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A case report of an anterior tibial artery pseudo-aneurysm open surgical management: A rare complication post total knee arthroplasty



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ABSTRACT

INTRODUCTION: Complications involving injury to neurological and vascular structures are infrequently reported after total knee arthroplasty (TKA). They are associated with significant morbidity and can be limb threatening.

PRESENTATION OF CASE: We present a patient with an anterior tibial artery (ATA) aneurysm post total knee arthroplasty.

A 69-year-old female was referred for a swelling over her left antero-lateral aspect of her leg 4 years post TKA. Radiological investigations showed an ATA pseudo aneurysm. The aneurysm was repaired by open ligation.

DISCUSSION: ATA pseudo aneurysm is a rare condition post arthroplasty. Patients can complain about calf pain, digits discoloration, paresthesia and the presence of a pulsating or enlarging mass. Symptomatic aneurysms require surgical intervention.

CONCLUSION: ATA pseudo aneurysms are uncommon. They are usually identified shortly after the initial insult. A delayed manifestation of a post knee arthroplasty complication as illustrated in our case is likely the first reported case of its kind. Clinicians should maintain a high index of suspicion should there be persistent localised swelling post TKA. However, due to the rarity of this condition, a variety of interventions have been reported in the English medical literature with probably no compelling evidence that favors one modality over the others.

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1. Introduction

Complications involving injury to neurological and vascular structures are infrequently reported after total knee arthroplasty (TKA), with an incidence ranging from 0.03% to 0.17% [1]. They are associated with significant morbidity and can be limb threatening with arterial thrombosis, arterio-venous fistulation or arterial severance.

We hereby report a rare case of a pseudo aneurysm arising from the anterior tibial artery (ATA) presenting as an enlarging swelling over the antero-lateral aspect of the leg. The patient was managed by a team of vascular surgeons in an academic tertiary hospital.

Multiple reports of pseudo aneurysms following TKA involving the popliteal artery have been described previously at the

time of the surgery. These presented as recurrent haemarthrosis or swelling in the popliteal fossa. However, structural injury to ATA is not common, as it usually arises from the popliteal artery inferior to which the tibial bone is cut.

Our work has been reported in line with the SCARE criteria [2].

2. Case report

A sixty-nine-year-old, female patient with a significant past medical history of hypertension underwent left total knee arthroplasty in 2012 for her left osteoarthritic knee. A lateral parapatellar approach was used followed by implant-specific instrumentations and the insertion of the implants themselves. No adverse intra operative events were noted. She recovered well and was discharged on post-surgery day 5. Subsequently, she was reviewed periodically by the orthopedic surgeons who noted a swelling but she was told merely to observe and no investigations or interventions were done. She re-presented to vascular surgery 4 years later complaining of an enlarging painful swelling with pulsation

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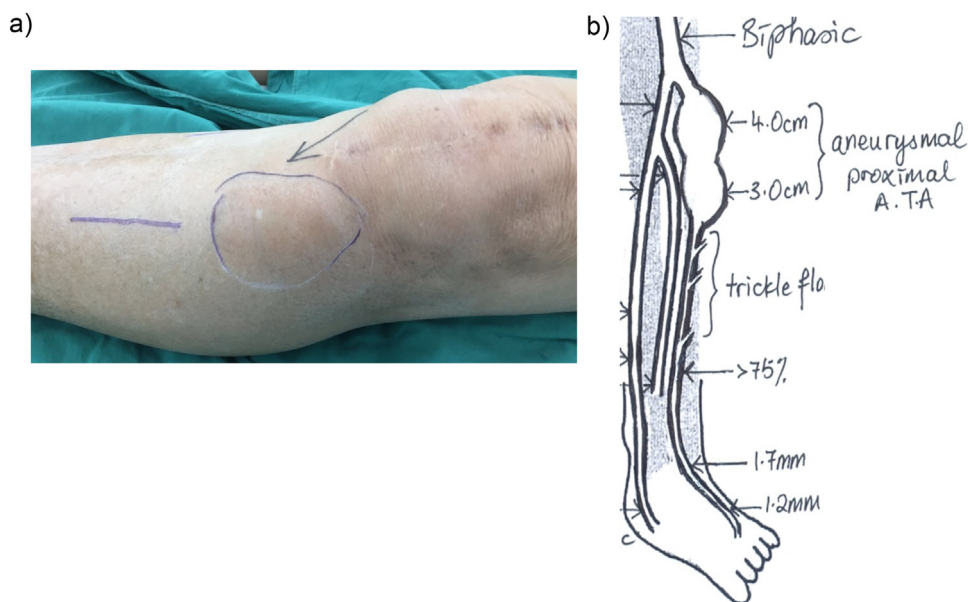


