Bilateral peroneal artery aneurysms

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ABSTRACT

True aneurysm of the tibial arteries is a rare clinical condition. We report the case of a 67-year-old man who presented with a gradual onset of right calf swelling and pain. Imaging revealed large aneurysms arising from the proximal peroneal arteries bilaterally, measuring 7.4cm and 4cm on the right and left respectively. A detailed medical history, clinical examination and laboratory investigations did not identify evidence of an underlying cause. A surgical reconstruction with an interposition vein graft was successfully performed. To our knowledge, this is the first reported case of primary aneurysm of the peroneal artery in the English literature. We undertook a systematic literature review to identify all reported cases of primary aneurysms of the tibial arteries. The clinical presentation, modes of investigation and interventional treatments are discussed.

KEYWORDS

Aneurysm – Peroneal artery – True

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True aneurysm of the tibial arteries is a rare clinical condition.¹ The pathogenic mechanisms are largely unknown but they have been linked to an inflammatory process.² More commonly reported aetiologies of aneurysms arising from the crural arteries include arterial trauma and infection, resulting in pseudoaneurysm formation.²

To our knowledge, a true aneurysm of the peroneal artery has not been reported previously. We describe a case of primary bilateral peroneal artery aneurysms treated successfully with surgical reconstruction. A systematic review of the literature was carried out to identify all reported cases of true aneurysms of the tibial arteries. Baseline demographics, clinical characteristics, methods of treatment and outcomes are compared.

Case history

A 67-year-old man was referred to our tertiary vascular centre with an 8-week history of right calf pain and swelling. He denied claudication symptoms affecting his legs. His past medical history was significant for ischaemic heart disease (treated previously with a coronary artery bypass and percutaneous coronary intervention) and hypertension. He never smoked, and was otherwise fit and well. Clinical examination identified a non-pulsatile swelling on the posteromedial aspect of the calf with a smooth and normal overlying skin. A full complement of femoral and infrainguinal pulses was present bilaterally.

Duplex ultrasonography showed a 7.4cm aneurysm arising from the peroneal artery. Contrast enhanced computed tomography (CT) confirmed a patent saccular aneurysm at the proximal segment of the right peroneal artery with concentric mural thrombus and a lumen of 3cm (Fig 1). The distal peroneal artery remained patent. The posterior tibial artery was of small calibre but patent. CT also revealed a 4cm aneurysm in the proximal segment of the contralateral peroneal artery with a fusiform morphology, and normal appearances of the arteries proximal and distal to the aneurysm (Fig 2).

A detailed medical history, clinical examination and laboratory investigations failed to identify evidence of an underlying cause of the aneurysms. Echocardiography was normal, the patient was afebrile, blood cultures were negative, inflammatory markers were not raised and there was no history of trauma to the legs.

The case was discussed at our multidisciplinary team forum, where surgical and endovascular treatments were considered. A decision was made to treat the aneurysms with a surgical bypass operation. The patient gave informed consent. The aneurysm was accessed through a medial calf incision. The distal popliteal artery was dissected and the anterior tibial vein was ligated to allow mobilisation of the tibioperoneal trunk. The proximal anterior and posterior tibial arteries and the peroneal artery were controlled with vessel loops. Balloon occlusion catheters were used in the peroneal artery proximal and distal to the aneurysm for haemostatic control. The aneurysm was successfully repaired

Figure 1 Computed tomography of the 7.4cm aneurysm arising from the right peroneal artery

Figure 2 Three-dimensional computed tomography of bilateral peroneal artery aneurysms

with resection and interposition of a reversed great saphenous vein graft. The tibial nerve was identified and preserved.

The operation was accomplished with no complications. Perfusion of the leg was preserved with a palpable dorsalis pedis and posterior tibial pulse. The patient had an uneventful postoperative course and was discharged on day 4. At the six-week follow-up visit, the patient reported no claudication symptoms. He remained well six months later. Histological analysis demonstrated a partially thrombosed true atherosclerotic aneurysm with no signs of infection, arteritis or connective tissue disorder. Intraoperative thrombus samples were sent for extended microscopy, culture, sensitivity and polymerase chain reaction analysis; no organisms or growth were seen. On this occasion, a vasculitis screen was not requested.

The left side aneurysm was asymptomatic. However, a decision was made to operate in few months' time and contralateral surgery is now planned at a later date.

Discussion

The popliteal artery is the most frequent site of true peripheral aneurysms.³ True aneurysms of the tibial arteries are uncommon. Pseudoaneurysms secondary to infection, trauma or iatrogenic injury have been reported.⁴ Infective endocarditis, as a result of Gram-positive organisms in

intravenous drug abusers, is the main cause of mycotic aneurysms.⁵

To our knowledge, there have been no reported cases of bilateral or single true primary peroneal artery aneurysm. The saccular morphology of the right peroneal artery aneurysm indicates a possible previous rupture of a true aneurysm resulting in a combination of a true and false aneurysm. Five cases of peroneal artery aneurysm of mycotic aetiology have been described in the literature and are summarised below.^{6–10}

Ferrero *et al* reported a 69-year old man with a sudden onset of pain in the right calf without signs of leg ischaemia.⁶ The diagnosis of a mycotic peroneal artery aneurysm was made based on the unusual location of the aneurysm, clinical presentation and positive blood cultures. The aneurysm was treated with coil embolisation and placement of a covered stent.

Another mycotic aneurysm was described by McKee and Ballard.⁷ They reported a 15-year-old boy with bilateral peroneal artery aneurysms resulting from *Candida* endocarditis following a cardiac valve replacement operation. Symptoms and clinical signs included pyrexia, a systolic murmur and a pulsatile mass with a thrill on the medial aspect of the calf. The left peroneal artery aneurysm was treated with an open surgical repair (resection) whereas the right-sided aneurysm was repaired with coil embolisation.

