Case report

Popliteal pseudoaneurysm after unicompartamental knee replacement: A case report

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ARTICLE INFO
Article history:
Received 13 October 2012
Received in revised form 7 February 2013
Accepted 1 March 2013

Keywords:
Pseudoaneurysm
Popliteal artery
Unicondylar knee arthroplasty
Vascular injury

ABSTRACT
Popliteal pseudoaneurysm is a rare but important complication of knee arthroplasties. To our knowledge, this complication has not been reported previously in the literature after unicompartamental knee arthroplasty. Apart from intraoperatively caused arterial injuries, obese patients and other previous cardiovascular diseases may be potential factors of risks for pseudoaneurysm in knee surgeries. As it is an uncommon complication and it has inconspicuous symptoms, both diagnosis and treatment can be delayed. This means that a high level of suspicion is necessary to prevent serious complications derived from pseudoaneurysms.

Level of Evidence: Level IV

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1. Introduction

Vascular complications after total knee arthroplasty are rare but several cases of pseudoaneurysms (PSA) affecting the genicular and popliteal vessels have been reported in the literature [1–5]. However, with unicompartamental knee arthroplasty (UKA) there is a low level of suspicion of vascular injury because these are not well recognized as possible complications. Only one case of compartment syndrome, secondary to arterial thrombosis, complicating UKA has been described previously [6]. We present a case of popliteal PSA in a patient who presented with symptoms similar to a deep venous thrombosis after primary UKA.

2. Case report

A 69 year-old woman with medial osteoarthritis of her left knee underwent a UKA. Her previous medical conditions included hypertension, hyperlipidemia and venous chronic insufficiency but not peripheral arterial diseases. Her body mass index was 38.3 (reference range 20 to 25). She complained of pain in her left knee and radiographs confirmed medial osteoarthritis (Fig. 1). The patient had a range of motion of 0° to 120° on the left knee and 0° to 130° on the contralateral side, without an obvious valgus or varus deformity.

The operation was performed by an experienced senior surgeon (GDF), under spinal and epidural anesthesia. A tourniquet was applied on the thigh for 50 min at a pressure of 350 mm Hg. An Oxford (BIOMET, United Kingdom) unicompartamental prosthesis was implanted with a minimally invasive approach without reaching the quadriceps tendon or elevating the patella. An oscillating saw was used for the vertical and horizontal cuts of medial plateau of the tibia, as well as for the horizontal cut of the femoral condyle. Although the size of the patient’s leg made the surgery slightly more challenging, the procedure was uncomplicated and there was no evidence of intra-operative vascular complications (Fig. 2).

The surgeon did not note any abnormal recurrence of circulation in the left leg after removing the tourniquet. About 12 h after the operation, the patient complained of pain and swelling in her left leg, but both the neurologic examination and the capillary refill were normal. A prophylactic dose of low molecular weight heparin was administered (enoxaparinum natricum 40 mg/24 h). On the 4th post-operative day, the patient was discharged home, having been advised to progressively ambulate with the aid of a walk.

On the 29th post-operative day, the patient complained of extreme swelling below her left knee. Peripheral pulses (pedal and posterior tibial) on left lower limb were not palpable. Ankle-brachial index was used but was inconclusive because the ankle index did not collapse at 200 mm Hg. The patient was examined meticulously, but no other clinical signs were observed. A sonographic examination was used in order to evaluate for a deep venous thrombosis but a mass with pulsatile flow was found in the left popliteal fossa. The mass extended from the popliteal artery with a transverse diameter of 2.9 cm...
and a longitudinal diameter of 4.9 cm (Fig. 3). An arteriogram was performed and a pseudoaneurysm was found extending from the second portion of the popliteal artery (Fig. 4). The peripheral vessels (anterior tibial artery, posterior tibial artery and peroneal artery) were patent. At the time of open pseudoaneurysm resection a partial arterial thrombosis was discovered. An end-to-end bypass with a contralateral saphenous vein graft was successfully performed. At six months’ follow-up, there was no evidence of pseudoaneurysm by duplex sonography. The patient had a range of motion of 0°-100° on the operated knee and was highly satisfied with her outcome.