Fig. 1. a. Left anterolateral pulsatile swelling 3 cm × 2 cm. Good clinically popliteal, dorsalis pedis and posterior tibial pulses. b. Aneurysmal proximal anterior tibial artery with good proximal doppler signal but slow flow distally into dorsalis pedis.

around the antero-lateral aspect of her left knee, increasing in size over a 2-month period. Clinical examination revealed a 3 cm × 2 cm fluctuant, pulsatile swelling with no sensory, motor or circulatory deficit (Fig. 1a). Distal pulses of dorsalis pedis, posterior tibial were well palpated. A duplex ultrasound was then performed, which suggested a 4 cm × 3 cm pseudo-aneurysm arising from the ATA with trickle of flow distally (Fig. 1b). She has no symptoms of peripheral vascular disease.

A computed tomography angiography of the left lower limb was then performed to further delineate the anatomy and to assess suitability for endovascular repair. This demonstrated a pseudo aneurysm of the left proximal ATA measuring 6.5 cm in width and 7 cm in length. There was mural thrombus in the posterior aneurysm with associated scalloping of the adjacent bones suggestive of its chronicity of the aneurysm. There was good flow distally via the posterior tibial and peroneal arteries (Fig. 2). In view of the close proximity of this to the origin of the ATA, it was felt that there would be insufficient length proximally either to stent or to embolize, and that an open ligation would be a far more straightforward procedure. This was especially true in view of the minimal run-off via the ATA owing to long term compression of the ATA just distal to the pseudo aneurysm.

The patient subsequently underwent open ligation of the ATA via the medial approach by two senior vascular surgeons. A lateral calf incision over the anterior compartment of the lower limb was then performed to gain access to distal ATA distally. The artery was ligated proximal and distal to the aneurysm. Patient did well post operatively and the drain was removed on day 3 post operatively. She remained well at her 1, 2 and 11-month outpatient review, where the swelling was noted to have significantly decreased in size and the pain resolved.

3. Discussion

Pseudo aneurysm of the ATA is a rare complication following orthopedic knee surgery. Procedures that have been linked to this form of vascular injury include tibial osteotomy [3,4], total knee arthroplasty [5], intramedullary nailing [6] as well as knee arthroscopy [7].

The ATA commences at the lower border of the popliteus muscle, enters the anterior compartment of the leg via an aperture at the interosseous membrane and courses anteriorly on the interosseous membrane medial to the neck of the fibula. As it approaches the ankle joint, it lies more superficially and becomes the dorsalis pedis artery. Of note, the larger posterior tibial artery communicates with the ATA via branches and thus enabling retrograde flow from the PTA to the ATA.

Localized injury to the wall of the ATA leads to blood extravasation which soon becomes tamponaded by the surrounding tissue. Subsequent fibrosis leads to the formation of a pseudo aneurysm which communicates with the lumen of the ATA via its neck. Pseudo aneurysms of the ATA can be asymptomatic or present with swelling, pain, bruising or complications such as tibial nerve palsy, rupture, embolism or thrombosis. Diagnosis can be made with non-invasive imaging (Ultrasound, CT angiography or MR angiography) although digital subtraction angiography is generally accepted to be the gold standard.

While this form of pseudo aneurysm has been reported to thrombose off spontaneously [8], vascular intervention rather than surveillance remains the favored approach in view of the potential catastrophic complications. However, due to the rarity of this condition, a variety of interventions have been reported in the English medical literature with probably no compelling evidence that favors one modality over the others.

Successful treatment of an ATA pseudo aneurysm using open surgery includes repair of the pseudo aneurysm with a saphenous vein interposition graft, as well as resection of the aneurysm followed by primary anastomosis [9]. These two types of operations restore the normal arterial blood flow to the lower limb and are best suited for lower limbs with healing wounds. However, the resection and primary anastomosis option are suitable only in clean, small limited lesions of the ATA [9].

Ligation of the ATA to treat a pseudo aneurysm is the third surgical option reported in the medical literature and is feasible when the posterior tibial artery is patent all the way down to the foot [6,9,14]. First described in 1963, this method is probably based upon the cumulative experience from managing vascular injuries during the major wars of the 20th century. The key learning point from these major human conflicts was that the ATA is a minor vessel

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