



CASE REPORT

ANEURYSM OF THE POPLITEAL ARTERY: CASE REPORT

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ABSTRACT

Popliteal artery aneurysms lead to many dreadful conditions if left untreated. We report a case of a 63-year-old man who presented with a pain in the lower extremity as a result of a popliteal artery aneurysm. He underwent surgery through a posterior approach with saphenous vein graft interposition. The presentation, investigation and treatment of this condition is discussed.

Keywords: Popliteal artery , Aneurysm, Management

POPLİTEAL ARTER ANEVİRİZMASI: VAKA SUNUMU

ÖZET

Popliteal arter anevrizmalarının tedavi edilmediğinde birçok istenmeyen duruma neden olduğu bilinmektedir. Popliteal arter anevrizması nedeni ile alt ekstremitte ağrısı ile başvuran 63 yaşındaki bir hastaya posterior yaklaşım ile safen ven interpozisyonu uygulanmıştır. Hastalığın tanısı ve tedavisi bu vaka sunumunda tartışılmaktadır.

Anahtar Kelimeler: Popliteal arter, Anevrizma, Tedavi

INTRODUCTION

The popliteal artery is the most common site for aneurysm formation among the peripheral arteries¹. A popliteal artery aneurysm (PAA) mostly affects elderly men, and atherosclerosis plays a major role in the etiopathophysiology of this disease^{2,3}. Management of PAA requires a great concern. It is known that when PAAs are left untreated, the risk of complications increases and the patients may encounter many dreadful situations, the worst being limb loss^{3,4}.

The objective of this report is to present a case of a PAA and review the recent literature about the diagnosis and management of PAAs.

CASE REPORT

A 63-year-old man was admitted to our institution with right lower limb pain of two months aggravated by walking and edema. There was no prior history of claudication. He had previously been seen by an orthopedic surgeon for his symptoms. Analgesic treatment and a simple knee brace were recommended. However, the patient's symptoms persistent for another month and he was then referred to our clinic. Digital subtraction angiography of the lower extremities was performed. This examination revealed a PAA with a diameter of 40x34 mm (Fig. 1) and the patient was scheduled for surgery. Doppler ultrasonography was performed to control the abdominal aorta and

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both carotid arteries, which were normal. A preoperative coronary angiogram was also normal. Under general anesthesia, the patient was prepared and draped in the supine position. The right greater saphenous vein was harvested beginning at the saphenofemoral junction and ending above the knee. The patient was then put in the prone position and the popliteal artery exploration was performed through a posterior incision. The aneurysm sac was adherent to the adjacent tissues. After systemic heparinization, the popliteal artery was clamped above and below the aneurysm. The aneurysm sac was entered and a huge amount of organized thrombus material was removed (Fig. 2). After this, the greater saphenous vein interposition was performed between the distal and proximal ends of the popliteal artery through an end to end anastomosis (Fig. 3).



Fig. 1: Digital subtraction angiography showing the popliteal artery aneurysm.

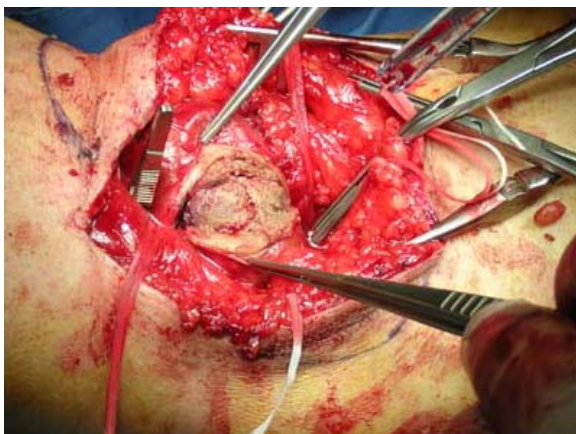


Fig. 2: Organized thrombus material removed from the aneurysm sac.

There was a sufficient pulse over the saphenous vein. After a normal postoperative course, the patient was discharged on postoperative day 7. One month postoperatively, a magnetic resonance angiography of the right lower limb showed a patent saphenous vein graft and his physical examination was normal with palpable popliteal and distal pulses on the postoperative tenth month.

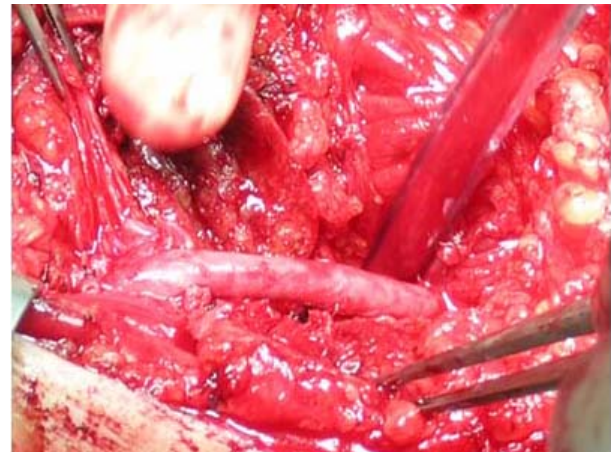


Fig. 3: Picture showing the saphenous vein graft interposition between the distal and proximal ends of the popliteal artery.