3. Discussion

Minimally invasive unicompartmental knee arthroplasty is an excellent surgical option to restore painless function in osteoarthritis of one compartment of the knee. Complications have been reported, but vascular injuries are not well recognized, and there are no studies to date that have described these serious problems. To our knowledge, we present the first case of pseudoaneurysm after unicompartmental knee replacement.

When the arterial injury is severe and acute signs are clear, such as white toes without vascular refill or severe pain, the injury is discovered quickly. However, spinal anesthesia could mask and confuse these signs, so it is recommended to take preventive measures or enhance rapid recognition in order to avoid irreversible ischemia and compartment syndrome [6]. Pseudoaneurysm may not be severe and only a small section of the vessel may be injured. In that case, a pseudoaneurysm can be produced and symptoms of arterial thrombosis and recurrent embolisms may occur. The classic presentation is a palpable thrill with a systolic bruit; however, pseudoaneurysms may be non-pulsatile if the cavity is occupied with thrombus, as in our case [7]. The common presenting symptoms are shared with deep venous thrombosis, and include pain, swelling and ecchymosis. These symptoms can appear immediately after the operation or present later, as in a case of geniculate pseudoaneurysm that was diagnosed in the 36th post-operative week [8]. Our patient was diagnosed in the 4th post-operative week with extreme swelling and continuous pain. Peroneal nerve symptoms were not observed in this patient but have been described by other authors [9].

Pseudoaneurysms may occur in the popliteal artery and the superior lateral, inferior lateral and inferior medial genicular arteries [1]. Pseudoaneurysms may be caused by unrecognized injuries. Butt et al. in 2012 described four types of injuries: 1) embolism and arterial thrombosis produced by tourniquet in the context of patients with previous vascular disease; 2) endothelial injuries during surgery due to manipulation associated to relative anchorage of vessels by tourniquet; 3) endothelial injuries by bone prominence or muscle-tendon unit structures after releasing flexion contracture and 4) direct and sharp injury of a vessel caused by surgical instruments [10]. The popliteal artery is situated 1–3 cm from the posterior cortex of the tibia [11]. Other possible mechanisms of injuries have been described as varus-valgus manipulation, hot cement [2] or arterial perforation with a surgical pin [9]. In this case, the patient is an obese patient with other cardiovascular risk factors. Although only 50 min of tourniquet induced ischemia was necessary to complete the unicompartmental knee prosthesis, a possible explanation may be that the anchorage of vessels with the tourniquet combined with both varus-valgus and flexion-extension movements, could have caused the arterial injury. However, we do not have clear evidence that this was the etiological mechanism.

Several types of treatments for pseudoaneurysms have been reported in literature [12,13]. Bypass graft, thrombin injection, endovascular stenting, excision/sewing and embolization have been used in the 20 cases reported in the last 20 years. Lastly, there is a tendency to treat with an endovascular stenting procedure with the advantages of decreased morbidity and hospital stay when compared to open surgery [14,15]. In our case, the vascular surgeons preferred open bypass grafting to preserve range of motion of the knee.

4. Conclusion

Pseudoaneurysm is a rare but serious complication that has not been previously reported after unicompartmental knee arthroplasty previously. We recommend increasing the size of the incision as well as the underlying dissection in obese patients with a previous history of cardiovascular disease in order to decrease tourniquet time and overall limb manipulation. Orthopedic surgeons should consider the possibility of pseudoaneurysm after unicompartmental knee arthroplasty in patients.
with appropriate symptoms. Doppler ultrasonography or angiography is recommended for patients who have undergone UKA and present with continuous pain and prolonged swelling below knee.

5. Conflict of interest statement

1. — Royalties from a company or supplier: none.
2. — Speakers bureau/paid presentations for a company or supplier: none.
3A. — Paid employee for a company or supplier: none.
3B. — Paid consultant for a company or supplier: none.
3C: Unpaid consultants for a company or supplier: none.
4. — Stock or stock options in a company or supplier: none.
5. — Research support from a company or supplier as a Principal Investigator: none.
6. — Other financial or material support from a company or supplier: none.
7. — Royalties, financial or material support from publishers: none.
9. — Board member/committee appointments for a society: none.
In resume: No benefits or funds were received in support of the study.

References