



Pseudoaneurysm after total knee arthroplasty : A rare complication with different possible clinical presentations

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We report three cases of false aneurysm involving the popliteal artery or one of its branches following total knee replacement. Two of them developed after primary total knee arthroplasty (TKA) and the third one after a revision TKA. False aneurysm is a rare complication of TKA. The main symptom is generally a painful pulsatile mass which develops postoperatively but our cases occurred with three distinct clinical manifestations. Doppler ultrasonographic and angio-CT investigations were used to achieve the correct diagnosis. Two patients were treated by percutaneous embolization ; the third patient required a mini-open surgery with an endovascular prosthesis. No complications were encountered.

Keywords : total knee arthroplasty ; TKA ; pseudoaneurysm ; false aneurysm ; local infiltration analgesia.

INTRODUCTION

Pseudoaneurysms may be caused by trauma, infection, as well as by surgical or diagnostic procedures (8). The popliteal artery is the most frequently involved after TKA but any artery around the knee may be affected (3). The incidence of this complication following total knee replacement is low, but it may be limb- or life-threatening (9). It is essential to pay attention to subclinical presentations that could delay the diagnosis. This is illustrated with the three cases reported.

CASE 1

A 64-year-old man with symptomatic osteoarthritis of his right knee joint underwent a navigated total knee arthroplasty. A non-cemented prosthesis (E-Motion, Braun Aesculap, Tuttlingen, Germany) was implanted through a medial arthrotomy. A thigh tourniquet was inflated at 350 mm Hg during 55 minutes. The immediate postoperative course was uncomplicated but the patient subsequently presented a recurrent knee haemarthrosis and a drainage with haemostasis was necessary after 6 weeks. However, he again presented twice to the emergency room with bleeding through the scar. A duplex ultrasound and CT-angiography were performed and showed a 2.5 hypoechoic mass lateral to the knee which was diagnosed as a pseudoaneurysm of the superior lateral branch of the popliteal artery. The vascular surgeon performed a percutaneous

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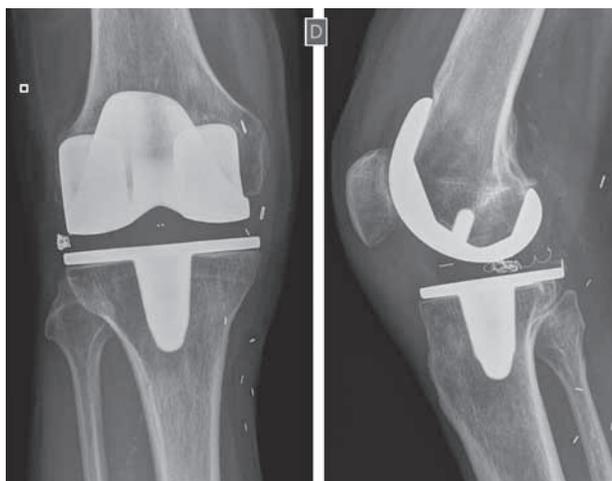


Fig. 1. — Anteroposterior and lateral radiographs showing clips from the first haemostatic intervention and coil embolization of the superior lateral branch of the popliteal artery (case 1).

coil embolization (Fig. 1). The patient had no recurrence of symptoms at one year follow-up.

CASE 2

A 73-year-old man underwent a primary navigated TKA using a cemented Sigma (DePuy) prosthesis through a medial parapatellar approach, with a thigh tourniquet inflated at 350 mm Hg for 50 minutes. The muscular and subcutaneous tissues around the knee were infiltrated with ropivacaine 2 mg/ml and a continuous intra-articular infusion system of ropivacaine was installed. The early postoperative course was uneventful, except for the persistence of a 20° flexion deformity of the knee. The patient was referred to the physiotherapist. He presented to the emergency room 18 days later with a posterior throbbing pain, a stiff knee and a functional disability. He particularly pointed out his inability to fully extend his knee. The duplex ultrasound (Fig. 2) revealed two pseudoaneurysms which were studied by CT-angiography. This showed a 1.5 cm large one in the infrapatellar fat pad, and a 2 cm pseudoaneurysm of the left inferior medial genicular artery which was treated by percutaneous embolization (Fig. 3). Pain relief was immediate.



Fig. 2. — Doppler ultrasound study of a pseudoaneurysm of the left inferior medial genicular artery (case 2).

