

Popliteal Artery Aneurysms and Popliteal Phymas

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For the differential diagnosis of popliteal phymas, popliteal artery aneurysms are evaluated. They are frequent among peripheral aneurysms. However, diagnosis is difficult in some patients because clinical symptoms vary. We report 2 patients who consulted our hospital for popliteal phymas. In these patients, surgery was performed via a posterior approach. In 1 patient, reconstruction was conducted using a great saphenous vein graft (SVG). Even when employing the posterior approach, SVG collection and reconstruction are possible without changing the posture for short-distance reconstruction. This procedure may prolong patency in comparison with artificial blood vessels. (Ann Thorac Cardiovasc Surg 2009; 15: 64–67)

Key words: popliteal artery aneurysm, popliteal phyma, posterior approach

Introduction

Popliteal artery aneurysms are relatively frequent among peripheral aneurysms. However, the overall incidence is 0.01% or less in inpatients.¹⁾ There are few opportunities for consultation, and symptoms vary: asymptomatic conditions to acute lower limb ischemia. Therefore diagnosis is sometimes difficult. In this study, we report 2 patients with popliteal artery aneurysms in whom popliteal phymas were detected at different times, and the etiologies varied.

Case Reports

Case 1

A 48-year-old male. His medical history was not contributory. He smoked (smoking index 1,120). He consulted the Department of Orthopedics for right popliteal pain and intermittent claudication, and he

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underwent puncture following a tentative diagnosis of Baker's cyst. Arterial hemorrhage was noted, and compression hemostasis was carried out. Detailed examination revealed a popliteal artery aneurysm measuring 45 × 48 mm, and the patient was referred to our department. In the right popliteal region, a nonpulsatile phyma was detected. The dorsal artery of the right foot was impossible to palpate. The ankle brachial pressure indexes (ABPIs) for the left and right were 1.2 and 0.9, respectively. Computed tomography (CT) and magnetic resonance imaging (MRI) revealed a popliteal artery aneurysm measuring 45 × 48 mm, with a thick thrombus in the inner area, in the right popliteal region (Fig. 1). Surgery was performed. Under general anesthesia, the patient was placed in the prone position, and the aneurysm was exposed via a posterior approach. Above and below the aneurysm, it was blocked and resected. Reconstruction was performed with a saphenous vein graft (SVG) collected through the ipsilateral lower thigh. A true aneurysm was suggested. After surgery, intermittent claudication subsided, and the dorsal artery of the right foot became palpable. The ABPI value for the right was 1.0.

Case 2

A 73-year-old female. She had 3 underlying diseases: bilateral occlusive arteriosclerosis, diabetes, and angina pectoris. She had undergone coronary bypass for angina

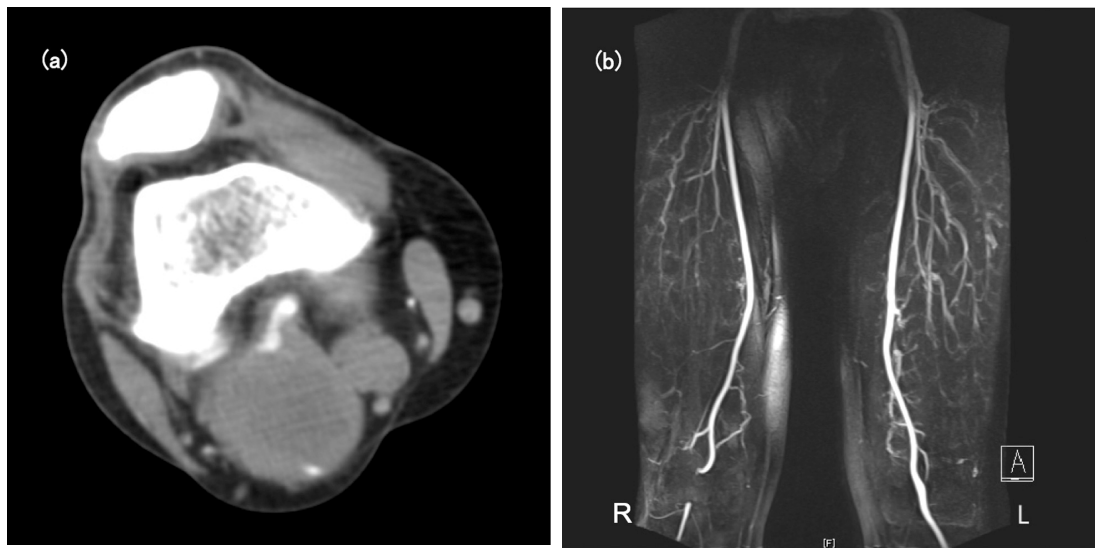


Fig. 1.
a: Right popliteal artery aneurysm of 45 × 48 mm with a thrombus inside.
b: Blood flow degradation near the right popliteal artery aneurysm.

