Late-onset bleeding due to displaced lesser trochanter after a short gamma nail: a case report

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Abstract

An 89-year-old female patient presented to the emergency department with a spontaneously occurring and rapidly increasing swelling and pressure pain in her left thigh. Five weeks previously, she had suffered a pertrochanteric femur fracture on the left side following a domestic fall, which was surgically treated with a short gamma nail. Following an uneventful post-operative course, the patient was discharged to a rehabilitation clinic. A CT angiography confirmed the clinical suspicion of bleeding, identifying the profunda femoris artery as the source. The cause of the vascular injury was the displaced lesser trochanter. By implanting a covered stent, the active bleeding was stopped, and after stabilizing the patient, the hematoma was surgically removed, whereby the lesser trochanter was left alone.

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Introduction

Vascular arterial bleeding complications are rare but potentially life-threatening complications following surgical osteosyntheses of proximal femur fractures.[1] These fractures account for 20% of all fractures in Germany, making them the most common type of fracture.[2,3] Projections indicate that by 2050, the global annual incidence of femur fractures is expected to reach 4.5 million.[4] In 1997, Gullberg *et al.* calculated that the incidence of femoral fractures would double from 1990 to 2025 and then double again by 2050, reaching between 7.3 and 21.3 million.[5] In view of the increasing number of fractures requiring surgical treatment, a further rise in the number of complications is also to be expected.

In vascular arterial complications, ischemic and hemorrhagic injuries are distinguished. Regarding localization, both intrapelvic and extrapelvic arterial vascular lesions can occur, with the latter being more common.[6] In most cases, the lesions involve the profunda femoris artery and its branches, followed by vascular lesions of the external iliac artery.[6] In addition to acute intraoperative bleeding, injuries caused by bony fragments play an important role in late-onset bleeding, and due to their potentially life-threatening course, these injuries require rapid diagnosis and treatment.

Case Report

An 89-year-old female patient was admitted on November 26, 2024, to the emergency department by the ambulance service following a fall at home. Clinical and imaging examinations revealed a pertrochanteric femur fracture on the left, which was surgically treated with a short gamma nail. Due to perioperative blood loss with a hemoglobin drop from 12 g/dL to 6.4 g/dL, an

erythrocyte concentrate was administered on the same day, and a large cutaneous and subcutaneous hematoma was clinically observed around the surgical wound on the left thigh and confirmed by an ultrasound. The hematoma had significantly regressed by the end of the inpatient's stay. Upon discharge on December 8, the patient was mobile with full weight-bearing, using a walking frame; her hemoglobin level was 9.4 g/dL, and subsequent rehabilitation took place (Figure 1).

On January 12, five weeks after the primary treatment of the femur fracture, the patient presented to the emergency department with a growing and painful hematoma on the left lateral side of the proximal thigh previously operated on. Consistent with the extensive hematoma on the thigh, laboratory tests revealed a hemoglobin level of 7.2 g/dL. During follow-up, the hemoglobin level dropped further to 6.4 g/dL, indicating acute bleeding, and an emergency CT angiography was performed. This revealed a large hematoma accumulating contrast medium located ventral to the femoral head, originating from the profunda femoris artery. The medially displaced lesser trochanter and a second cup-shaped bone fragment caudal to the lesser trochanter were identified as the vascular injury causing the bleeding (Figure 2).

Interventional angiography, including percutaneous transluminal angioplasty (PTA), was performed *via* a crossover technique from the right common femoral artery. A covered stent (BeGraft-Bentley 6.0 x 58) was subsequently inserted into the profunda femoris artery in the region of the vascular injury. Post-intervention, no complications occurred. The following day, despite the persistent hematoma, the thigh hematoma was surgically removed laterally by opening the wound and fascia. Approximately 500 mL of organized hematoma was discharged (Figure 3).

Figure 2. CT angiography showing the active bleeding. The cause of bleeding was attributed to the displaced bone fragment (large white arrow).

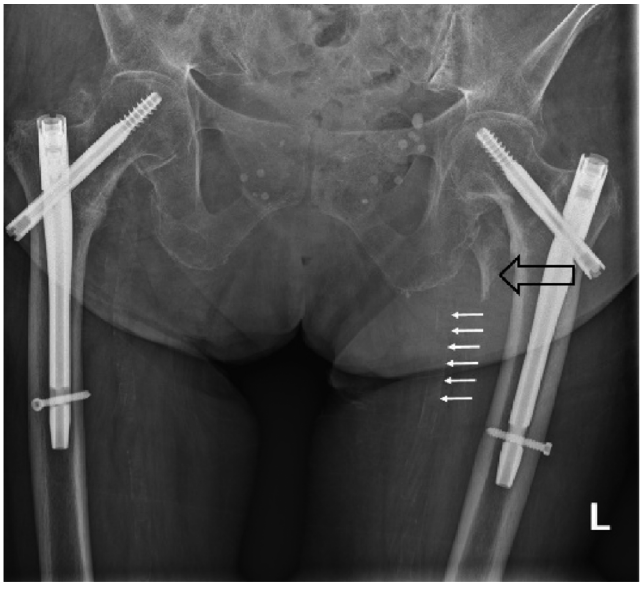

Figure 1. Postoperative image of the left pertrochanteric femur fracture with medially displaced bone fragment (large arrow). The course of the calcified common femoral artery or the superficial femoral artery is shown medial to the fragment (small white arrows).

