



Open Repair of a Giant Popliteal Artery Aneurysm Presenting with Nerve Compression Symptoms

Masaya Nakashima¹ and Masayoshi Kobayashi²

¹Department of Vascular Surgery, Tokoname Municipal Hospital, Tokoname, ²Department of Cardiovascular surgery, Fujita Health University Graduate School of Medicine, Toyoake, Japan

Popliteal artery aneurysm (PAA) is a rare vascular disease, especially in women, and presents with various symptoms, ranging from being asymptomatic to rupture or acute life-threatening ischemia. We have presented a case of PAA in an 81-year-old woman complaining of tingling sensations in her leg. Computed tomography revealed a large 10-cm sized PAA. Because of the compression related symptoms, an open repair approach was selected and performed successfully via a posterior approach, including partial aneurysm resection and interposition graft with a reversed saphenous vein.

Key Words: Popliteal artery, Saccular aneurysm, Bypass surgery, Limb salvage, Neuralgia

Received November 23, 2020

Revised February 12, 2021

Accepted February 21, 2021

Corresponding author: Masaya Nakashima

Department of Vascular Surgery,
Tokoname Municipal Hospital, 3-3-3
Asukadai, Tokoname, Aichi 479-8510,
Japan

Tel: 81-569-35-3170

Fax: 81-569-34-8526

E-mail: tkdr-3697@tac-net.ne.jp

<https://orcid.org/0000-0003-4608-9533>

Copyright © 2021 The Korean Society for Vascular Surgery

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Vasc Specialist Int 2021;37(1):37-40 • <https://doi.org/10.5758/vsi.200077>

INTRODUCTION

Popliteal artery aneurysm (PAA) is a rare type of peripheral artery aneurysm that is usually detected incidentally on computed tomography or ultrasonography. PAA can also cause sudden distal thrombotic and embolic occlusion, which is potentially limb-threatening. Typically, PAA may be the finding of a prominent pulsatile popliteal mass, and compression of the nerve or vein by an enlarging PAA may cause numbness, pain, and edema. This report presents a literature review of successful open repair of large PAAs causing nerve compression. The patient and her family provided consent for publication of this report.

CASE

An 81-year-old woman with a history of stroke on aspirin 100 mg/day was admitted to the orthopedic department with complaints of occasional numbness in the left lower extremity and walking disturbance. She complained of in-

termittent tingling sensations in her left leg and a pulsatile mass in the left popliteal region that had been present for a few years. She did not seek medical attention and was still working as a hairdresser. Over time, the numbness and weakness in the left leg worsened. Urgent magnetic resonance imaging revealed a massive left-sided popliteal mass containing thrombus and no musculoskeletal abnormalities. She was immediately referred to the vascular surgery department. Contrast-enhanced computed tomography revealed a PAA containing a partially organized thrombus in the left lower extremity (Fig. 1A). Three-dimensional computed tomography revealed a solitary fusiform aneurysm of the left popliteal artery and the absence of abdominal and contralateral peripheral aneurysms. Ultrasonography revealed a compressible superficial mass measuring 100 mm in diameter in the left popliteal fossa (Fig. 1B). Laboratory investigations revealed a fibrin degradation product (FDP) level of 51.5 µg/mL and a D-dimer level of 28.7 µg/mL, suggesting activation of the fibrinolytic system. The vascular abnormality was diagnosed as a giant PAA presenting

with symptoms of sciatic nerve compression.

Given the motor and sensory symptoms in the lower limb, we opted for open surgical repair of the PAA. First, we harvested the length of the contralateral great saphenous vein (GSV) from the right thigh in the supine position. A slightly lazy S-shaped skin incision was then made in the upper popliteal fossa with the patient in the prone position (Fig. 2A). The common peroneal nerve was attached to the PAA, and saved during the dissection. After systemic injection of 3,000 U unfractionated heparin, the aneurysm was opened tangentially, mural thrombi were removed, and internal sutures were made in bleeding branches. After partial resection of the PAA, an interposition graft with a reversed GSV was performed in an end-to-end fashion with a running 5-0 polypropylene suture (Fig. 2B). Pathological

examination of the resected aneurysm showed intimal and medial layers that were thickened by thrombus with mild fibrosis of the wall.

The postoperative course was uneventful and neurological symptoms gradually disappeared. Postoperative computed tomography revealed a patent bypass graft (Fig. 3). Postoperative 2 months later, laboratory investigations revealed an FDP level of 6.8 µg/mL and a D-dimer level of 1.9 µg/mL. Heparin was injected for 2 days postoperatively and switched to oral warfarin for 1 year as an anticoagulation therapy. She was discharged without any serious sequelae and was faring well at the 5-year follow-up evaluation.