DISCUSSION

The diagnosis of PAAs is not straightforward because of their nonspecific manifestations. As in our case, the patients usually refer to orthopedic surgeons with vague symptoms such as pain and edema in the lower limb. There may be a pulsatile mass at the popliteal region unless the aneurysm is thrombotic. Otherwise, the diagnosis is challenging and mostly an incidental finding on knee X-rays. It is suggested that nearly one third of the patients with PAA are asymptomatic at the time of diagnosis⁵.

The prevalence of PAA is 1% in the general population, it is often bilateral and associated with abdominal aortic aneurysms^{6,7}.

The uncertainty over the normal size of the popliteal artery leads to debates in the definition of PAA. In recent studies, the diameter of the normal popliteal artery is measured to be less than 9mm^{8,9} which was the accepted diameter of the popliteal artery in the textbooks¹⁰. Although symptomatic



aneurysms of any size should be treated surgically, the management of asymptomatic PAAs is controversial^{11,12}. The accepted threshold for surgical treatment of asymptomatic PAA is considered to be 20mm in diameter^{5,13}. However, it should be kept in mind that the smaller aneurysms also carry the risk of complications¹⁴.

The symptom profile of PAA ranges from intermittent claudication to rupture of the aneurysm and 50% of asymptomatic PAAs develop symptoms within 2 years after their discovery^{15,16}. It has been reported that surgery has a low mortality rate in asymptomatic patients and prevents ischemic complications that may occur due to thrombosis or distal embolism from the aneurysm¹⁷. Thrombus within an aneurysm is an indication for elective surgery whatever the size of the PAA¹⁸. Surgical intervention of an asymptomatic PAA has a high limb salvage rate and better outcome than symptomatic aneurysms¹⁹. In a study which reviewed 51 cases of PAA, the primary patency rates were 100% at 1 year and 85.6% at 5 years for the limbs undergoing elective repair²⁰.

Medial and posterior approaches are the most preferred incisions for PAA surgery. Medial approach enables the surgeon to harvest the saphenous vein graft from the same incision and allows access to distal arteries. It is suggested that the posterior approach is a simple and safe method and enables aneurysmectomy when PAA is saccular²¹. We preferred surgical repair in this case through a posterior incision using the saphenous vein as a conduit. The five year patency rate of surgical repair of asymptomatic PAAs is nearly 80% with vein grafts and this leads to increased rates of limb salvage².

Nonsurgical treatment of PAA is another topic open to discussion. Recently, with the advances in endovascular techniques, especially in aortic aneurysms, the peripheral aneurysms also became candidates for this conservative approach. Endovascular approach has some advantages over surgical repair in lower extremity aneurysms as it does not cause high amounts of bleeding, the patients recover in a short period of time and

also the hospital stay is shorter²². However, this technique has some disadvantages where PAA is concerned and it is reported that stents at the popliteal region are not as effective as for femoral or iliac aneurysms²³. Because the popliteal artery is a branching artery and it is located at the knee joint, endografts may kink during knee joint movement and kinking of the grafts may cause important problems¹⁷. There are two large series of endovascular treated PAAs to date. In both of these studies, the most widely used stent graft was Haemobahn/Viabahn (W.L. Gore and Associates, Inc., Flagstaff, AZ, USA). This stent graft is highly flexible and it is appropriate for PAAs^{24,25}. These studies state that the patency rates of open surgery and endovascular treatment of PAAs are similar in selected cases with suitable anatomy.

Endovascular treatment was not suitable in our case because the proximal and distal neck of the aneurysm had a length of <1cm which could not offer a secure site of fixation of the stent. As a conclusion, the management of asymptomatic PAAs is still controversial. Elective surgery seems to be the better alternative since it has high graft patency and limb salvage rates. The diagnosis of PAAs should always be kept in mind when a patient refers with a lower limb pain especially in the popliteal region because as stated by Guvendik et al, PAAs are described as being 'sinister harbingers of sudden catastrophe'²⁶.

REFERENCES

1. Debasso R, Astrand H, Bjarnegard N, Ryden Ahlgren A, Sandgren T, Lanne T. The popliteal artery, an unusual muscular artery with wall properties similar to the aorta: implications for susceptibility to aneurysm formation? J Vasc Surg. 2004;39:836-842.
2. Galland RB. Popliteal aneurysms: controversies in their management. Am J Surg 2005;190:314-318.
3. Kanko M, Burma O, Ozkan H, Akosman A. Peripheral arterial aneurysms. Turkish J Thorac Cardiovasc Surg 1997;5:296-299.
4. Pulli R, Dorigo W, Troisi N, et al. Surgical management of popliteal artery aneurysms: which factors affect outcomes? J Vasc Surg 2006;43:481-487.
5. Dawson I, Sie RB, Van Bockel JH. Atherosclerotic popliteal aneurysm. Br J Surg 1997;84:293-299.
6. Dawson I, Sie R, Van Baalen JM, Van Bockel JH. Asymptomatic popliteal aneurysm: elective operation versus conservative follow-up. Br J Surg 1994;81:1504-1507.