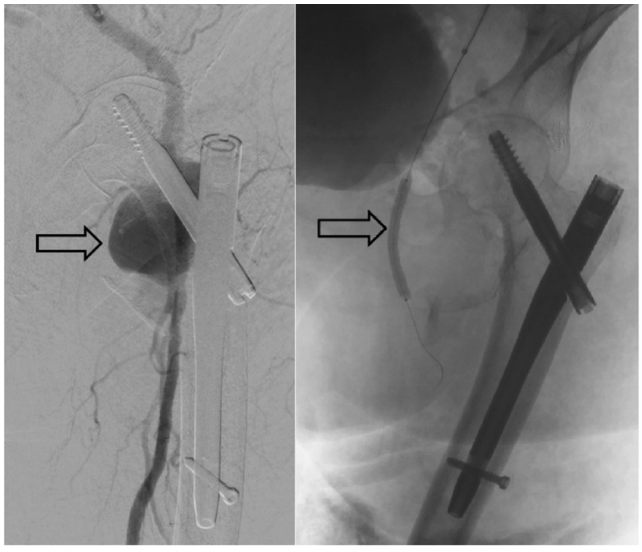

Figure 3. Angiographic representation of the bleeding with placement of the covered stent in the profunda femoris artery (large arrow in images from left to right).

Discussion

As society ages, typical age-related diseases, such as femoral fractures near the hip joint, are becoming more common. Proximal femur fractures and their treatment are associated with significantly increased morbidity and mortality, representing a substantial economic burden on the healthcare system and care services.[7]

The 30-day mortality rate following acute myocardial infarction appears to be lower in many countries,[8,9] than that following a proximal femur fracture.[7,10,11] Possible complications of surgical repair include infections, wound healing disorders, and mechanical complications with cut-out, non-union/delayed union, and peri-implant fractures, as well as bleeding risks.[12]

Vascular complications are uncommon due to the elasticity of vessels. They can be anatomically divided into venous and arterial complications, with the latter being rarer, with an incidence of approximately 0.2% reported in the literature. The extrapelvic vessels are more commonly affected than the intrapelvic vessels, and the majority of these injuries involve the profunda femoris artery and its branches, followed by intrapelvic lesions of the external iliac artery and vein. Vascular compression, intimal tearing with thrombosis, laceration with bleeding, and vessel wall damage leading to pseudoaneurysm formation or an arteriovenous fistula are among the mechanisms of vascular injury.[1]

The first description of such an arterial injury dates back to 1964.[12] Injuries can occur directly at the time of the accident through bone fragments, iatrogenically during intraoperative drilling, through misplacement of Kirschner wires, or while inserting reduction forceps or elevators, but also after several weeks or months due to irritation of the vessel wall caused by protruding screws, for example.[13] Secondary displacement of the lesser trochanter or other bone fragments still represents an infrequent arterial injury in the category of non-iatrogenic injuries. It requires a high level of attention due to its potentially life-threatening course. In approximately 2/3 of these cases, the profunda artery and its branches are injured, followed by the superficial femoral artery. In the case of vascular laceration, there is a rapid drop in hemoglobin, in the worst case leading to hemorrhagic shock,[14] whereas a pseudoaneurysm is more likely to present with soft tissue swelling, continuous bloody discharge from the fasciotomy wound, and anemia, representing the "triad of pseudoaneurysm symptoms".[15]

The diagnosis is usually made by CT angiography. Doppler sonography may be limited due to the location of the profunda femoris artery and requires appropriate expertise.[16] Indirectly, and only in conjunction with clinical findings, radiological findings of a medially or cranially displaced lesser trochanter or medially displaced calcified vessels can be indicative of a possible aneurysm.[17] The therapy depends on the source and size of bleeding and is mainly performed endovascularly; open surgical interventions may also be considered, especially for large lacerations and large aneurysms.[18] Endovascular methods, including coiling, stenting, or their combinations, are employed.

Regarding the displaced and remaining bone fragment, various reports on the procedure can be found in the literature. Surgical removal following vascular ligation[17] is described, as well as leaving the bone fragment in place with successful endovascular treatment without recurrence.[17,19]

In the case presented, five weeks after the fracture, displacement of the lesser trochanter resulted in injury to the profunda femoris artery, which was managed endovascularly. Surgical removal of the lesser trochanter was only considered in cases with an open vascular supply.

Conclusions

Regular postoperative wound checks are essential at 3, 6, and 9 weeks following hospital discharge. This is because late-onset arterial bleeding can be a complication, and as observed in this particular case, it may manifest without warning and without any discernible external factors.

Despite being a very rare complication, given the rising number of elderly patients undergoing surgical interventions for osteoporotic fractures, a corresponding increase in the incidence of this type of complication is anticipated.

Therefore, closely monitoring for any instances of painful and indistinct swelling is particularly crucial if such swelling persists following surgery or if new swelling develops.

In cases of clinical suspicion of bleeding, proceed promptly with further diagnostics and imaging with high specificity and sensitivity, such as CT angiography or angiography with PTA standby.

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