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CASE REPORT

Profunda Femoris Artery Injury Following Internal Fixation with Cannulated Hip Screws for a Femoral Neck Fracture

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Profunda femoris artery (PFA) injury is a rare complication following fracture of the femoral neck. Here, we present a case of a patient with an injured branch of the PFA following internal fixation with cannulated hip screws for a femoral neck fracture. Computed tomography angiography revealed active bleeding from the ascending and descending branches of lateral femoral circumflex artery. We suspected that the cause of the vessel laceration was the sharp tip of the guidewire used during surgery or the closed reduction performed during surgery. The patient was successfully treated with coil embolization. With early recognition and prompt radiological intervention, this rare complication following fracture fixation surgery can be treated without the need for additional surgery.

Key words: Profunda femoris artery, femoral neck fracture, cannulated hip screw

INTRODUCTION

Profunda femoris artery (PFA) injury is a rare complication following fracture of the femoral neck,[1-3] and it can be caused by the initial trauma or subsequent internal fixation.[4] Cases of pseudoaneurysms following arthroscopy, application of an external fixator, fracture, arthrodesis, and internal fixation have been previously reported. A pseudoaneurysm should be suspected if persistent pain, thigh swelling, and unexplained anemia are noted, and further investigations should be performed. The clinical diagnosis can be confirmed with angiography and computed tomography angiography (CTA), and transcatheter embolization can be used for the treatment. Here, we present a patient with an injured branch of the PFA following internal fixation with cannulated hip screws for a femoral neck fracture.

CASE REPORT

A 55-year-old man presented to our department with a displaced subcapital fracture of the right femoral neck [Figure 1]. He had a history of recurrent intracranial hemorrhage with right-side limb hemiplegia and epilepsy syndrome, and he was on piracetam (Nootropil 1200 mg once daily). We performed closed reduction and fixation with cannulated hip screws 7 days after admission [Figure 2]. One version wire was used during surgery, which proceeded unremarkably. There were no intra-operative or immediate postoperative complications. In addition, no vascular or neurological complications were noted on initial examination. However, the swelling was noted over the right proximal femur 4 days after surgery, and blood analysis revealed a hemoglobin level of 8.8 g/dl. Urgent ultrasonography and CTA were performed. CTA revealed active contrast extravasation from the ascending and descending branches of lateral femoral circumflex artery (LFCA), which arises from the PFA [Figure 3]. Based on the bleeding site, we suspected that the cause of vessel laceration was the sharp tip of the guidewire used during surgery or the closed reduction performed during surgery. The bleeding was successfully treated with transarterial embolization using a single vascular occlusion coil (3 mm × 4 cm) [Figure 4]. The patient recovered well and was discharged 19 days after the

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Figure 1: A preoperative plain radiograph of the right hip showing a displaced subcapital fracture of the femoral neck

Figure 2: A postoperative plain radiograph of the right hip after closed reduction and internal fixation with three cannulated screws

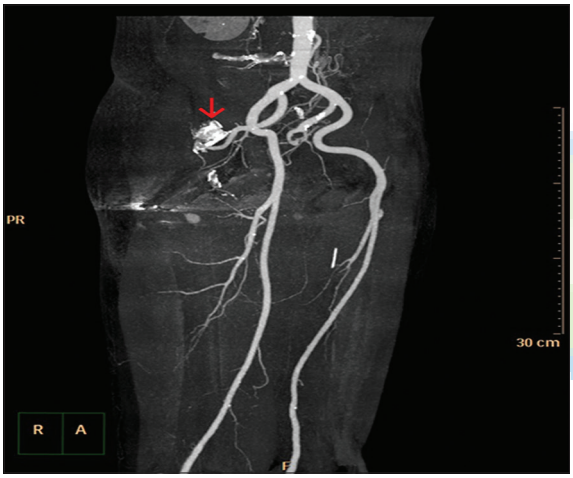

Figure 3: A computed tomography angiography image showing active contrast extravasation from the ascending and descending branches of the lateral femoral circumflex artery (red arrow), which arises from the profunda femoris artery