DISCUSSION

PAA is usually caused by atherosclerosis but may also result from trauma, congenital disorder, mycotic infection, or inflammatory arteritis. PAA is more common in men over 60 years of age with a history of cardiovascular disease and

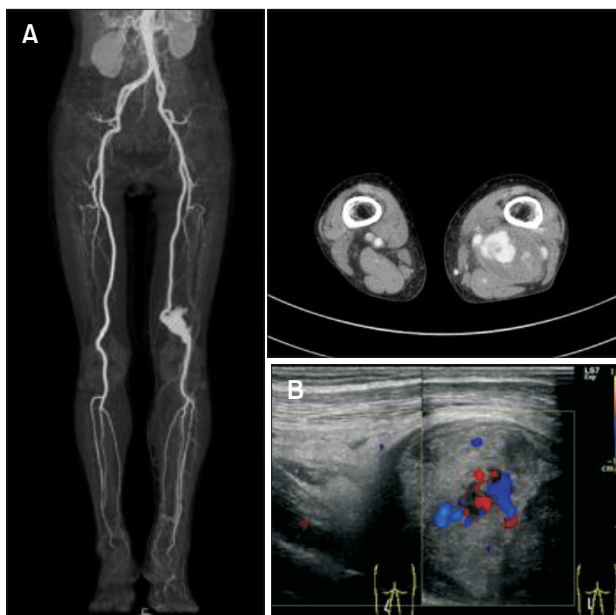


Fig. 1. (A) Computed tomography showed a huge aneurysm with thrombus from the midthigh to popliteal fossa. (B) Ultrasonography showed a left popliteal giant mass filled with thrombus.



Fig. 3. Postoperative computed tomography showed patent bypass graft.

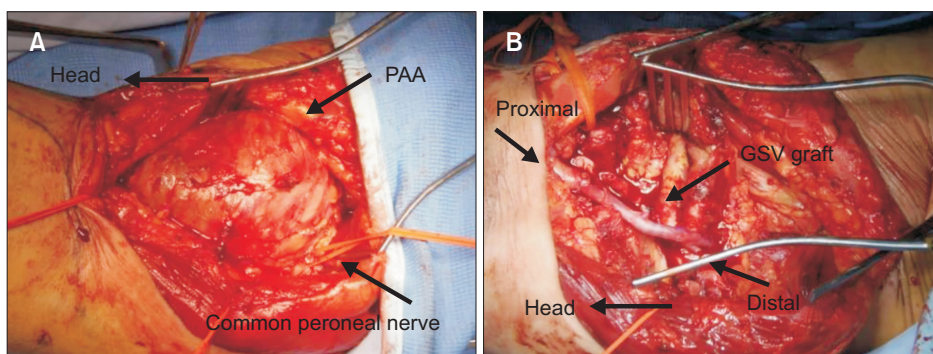


Fig. 2. (A) Operative findings of the giant popliteal artery aneurysm (PAA) with the patient in the prone position. (B) Operative image after partial aneurysmectomy and interposition graft. The left popliteal artery was reconstructed with a reversed great saphenous vein (GSV) graft.

may be bilateral and associated with thoracic or abdominal aortic aneurysm [1,2]. PAA is the most common type of peripheral artery aneurysm, accounting for approximately 70%–80% of cases and is much less frequent in women [1–5]. Although poor distal runoff is a risk factor for ischemic complications in asymptomatic cases, patients with PAA are at high risk of acute life-threatening thromboembolic limb ischemia and occasionally require amputation [4]. In Europe and the United States, more than half of cases are asymptomatic, and embolic ischemia or neurological abnormalities involving the lower limb are rare [2,5]. The most common presentation is an ischemic lower limb with symptoms of coldness, claudication, and rest pain secondary to peripheral embolization or thrombosis [1,3,5]. Compression related symptoms, such as numbness, pain, and edema, may occur if nerve and venous tissues are compressed by an enlarging giant popliteal aneurysm in a relatively small compartment. In 2017, Ravn et al. [6] reported three distinct differences that in 1,509 patients with PAA, 74 patients (4.9%) were women. The prevalence of PAA seems to be similar to men with the disease, but bilateral PAA was less common in women, and symptomatic PAA is more often <20 mm in diameter. This could be explained by the fact that woman generally have smaller blood vessels than men. We encountered a case of giant PAA in woman presenting with peripheral neuropathy of an orthopedic neurological compression from aneurysm. Anatomically, the inner portion of nerves in the popliteal lesion contains an extensive network of epineural vessels. The sciatic nerve divides into the common peroneal and posterior tibial nerves in the posterior mid-thigh. Neurological symptoms of in the lower limbs can arise from several different mechanism and causes compressed by a peripheral aneurysm and hematoma. In 2018, Rahimizadeh et al. [7] reported a case of posterior tibial neuropathy secondary to the compressive effect of a traumatic pseudoaneurysm of the proximal segment of the anterior tibial artery. However, some patients may present with symptoms of compression (swelling of the leg caused by venous thrombosis and neurological disturbance) involving a vein or nerve as result of the mass effect associated with giant popliteal aneurysm.

