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CASE REPORT

Tuberculous False Aneurysm of the Femoral Artery Managed by Endoluminal Stent Graft Insertion

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Introduction

Despite a recent increase in pulmonary tuberculosis,[1] this infection rarely involves the vascular system. Tuberculous aneurysms have been reported mostly in the thoracic[2–6] and abdominal aorta[7–10] and their major branches. Tuberculous aneurysms of the infrainguinal artery are particularly unusual.

Because of the rarity of infected or mycotic aneurysms of the lower limb arteries, and particularly of tuberculous aneurysms, there is no recognised treatment. We report the case of a patient with pulmonary tuberculosis complicated by the development of a tuberculous mycotic false aneurysm of the superficial femoral artery, initially successfully treated by the insertion of an intravascular covered self-expanding metallic stent.

Case Report

A 68-year-old man was admitted with a history of difficulty in walking for 4 days because of a painful lump in his left thigh. There was no history of trauma.

On examination he was unkempt and appeared cachectic and unwell. He was pyrexial with a temperature of 38 °C. He had an expansile mass approximately 15 cm in diameter in the region of the adductor canal of his left leg. The distal pulses were palpable. An examination of his chest revealed decreased air entry and dullness to percussion at the right base. A full blood analysis revealed a haemoglobin of 8.0 gm/dl and a normal white count with a relative lymphopenia of 0.8%. A duplex scan confirmed the presence of a 10-centimetre false aneurysm arising from the distal superficial femoral artery. The ankle–brachial pressure index was 1.

The chest X-ray showed right basal shadowing associated with some pleural thickening. He had been diagnosed with pulmonary tuberculosis on a previous hospital admission 3 months earlier. At that time, a computed tomography (CT)-guided biopsy of the right pleural thickening had histologically confirmed inflammatory changes, with acid-fast bacilli on Ziehl–Neelsen staining, and *Mycobacterium tuberculosis* grown on Löwenstein–Jensen medium. He had been treated with combination anti-tuberculous chemotherapy, but he was not compliant with his medication.

The clinical diagnosis was active pulmonary tuberculosis with a mycotic aneurysm of the superficial femoral artery. He received a blood transfusion and anti-tuberculous medication, rifampicin and isoniazid, was recommenced. Analgesics given for the painful mass were ineffective.

Conventional exclusion of the aneurysm with a short femoropopliteal vein bypass graft was considered to be optimal treatment for this lesion. However, an anaesthetic assessment of the patient's general health precluded either general or epidural anaesthesia. The patient underwent intra-arterial digital subtraction angiography, which showed a false aneurysm of the distal superficial femoral artery. A 4-cm-long 8-mm diameter polyester-covered nitinol stent ('Passager', Boston Scientific, St Albans, U.K.) was inserted percutaneously across the neck of the false aneurysm,

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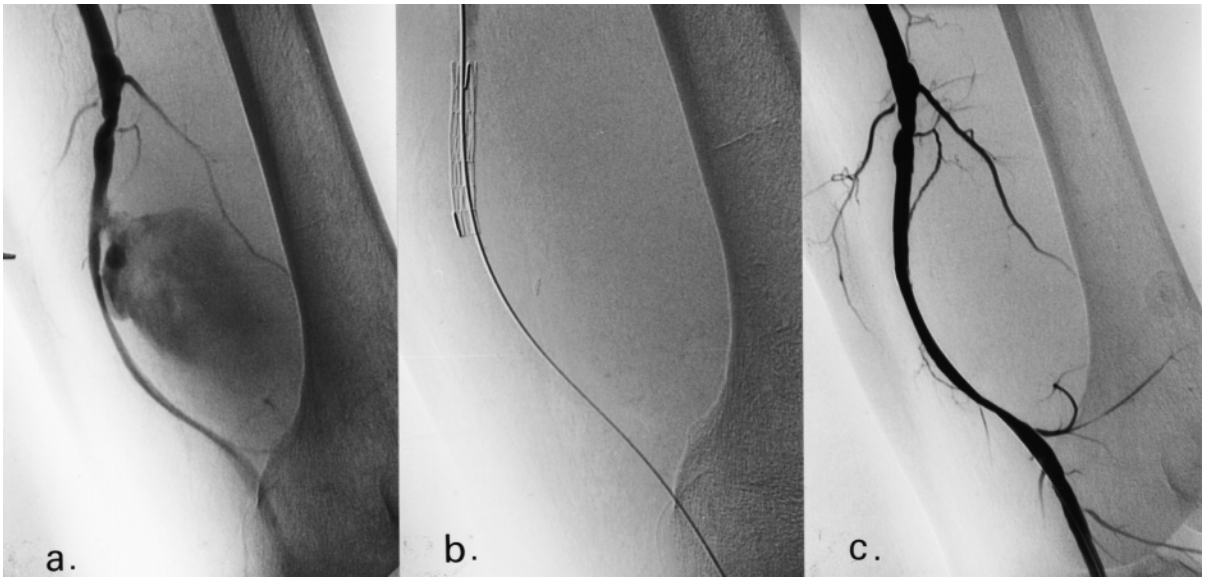

Fig. 1. The successful exclusion of a left superficial femoral artery tuberculous mycotic false aneurysm shown by intra-arterial digital subtraction angiography: (a) there is a 10 cm false aneurysm with a narrow neck arising from the distal superficial femoral artery, with compression of the popliteal artery by the large false aneurysm; (b) an 8-mm × 4-cm covered stent has been placed in the artery across the neck of the aneurysm; (c) the false aneurysm cavity has been totally excluded.

which totally excluded the false aneurysm cavity (Fig. 1). This resulted in rapid relief of his leg pain.