CASE 3

A 66-year-old woman had undergone in 2000 a total knee arthroplasty, which was revised in 2010 due to complete loosening using a Sigma TC3 prosthesis (DePuy), under a 400 mmHg thigh tourniquet during 120 minutes. She was morbidly obese (BMI = 51.3 kg/m²). After tourniquet release, a posterior bleeding was noted, and advice was sought from a vascular surgeon. He found a minor contusion of the adventice of the popliteal artery. The rehabilitation was slow and the patient complained of calf pain and foot hypoaesthesia without motor involvement. Electromyography revealed an axonal neuritis of the sciatic nerve without motor impairment. Duplex ultrasound showed no deep venous thrombosis. Six weeks later, she fell and developed a swollen knee with a functional disability. Clinical examination revealed a painful pulsatile popliteal mass described as a large pseudoaneurysm by the duplex ultrasound study with a decreased signal in the peripheral arteries (Fig. 4). This was further defined by a computed tomography as a 50 × 40 × 38 mm popliteal pseudoaneurysm, explaining the neurological symptoms. This false aneurysm was managed through a limited approach of the superficial femoral artery, and successfully excluded by a 6 mm × 4 cm endovascular covered stent. Intra-operative angiography control was excellent and the peripheral pulses increased immediately. Clinical follow-up showed no more foot pain.

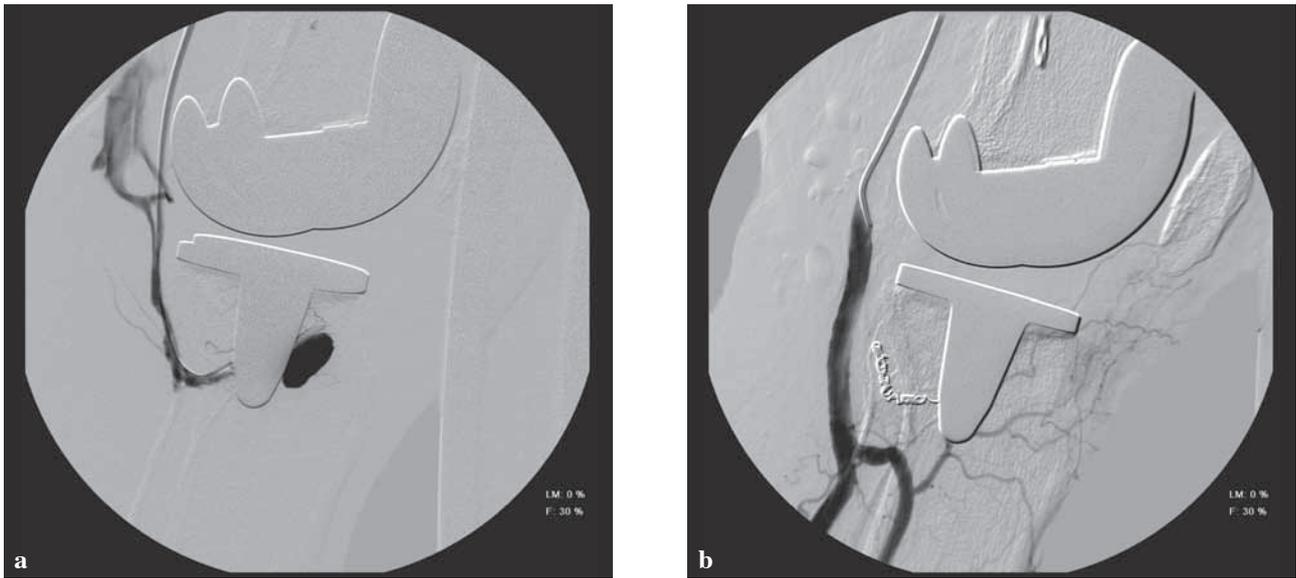


Fig. 3. — Digital subtraction arteriogram demonstrating the pseudoaneurysm of the left inferior medial genicular artery before (a) and after (b) coil embolization (case 2).