Endovascular treatment of PAA was first reported in 1994 by Marin et al. [8]. Open repair for popliteal aneurysm is gold standard treatment for PAA, and endovascular treatment may be considered based on the patient's age, surgical risk, symptoms and size and location of the aneurysm. The decision to perform open surgery for giant PAA presenting with neurological disorder should be individualized according to the symptoms and needs of the patient. Open surgery has been selected in many patients with emergent rupture or poor runoff, infection, and giant aneurysm,

and in young patients. However, the current evidence supports the use of endovascular treatment in high-risk and/or elderly patients. Furthermore, open surgical repair with autogenous vein grafting has been reported to have an acceptable primary patency rate [9,10]. In 1997, Society for Vascular Surgery recommended that symptoms of nerves or vein compression should be included in the exclusion criteria for endovascular treatment [11].

There are severe limitations to endovascular therapy. The patency rates of stent graft vary from report to report because of the different types of procedures at different centers, length/location of the anatomical lesion, and underlying disease. Device-related implications include stent graft endoleak, migration, dislocation, collapse, and occasional need for surgical conversion. Orthopedic and biomechanical stress between the stent graft and the native popliteal artery when the knee is in flexion is the most likely cause of stent graft migration and fracture. Therefore, the patient must be advised to avoid knee flexion beyond 90° postoperatively. The quality of runoff, diameter and length of the stented segment, and type of device are important considerations in terms of the patency and durability of the stent graft.

We opted for an elective open surgical repair using an autogenous reversed saphenous vein conduit in the prone position via a posterior approach. This report documents a rare case of leg numbness/weakness due to PAA formation and the effectiveness of classical arterial bypass surgery in relieving compression symptoms in an elderly woman.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

Masaya Nakashima

<https://orcid.org/0000-0003-4608-9533>

Masayoshi Kobayashi

<https://orcid.org/0000-0001-5830-1509>

AUTHOR CONTRIBUTIONS

Concept and design: MN. Analysis and interpretation: MN. Data collection: MN. Writing the article: MN. Critical revision of the article: MK. Final approval of the article: MN, MK. Statistical analysis: none. Obtained funding: none. Overall responsibility: MN.

REFERENCES

- 1) Dent TL, Lindenauer SM, Ernst CB, Fry WJ. Multiple arteriosclerotic arterial aneurysms. *Arch Surg* 1972;105:338-344.
- 2) Galland RB. History of the management of popliteal artery aneurysms. *Eur J Vasc Endovasc Surg* 2008;35:466-472.
- 3) Gaylis H. Popliteal arterial aneurysms. A review and analysis of 55 cases. *S Afr Med J* 1974;48:75-81.
- 4) Huang Y, Gloviczki P. Popliteal artery aneurysms: rationale, technique, and results of endovascular treatment. *Perspect Vasc Surg Endovasc Ther* 2008;20:201-213.
- 5) Dawson I, Sie RB, van Bockel JH. Atherosclerotic popliteal aneurysm. *Br J Surg* 1997;84:293-299.
- 6) Ravn H, Pansell-Fawcett K, Björck M. Popliteal artery aneurysm in women. *Eur J Vasc Endovasc Surg* 2017;54:738-743.
- 7) Rahimizadeh A, Davaei M, Shariati M, Rahimizadeh S. Posterior tibial neuropathy secondary to pseudoaneurysm of the proximal segment of the anterior tibial artery with delayed onset. *J Brachial Plex Peripher Nerve Inj* 2018;13:e15-e19.
- 8) Marin ML, Veith FJ, Panetta TF, Cynamon J, Bakal CW, Suggs WD, et al. Transfemoral endoluminal stented graft repair of a popliteal artery aneurysm. *J Vasc Surg* 1994;19:754-757.
- 9) Huang Y, Gloviczki P, Noel AA, Sulivan TM, Kalra M, Gullerud RE, et al. Early complications and long-term outcome after open surgical treatment of popliteal artery aneurysms: is exclusion with saphenous vein bypass still the gold standard? *J Vasc Surg* 2007;45:706-713; discussion 713-715.
- 10) Golchehr B, Zeebregts CJ, Reijnen MMPJ, Tielliu IFJ. Long-term outcome of endovascular popliteal artery aneurysm repair. *J Vasc Surg* 2018;67:1797-1804.
- 11) Rutherford RB, Baker JD, Ernst C, Johnston KW, Porter JM, Ahn S, et al. Recommended standards for reports dealing with lower extremity ischemia: revised version. *J Vasc Surg* 1997;26:517-538.