Albayrak *et al* reported a mycotic aneurysm of the peroneal artery in a 37-year-old man who presented with weakness, sweating, cough, weight loss and right calf pain.⁸ Blood cultures confirmed the presence of *Staphylococcus aureus* infection, suggestive of infective endocarditis. Echocardiography also confirmed vegetations on the mitral and aortic valve. Surgical treatment was undertaken with ligation of the peroneal artery proximal and distal to the aneurysm.

A further report described a 61-year-old woman with a history of infective endocarditis secondary to *Acinetobacter* following tooth extraction.⁹ Soon afterwards, she developed pain and swelling in the left calf, and a mycotic aneurysm of the peroneal artery was identified. Surgical excision of the aneurysm was performed successfully.

Another pseudoaneurysm arising from the peroneal artery was reported in a 72-year-old man with a large firm mass below the right popliteal fossa.¹⁰ The patient had had a previous episode of septicaemia due to *Staphylococcus aureus*, after which he developed a painless swelling in the right calf. Treatment consisted of direct human thrombin injection.

Four true aneurysms of the tibioperoneal trunk have been reported (Table 1).^{11–14} In three of these cases, the patients presented with a pulsatile and/or painful mass.^{11,15,14} Other symptoms necessitating urgent investigations have been described, including blue toe syndrome.¹⁴ A high index of suspicion is required for a prompt diagnosis. In one of the reported cases, the aneurysm was initially misdiagnosed as myalgia in the right gastrocnemius muscle because all

Table 1 Summary of literature on true aneurysms of the tibial arteries and tibioperoneal trunk

	Age / sex	Method of treatment	Outcome	Clinical framework
Cappendijk, 1999 ¹¹	60 F	Saphenous vein bypass	Symptoms resolved. Graft patent at 15 months following intervention.	<i>Presentation:</i> Persistent pain and palpable mass in the right calf. No history of trauma. <i>Aetiology/risk factors:</i> Hypertension, dyslipidaemia <i>Investigations:</i> DUS, CT arteriography <i>Diagnosis:</i> Aneurysm of the tibioperoneal trunk
Spronk, 2003 ¹²	52 F	Excision of the aneurysm followed by reconstruction using a venous patch	Ischaemic symptoms disappeared completely. Patent neotibioperoneal trunk.	<i>Presentation:</i> Painful, ischaemic toes of right foot <i>Aetiology/risk factors:</i> Smoking <i>Investigations:</i> DUS, arteriography <i>Diagnosis:</i> Partially thrombosed aneurysm measuring 2.5cm at the origin of the right tibioperoneal trunk
Ferrero, 2011 ¹³	66 F	Aneurysmectomy with end-to-end anastomosis	Discharged in good general condition with complete pain relief and palpable foot pulses. Vessel patency with absence of stenosis, pseudoaneurysm or recurrent aneurysm at 69 months.	<i>Presentation:</i> Pulsatile and painful mass in the right calf <i>Aetiology/risk factors:</i> Hypertension, dyslipidaemia <i>Investigations:</i> DUS, selective arteriography <i>Diagnosis:</i> Giant tibioperoneal trunk aneurysm
Faccenna, 2011 ¹⁴	67 M	Saphenous vein bypass	Discharge on day 8. Relief of symptoms. Posterior tibial pulse present. Bypass patent at 3 months.	<i>Presentation:</i> Pulsatile and painful mass in the anterolateral compartment of the right leg and blue toe syndrome <i>Aetiology/risk factors:</i> No history of trauma, claudication and/or foot ischaemia or risk factors for atherosclerotic disease <i>Investigations:</i> DUS, arteriography <i>Diagnosis:</i> Saccular aneurysm involving the tibioperoneal trunk and the origin of the peroneal and posterior tibial arteries

CT = computed tomography; DUS = duplex ultrasonography, M = male, F = female

peripheral pulses were present, the capillary refill was normal and routine blood tests were unremarkable. In addition, establishing a diagnosis for a peroneal artery aneurysm is not always easy since general symptoms such as claudication, pain, swelling, blue toe and ischaemic leg are neither suggestive nor typical. The main diagnostic modalities for this condition are duplex ultrasonography and/or CT or magnetic resonance imaging.

Absolute indications for interventional treatment have not been clearly defined. It has been suggested that symptomatic aneurysms, those with intraluminal thrombus and those of a large size should be repaired.^{15,16}

The choice of treatment (surgical or endovascular) depends on variables such as the size, shape and location of the aneurysm, along with the patient's co-morbidities and general fitness for reconstructive surgery.¹⁷ Surgical repair can be accomplished with an interposition vein bypass graft. Ligation is also an option in the presence of adequate collateral circulation.¹⁸ Endovascular repair consists of coil embolisation with or without covered stent placement. These methods are good alternative treatments for high risk patients for conventional surgical repair.¹⁷ In our case, given the large size of the aneurysm with possible pressure effects on adjacent structures and the relative fitness of the patient, a surgical option was deemed appropriate.

Conservative treatment in asymptomatic patients and/or those with small aneurysms as well as elderly patients and those with a significant co-morbid burden has been suggested with continuous monitoring of the aneurysm using duplex ultrasonography.^{12,19} Treatment should be tailored to the patient's general condition, co-morbidities, and aneurysm site and shape.

Conclusions

True aneurysm of the peroneal artery is a rare clinical condition. Surgical repair with vein interposition graft is a viable treatment option.

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