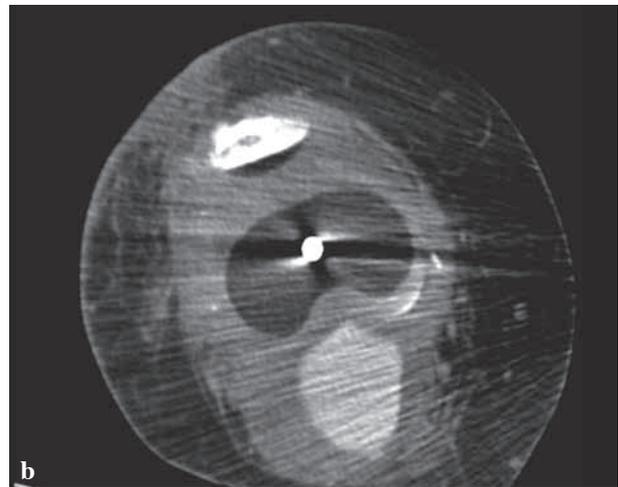
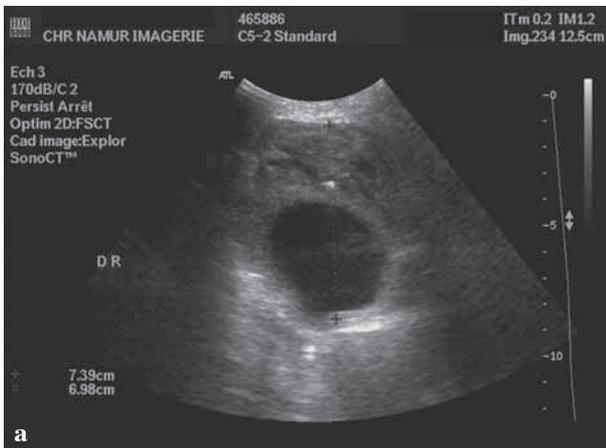


Fig. 4. — Doppler ultrasound showing the popliteal pseudoaneurysm (a) and corresponding view on axial CT angiogram (b) (case 3).

DISCUSSION

Total knee arthroplasty carries a risk for vascular injuries because of the anatomical position of the popliteal artery behind the articulation during the tibial cut in flexion, the posterior capsular release

and excision of the PCL (5,11). Nevertheless, pseudoaneurysms or false aneurysms are infrequently reported after TKA. Most reports show an incidence ranging from 0.03% to 0.2% (1,7), in line with our experience (0.15%). The rarity of this complication, as well as the time interval needed to develop the

pseudoaneurysm may explain the frequent delay before diagnosis.

Any pseudoaneurysm necessarily implies a trauma to the artery (from retractors, oscillating saw, drill, rongeur, heat from bone cement, or from repeated local trauma), except for the infected or mycotic false aneurysm. In one of our cases, the cause of the two concomitant pseudoaneurysms may be the needling during local infiltration of anaesthetics. This does not seem to have been documented in English language literature. As peri- and intraarticular infiltration analgesia is now widely used after arthroplasty, one should be alert to the risk of such arterial complications.

Symptoms include pain, gait disability, neurologic deficits, or cold foot. Clinical signs may involve knee swelling, an enlarging pulsatile mass, thrill, haemorrhage, ecchymosis, sensitive or motor deficit and decreased peripheral arterial pulse.

Further investigation to precise the diagnosis may be first an ultrasound study as it is cheap, sensitive and easily available. Angiography remains a good alternative for both diagnosis and treatment. Computed tomography or magnetic resonance imaging are less useful, as they give too many artifacts around the implants.

Treatment depends on the size and location of the pseudoaneurysm. Doppler guided compression should be attempted for pseudoaneurysms less than 5 cm in diameter (6,10) but percutaneous thrombin or fibrin injection seems to be more efficient (11). Endovascular procedures are particularly interesting and efficient for diagnosis and treatment by direct embolization using coils or thrombin (2). Stent grafts could also be used, as this has become a valid alternative to open repair, although the use of stent grafts across highly mobile joints is still debated (4). Open surgical repair is reserved for cases which could not be managed by endoluminal approaches and need thrombectomy, oversewing, ligation, arterial wall repair by patch, vein graft or arterial bypass. Obesity may be a relative contra-indication to open intervention.

We emphasize the fact that subclinical manifestations may result in misdiagnosis or delayed diagnosis of a pseudoaneurysm. As shown by the three

cases reported, different non-specific clinical complaints can be the first clinical manifestation of a pseudoaneurysm. Our first patient had recurrent haemarthrosis and bleeding through the scar, the second essentially complained of difficulty in rehabilitation owing to a persistent knee flexion deformity, and the third complained of unilateral stocking anaesthesia. Therefore, surgeons should be alert to the possibility of this rare complication which may affect the outcome of the arthroplasty and may even become limb/life-threatening.

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