distal fragment (fig 2).



**Fig. 3.** — The clinical picture on the day following embolectomy. The mottling and patchy skin discoloration progressed to the proximal thigh.

The patient made an uneventful recovery immediately after the surgery and no signs for any concern were noticed. On the second postoperative day the operated limb was noticed to be cold with absent popliteal and distal pulses. The femoral pulse was present and symmetrical to the opposite side. Patchy mottling appeared within the next few hours over her left foot and lower leg. A vascular opinion was sought. In view of the history of chronic atrial fibrillation, the ischaemic changes in the limb nearly 48 hours after the operation and the absence of any signs of structural damage to the femoral vessels, the diagnosis of an embolic occlusion was made.

Embolectomy under local anaesthesia was performed the same evening. An occlusion was identified in the superficial femoral artery 10 cm distal to the inguinal ligament and white atherosclerotic plaques were removed with no evidence of thromboembolism. No obvious improvement in the vascularity was noted (fig 3). In view of her deteriorating general condition and poor expected outcome with any further procedures, a decision was made against any further active intervention. The skin discoloration progressed proximally to the thigh and her general condition deteriorated progressively and she died the second day after the embolectomy.

Post-mortem examination, with special attention to the aetiology of the vascular insult, confirmed generalised atherosclerosis with no evidence of any thromboembolism. There was no evidence of any

external injury or external haematoma collection around the superficial femoral or the profunda femoris artery. There were no unstable or complex plaques noticed in the proximal aorta.

## DISCUSSION

A review of literature of arterial injuries following hip fracture surgery reveals reports of penetrating trauma from drill bits, prominent screw tips or sharp bone spikes (3, 4, 10). The deep femoral artery is involved in these cases because of its proximity to the proximal femur, as against the superficial femoral artery. The clinical presentation is usually an intra-operative or immediate post-operative bleeding (4, 10) or an aneurysm presenting at a later date (1).

Acute onset limb ischaemia with occlusion of the superficial femoral artery following hip fracture surgery is an unusual presentation. The findings at the time of embolectomy, along with the autopsy findings excluding a thromboembolic episode, confirm the occlusion of the superficial femoral artery by atheromatous plaques. There is a possibility that the atheroma occluding the superficial femoral artery was an embolus. The atheromatous emboli usually arise from protruding plaques or plaques with mobile components in the proximal aorta (5). These were absent in this case, as confirmed by the post-mortem findings. Also, occlusion of the artery near the operative site and failure to relieve this occlusion with embolectomy favour the diagnosis of a local atheromatous plaque.

The vascular surgeons performed an embolectomy on the basis of clinical presentation and an arteriography was deferred. This decision was also influenced by the fact that the patient was not a candidate for any major surgical procedure if it was deemed necessary. An arteriogram could have helped with the initial diagnosis however the final diagnosis was confirmed, in retrospect, by the findings at the time of embolectomy and the post-mortem examination.

In retrospect, the two possible mechanisms for this injury were traction during the procedure and forceful medial retraction following the use of vertically placed Hey Groves clamp to hold the

fracture reduction. As both of these manoeuvres would stretch the femoral artery, they could have worked in combination to result in a 'fracture' of the calcified and potentially friable femoral artery.

Traction, forceful medial retraction anterior to the hip joint, hyperextension and manoeuvres for dislocating the hip joint have all been implicated as the possible mechanisms for similar non-penetrating arterial injuries during the hip replacement surgeries (6, 8). Stretching of an artery has been shown to cause rupture of the intimal layer before the more elastic outer layers (9). Atherosclerosis and perivascular cicatrix from previous surgery have been identified as the risk factors for indirect arterial injuries (2, 3).

Arterial injuries diagnosed after distal ischaemic changes have set-in have an unfavourable outcome (2, 7, 10). The preferred management for an intimal flap occluding the arterial lumen, if diagnosed early, is endarterectomy or bypass surgery (2, 8). The vascular injury in our patient was detected on the second post operative day and highlights the importance of close postoperative vigilance. The atypical presentation of an iatrogenic intra-vascular occlusion would continue to elude diagnosis unless the possibility is recognised and a high index of suspicion is maintained.

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