The patient remained pyrexial after the insertion of the stent graft. When he was reassessed for anaesthesia, he was deemed fit to undergo an evacuation and drainage of the clot from the false aneurysm cavity. Culture of the clot grew *Mycobacterium tuberculosis.* The swinging pyrexia persisted despite initial drainage. A gallium scan revealed accumulation in the region of the left knee. The cavity was drained on a further two occasions in the following 3 months. Microbiological cultures taken from the false-aneurysm cavity repeatedly grew a mixed growth of coliform bacilli, which was treated with amoxycillin–clavulanic acid.

Five months after admission the patient had greatly improved, mobilising slowly but persisting with a swinging pyrexia. Duplex scan confirmed patency of the stent, and there was no clinical evidence of septic embolisation in the left leg. Blood cultures were consistently sterile. The decision was taken to remove the stent and perform a femoropopliteal bypass as originally intended, as the stent graft was considered to be the most likely source of continuing infection.

A reversed ipsilateral long saphenous vein graft was used for a femoropopliteal bypass after the removal of the stent and ligation of the native superficial femoral artery proximal and distal to the neck of the mycotic aneurysm. The stent was patent and fully intact. Culture of the stent revealed a growth of *Citrobacter koseri.* He was started on a course of amoxycillin–clavulanic acid, to which this organism was sensitive. Throughout the 2 weeks following the stent removal, the patient remained pyrexial.

The pyrexia settled after the patient's anti-tuberculous medication was converted from oral to intravenous treatment. Unfortunately, 1 month later the patient died following a myocardial infarction, confirmed at post-mortem examination.

Discussion

There have been eight previous case reports of tuberculosis of the femoral artery, seven reported between 1906 and 1962, which were all summarised by Mulmed[11] in 1980 when he also reported a similar case. The most recent report was in 1989, the cause being recorded as Calmette–Guerin bacillus (BCG) dissemination to the femoral artery following immunisation.[12] BCG has also been reported as infecting an abdominal aortic aneurysm and a graft subsequently inserted to treat it.[13]

Tuberculosis appears to have a predilection for the thoracic aorta and the innominate arteries,[9,10,14] presumably as a result of direct spread from involved adjacent pulmonary segments. The involvement of extrathoracic arteries presumably results from haematogenous spread. Haematogenous spread may allow infecting organisms to settle within the thrombus lining an existing aneurysm. However, the reporting of an incidentally discovered tuberculous focus of an

otherwise healthy renal artery suggests that primary infection of an arterial wall is the most likely occurrence.[15] This type of infection may cause thinning of the arterial wall with mycotic aneurysm formation, which in turn may rupture, leading to the development of a false or pseudoaneurysm, which is the most frequently reported variety of tuberculous aneurysm.

Untreated, tuberculous aneurysms have resulted in rupture with exsanguination of the patient. Mycotic aneurysms of the extra-aortic arterial tree are amenable to debridement of infected tissue and primary repair with direct suture, closure using an autologous vein patch, or reconstruction using autologous vein. These techniques are not feasible in the aorta where tuberculous aneurysms have most frequently been reported, and therefore synthetic grafts and patches must be used. Perioperative antituberculous chemotherapy is mandatory in all cases to decrease the incidence of infection in the implanted graft, which should itself be antibiotic impregnated.

The patient reported was sufficiently unwell to prohibit a general anaesthetic. Minimally invasive treatment was considered optimal in the first instance to achieve control of the false aneurysm and the severe pain resulting from it. The intravascular stent proved to be an effective temporary treatment. The stent was removed because of a pyrexia, which persisted despite repeated drainage. The culture of *Citrobacter koseri* from the stent graft vindicated the conversion to femoropopliteal bypass grafting using autologous vein. The secondary infecting organism was unexpected, though stent graft-related infection, with potentially catastrophic consequences, has been reported in even sterile insertion sites.[16,17]

Stent grafting does not appear to provide a permanent endovascular solution to an infected femoral artery aneurysm, though adequate temporary control may be easily achieved. The insertion of a Palmaz stent covered in autologous saphenous vein has been successful in treating a mycotic false aneurysm of the femoral artery[18] and, because of the absence of a synthetic covering, this may be a better option for infected aneurysms. Antibiotic-bonding of gelatin or collagen-impregnated stent grafts may also prove to be more effective long-term treatment of mycotic aneurysms, particularly as they have been shown to be effective in the aorta, and rifampicin is frequently the antibiotic of choice. However, reports of long-term success in stenting mycotic aneurysms with composite stent–autologous vein graft combinations or antibiotic-bonded stent grafts are not available.

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