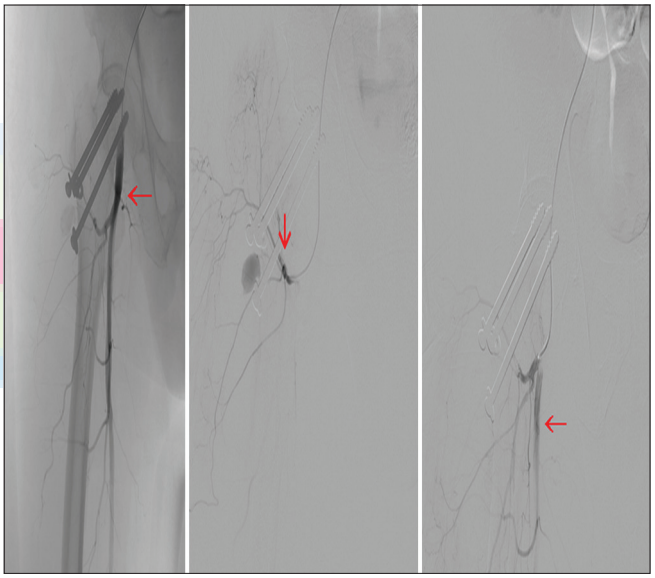

Figure 4: Images showing transarterial embolization with a single vascular occlusion coil (3 mm × 4 cm) (red arrows) for the injury site of profunda femoris artery indicated in Figure 3

initial fixation. At the 12-month follow-up, no complications were noted, and plain radiography revealed bony union without osteonecrosis of the femoral head [Figure 5].

DISCUSSION

The common femoral artery usually bifurcates into the superficial femoral artery and PFA. The LFCA arises from the lateral side of the PFA, travels across the iliopsoas anterior to the femoral neck, runs beneath the sartorius, and lies deep in the rectus femoris. It divides into the ascending, transverse, and descending branches, and one of these branches was likely injured in our case.[5] The relative anterior position of the LFCA increases the risk of injury from a version wire passed along the femoral neck toward the head. Vascular complications after femoral neck fractures are rare. Damage to the vessel can result from the fracture itself (bone spike),[6] or iatrogenic postosteosynthesis (drills, screws, and displaced implants).[7] Femoral artery pseudoaneurysms have been reported to occur after surgical procedures, such as internal fixation for intertrochanteric, subtrochanteric, or intracapsular femoral neck fractures, intramedullary nailing of the femur, core decompression of the femoral head for osteonecrosis, and revision total hip arthroplasty.[8] Injury from a bone spike may occur at the time of initial trauma, during reduction or postoperatively during mobilization and may involve a lesser trochanter fragment, which can migrate with the movement of

Figure 5: A postoperative plain radiograph of the right hip obtained at the 12-month follow-up showing bony union without osteonecrosis or loss of reduction

the hip owing to the function of the attached iliopsoas muscle.[9] A previous study identified technical risk factors specific to dynamic hip screw fixation.[10] The retraction of surrounding tissue that complicates thigh compartment syndrome has been considered in the progression of vessel injury.[11] Sclerotic vessels in the elderly have been reported to prone to injury during torsional manipulation at surgery.[12] In addition, internal rotation of the hip has been reported to move the PFA closer to the femur cortex, increasing the risk of arterial injury.[13]

Our patient was being administered piracetam (Nootropil), which is known to increase the risk of hemorrhage. Piracetam can affect platelets, red blood cells, and vessel walls by increasing erythrocyte deformability and decreasing platelet aggregation, erythrocyte adhesion to vessel walls and capillary vasospasm, resulting in a high risk of arterial injury and bleeding after trauma and surgical interventions.[14]

Acute symptoms onset occurs when the arterial injury is caused by fractured bone fragments at injury or manipulation, or by over-penetration of a drill bit, retractor, or screw. Delayed symptoms onset occurs secondary to prolonged impingement or erosion of the artery by a protruding fixation screw, particularly seen in arteries with atherosclerotic plaques.[13] The injury risk can be decreased by manually clearing the path of the guidewire and by using its blunt end. The diagnosis of arterial injury after fixation for hip fracture is difficult because the injury is usually masked by trauma or other complications, such as deep venous thrombosis. Clinical differentiation between these complications is difficult, and therefore, diagnosis is usually delayed.[13] Without timely management, a pseudoaneurysm may continue to enlarge and eventually rupture, which may result in severe hemorrhage.[15] Potential complications include infection, interference with fracture healing, and thigh compartment syndrome,[16] which can affect adjacent tissues and result in soft tissue destruction, neuropathy, venous obstruction, and thrombosis. In previously reported cases of iatrogenic false aneurysms of the profunda artery, surgical repair (ligation and excision, and suture of the arterial defect) was advocated. Interventional radiological procedures are preferred because most patients with hip fractures are elderly with multiple comorbidities and are poor candidates for a second surgery. Percutaneous transarterial embolization can be performed to avoid a second major surgery and general anesthesia. Embolization at diagnosis can save time and eliminate the risks associated with a second surgery. Limited time is required for coil embolization, and it can even be performed in patients who are on oral anticoagulation therapy. In addition, infection and wound healing problems associated with reintervention can be avoided.[12] With early recognition and prompt radiological intervention, vessel injury following fracture fixation surgery can be treated without the need for additional surgery.

We reported a case of an injured branch of the PFA following internal fixation, which was treated successfully with coil embolization.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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