7. Varga ZA, Locke-Edmunds JC, Baird RN. A multicentre study of popliteal aneurysms. Joint Vascular Research Group. *J Vasc Surg* 1994;20:171-177.
8. Morris-Stiff G, Haynes M, Ogunbiyi S, et al. Is assessment of popliteal artery diameter in patients undergoing screening for abdominal aortic aneurysms a worthwhile procedure? *Eur J Vasc Endovasc Surg* 2005;30:71-74.
9. Wolf YG, Kobzatsev Z, Zelmanovich L. Size of normal and aneurysmal popliteal arteries: a duplex ultrasound study. *J Vasc Surg* 2006;43:488-492.
10. Van Bockel JH, Hamming JF. Lower extremity aneurysms. In: Rutherford RB, editor. *Rutherford vascular surgery*, 6th ed. Philadelphia: Saunders; 2005: 1534-15351.
11. Schellack J, Smith RB, Purdy GD. Nonoperative management of selected popliteal aneurysms. *Arch Surg* 1987;122:372-375.
12. Gouny P, Bertrand P, Duedal V, et al. Limb salvage and popliteal aneurysms: advantages of preventive surgery. *Eur J Vasc Endovasc Surg* 2000;19:496-500.
13. Naylor AR. Regarding "Small popliteal aneurysms: are they clinically significant?" *J Vasc Surg* 2003;37:909-910.
14. Ascher E, Markevich N, Schutzer RW, Kallakuri S, Jacob T, Hingorani AP. Small popliteal aneurysms: are they clinically significant? *J Vasc Surg* 2003;37:755-760.
15. Michaels JA, Galland RB. Management of asymptomatic popliteal aneurysms: the use of a Markov decision tree to determine the criteria for a conservative approach. *Eur J Vasc Surg* 1993;7:136-143.
16. Hirsch AT, Haskal ZJ, Hertzner NR, et al. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic): a collaborative report from the American Association for Vascular Surgery/Society for Vascular Surgery, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, Society of Interventional Radiology, and the ACC/AHA Task Force on Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Peripheral Arterial Disease): endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation; National Heart, Lung, and Blood Institute; Society for Vascular Nursing; TransAtlantic Inter-Society Consensus; and Vascular Disease Foundation. *Circulation* 2006;113:e463-654.
17. Antonello M, Frigatti P, Battocchio P, Sandro L, Cognolato D, Dall'Antonia A, et al. Open repair versus endovascular treatment for asymptomatic popliteal artery aneurysm: results of a prospective randomized study. *J Vasc Surg* 2005;42:185-93.
18. Galland RB, Magee TR. Popliteal aneurysms: distortion and size related symptoms. *Eur J Vasc Surg* 2005;30:534-8.
19. Mahmood A, Salaman R, Sintler M, Smith S, Simms MH, Vohra RK. Surgery of popliteal artery aneurysms: a 12-year experience. *J Vasc Surg* 2003;37:586-93.
20. Aulivola B, Hamdan AD, Hile CN, Sheahan MG, Skillman JJ, Campbell DR, et al. Popliteal artery aneurysms: a comparison of outcomes in elective versus emergent repair. *J Vasc Surg* 2004;39:1171-7.
21. Beseth BD, Moore WS. The posterior approach for repair of popliteal artery aneurysms. *J Vasc Surg* 2006;43:940-5.
22. Nagarajan M, Chandrasekar P, Krishnan E, Muralidharan S. Repair of iliac artery aneurysms by endoluminal grafting. *Tex Heart Inst J* 2000;27:250-2.
23. Henry M, Amor M, Heny I, Klonaris C, Tzvetanov K, Buniet JM, et al. Percutaneous endovascular treatment of peripheral aneurysms. *J Cardiovasc Surg* 2000;41:871-3.
24. Tielliu I, Verhoeven ELG, Zeebregts CJ, Prins TR, Span MM, Van Den Dungen JJ. Endovascular treatment of popliteal artery aneurysms: results of a prospective cohort study. *J Vasc Surg* 2005;41:561-7.
25. Mohan IV, Bray PJ, Harris JP, May J, MS Stephen, Bray AE, et al. Endovascular popliteal aneurysm repair: are the results comparable to open surgery. *Eur J Vasc Endovasc Surg* 2006;32:149-54.
26. Guvendik L, Bloor K, Charlesworth D. Popliteal aneurysm: sinister harbinger of sudden catastrophe. *Br J Surg* 1980;6:294-296.