Cystic Adventitial Disease of Popliteal Artery: Case Report

Lewis Meecham, MB BCh¹ Anna Wright, MB ChB¹ Amarjit Atwal, BM BS¹

¹Department of Vascular Surgery, Worcestershire Royal Hospital, Worcester, Worcestershire, United Kingdom

Address for correspondence Amarjit Atwal, Department of Vascular Surgery, Worcestershire Royal Hospital, Worcester, Worcestershire, United Kingdom (e-mail: Amarjit.Atwal@wrcsacute.nhs.uk).

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Abstract

Keywords

- ▶ claudication
- ▶ popliteal artery
- ▶ peripheral arterial disease
- ▶ percutaneous

Cystic adventitial disease (CAD) is a rare cause of arterial stenosis. A total of 85% of cases are usually found in the popliteal artery. Men in their fourth and fifth decade are more commonly affected. If untreated the disease will progress eventually ending in occlusion of the affected vessel and limb-threatening ischemia. With this in mind an effective and long-lasting treatment is required, and here we present a case with CAD of the popliteal artery and discuss the merits of different treatment strategies.

Cystic adventitial disease (CAD) is a rare but well documented form of nonatherosclerotic arterial stenosis; it most often affects the popliteal artery but can affect any artery or vein.¹ It most commonly affects men in their fourth and fifth decade of life. Its etiology is uncertain with four theories being implicated. The trauma theory hypothesizes degeneration from repetitive trauma and cyst development. The ganglion theory suggests synovial cysts track along the synovial vessels eventually settling in the adventitia of major vessels. The systemic disorder theory implicates connective tissue disorders as the cause of CAD. The most widely accepted is the developmental theory; this theory proposes undifferentiated mesenchymal cells which are destined to form the joint, nest within the arterial adventitia of the adjacent blood vessels. These become active, secreting mucoid material forming the adventitial cysts.^{2,3}

Options for treatment include excision of cysts, removal of the diseased segment of artery, and interposition vein graft or radiological aspiration.³ We present a case of CAD of the popliteal artery and its subsequent management and discuss the merits of the known treatment strategies.

Case Presentation

A 41-year-old male fireman presented to the vascular clinic with a 2-month history of intermittent left calf claudication at 800 yd. Before this, he was fit and well, with no history of trauma and no risk factors for peripheral vascular disease. No conditions ran in the family and he was a nonsmoker.

Examination was unremarkable except absent dorsalis pedis pulses bilaterally. Resting ankle brachial pulse index (ABPI) was 1.0 on the right and 0.9 on the left, and his ABPI did drop to 0.37 on the left immediately after exercise with loss of the posterior tibial pulse. Initially, popliteal entrapment was suspected and magnetic resonance angiography (MRA) was arranged.

MRA (▶Fig. 1) revealed CAD of the left popliteal artery causing stenosis of the lumen. He was listed for surgical exploration and underwent excision of the cysts from the diseased segment.

It appeared that this approach had been successful until 7 months later when the patient developed intermittent claudication at 500 yd. Duplex ultrasonography revealed 80% stenosis at the previous site of cyst excision. His popliteal artery was re-explored and showed recurrence of CAD. The disease segment of artery was removed and an interposition vein graft placed. He was commenced on lifelong aspirin 75 mg OD and has remained asymptomatic with patency of the graft since.

Discussion

CAD is a rare condition. This adds challenges when attempting to establish the gold standard treatment. Several treatments have been published in case reports and small series. Published reviews have attempted to collate the data and comment on successful outcomes. By far the most widely

Fig. 1 Magnetic resonance imaging showing left popliteal cyst.

reported is surgical cyst excision. As the lumen in CAD is intact and the stenosis is due to external compression, removal of the cyst relieves said compression and allows the lumen to return to normal diameter without damage to the vascular endothelium, which is thought to be beneficial. Tsolakis et al report a success rate of 94%; however, more recent literature reports success rates at 85% failure is most often due to cyst recurrence.³⁻⁶

Surgical excision of the diseased segment with interposition vein grafting is the second most reported technique. This technique is successful in between 93.5 and 95% of cases,^{3,5} its failures are due to neointimal hyperplasia causing stenosis at the graft anastomosis and thrombotic occlusion of the vein graft.

Radiological-guided aspiration of cysts has been reported with mixed results. Some cases have required multiple aspirations before satisfactory resolution, some attempts have failed due to thickness of the fluid, and some have been successful. Although cyst preserves autologous endothelium, which is highly desirable, long-term CAD does recur after aspiration rendering this treatment strategy as ineffective.²

Extra-anatomical bypass grafting would address the issue of compromised arterial supply, providing the anastomosis remained free from stenosis, this however would not address the local inevitable pressure effects from continued cyst expansion.⁷

Other treatment approaches have been attempted but not widely practiced due to their poor outcomes. These include arteriotomy and patch angioplasty, intraoperative cyst aspiration, and end-to-end native artery anastomosis.

Endovascular treatments comprising percutaneous transluminal angioplasty with or without stents have been reported, these have however been unsuccessful, it is thought that endovascular treatment has a very limited role in this condition.^{3,8}

Interposition vein graft involves popliteal fossa exploration. This exposure is invasive and carries potential for

morbidity; chronic pain, nerve damage, and fascial hernia are all recognized complications. These are less likely with less invasive procedures. Long-term success requires full cyst excision, for this to be performed adequately popliteal fossa exploration is mandatory.

Referring to our case, excision of cysts was attempted initially with good immediate results. Unfortunately, these recurred within a matter of months necessitating further surgery. On this occasion, it was felt that excision of the diseased segment and interposition vein graft would be a more definitive procedure with less likelihood of recurrence and better long-term outcome.⁵ To date, this has proven to be a good decision. The patient is now 2 years postprocedure with satisfactory follow-up scanning and is asymptomatic.

Conclusion

In our experience excision of cysts in CAD is an ineffective treatment, the risk of recurrence is high and inevitably leads to excision of the diseased segment and placement of an interposition graft. Currently, no evidence supports the use of an endovascular treatment strategy, we would recommend interposition grafting as the treatment of choice for CAD.

Conflicts of Interest

None.

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