a | b



Fig. 2. Left popliteal artery aneurysm of 23 × 35 mm with no thrombus inside (arrow).

pectoris. To treat bilateral occlusive arteriosclerosis, lower limb bypass with an SVG had been performed. At a local clinic, an asymptomatic pulsating phyma in the left popliteal region was suggested. In the left popliteal region, a pulsating phyma was noted. Palpation revealed no abnormalities in the lower limb blood vessels. The ABPI values for the left and right were 0.8 and 0.9, respectively. CT and MRI showed a popliteal artery aneurysm measuring 23 × 35 mm, with no thrombus in the inner area (Fig. 2). For differential diagnosis, SVG dilatation and an aneurysm at the anas-

tomotic site were considered. We exposed the aneurysm via our posterior approach and examined the lumen. Dilatation of the previous SVG was suggested. The aneurysm was resected, and reconstruction was performed using an expanded polytetrafluoroethylene (ePTFE) graft. After surgery, the patient was discharged without complications.

Discussion

In Europe and the United States, popliteal artery aneu-

rysms are most frequent among peripheral aneurysms of the limbs. The incidence follows that of femoral artery aneurysms. Aneurysms in these 2 sites account for 70% of peripheral aneurysms.²⁾ In Japan, the incidence of popliteal artery aneurysms ranges from 15 to 28% among peripheral aneurysms of the limbs, following that of femoral artery aneurysms (50%). According to some studies, bilateral aneurysmal development or simultaneous development with an abdominal aortic aneurysm is observed in approximately 50% of patients.^{1,3,4)} In most patients, the etiology is associated with arteriosclerosis,⁵⁾ as demonstrated in Case 1. Other etiological factors include iatrogenic ones, such as venous dilatation and false aneurysms,^{6,7)} as indicated in Case 2.

Clinical symptoms vary: asymptomatic conditions (a phyma detected on palpation alone) to marked ischemia of the lower limbs.⁸⁾ In Case 1, intermittent claudication had persisted. Huang et al. investigated 358 patients and reported that aneurysms were asymptomatic in 40% of them, whereas chronic ischemic symptoms of the lower limbs such as intermittent claudication were observed in 39% and acute in 21%.¹⁾ Thromboembolism is the most important complication, and the major amputation rate is 30%.¹⁾

Some disorders with chronic ischemic symptoms of the lower limbs are associated with Baker's cyst-related compression of the popliteal artery, as reported by Olcott and Mehigan.⁹⁾ When a thick thrombus is observed around the aneurysm, pulsation is difficult to detect, sometimes making diagnosis difficult by physicians other than specialists,⁸⁾ as demonstrated in Case 1.

For the differential diagnosis of popliteal phymas, popliteal artery aneurysms, Baker's cysts, popliteal artery outer membrane cystomas, and neurinomas must be considered. Duplex echography is useful for differentiating popliteal phymas. CT, CT angiography, and magnetic resonance angiography are also useful for diagnosing these phymas, evaluating aneurysmal features and peripheral run-off states, and selecting techniques and approaches.^{1,10,11)} In patients with popliteal phymas and chronic ischemic symptoms of the lower limbs, the presence or absence of intermittent claudication and a decrease in ABPIs may also be reference findings. In Case 1, there was no pulsation because of a thick thrombus; however, intermittent claudication and a decrease in ABPIs were observed. In such cases, screening using Duplex echography may be important. When popliteal phymas are detected, even physicians

other than specialists should investigate the differential diagnosis of popliteal artery aneurysms with specialists and then evaluate ABPIs.

To treat popliteal artery aneurysms, circulatory reconstruction is performed. As indicated in many studies, the lower limb salvage rate ranges from 14 to 40%, even when emergency surgery is performed in patients with popliteal artery aneurysms detected based on acute ischemic symptoms of the lower limbs, including embolism. Moreover, the incidences of complications and graft failure are high.^{1,12,13)} When surgery is performed in patients with asymptomatic to chronic ischemic symptoms of the lower limbs, the lower limb salvage rate is high, and the incidences of complications and graft failure are low. Therefore circulatory reconstruction should be performed when asymptomatic popliteal artery aneurysms measure 2 cm or more.¹⁴⁾

Concerning surgical procedures, the aneurysmal site and peripheral run-off state must be considered. To reach the popliteal artery, we employ medial and posterior approaches. The former approach is selected when the aneurysm involves the superficial femoral artery, or when stenosis/occlusion of the superficial femoral artery is present. It facilitates exposure involving 3 bifurcations of the lower thigh and the collection of the great saphenous vein. However, it is difficult to expose the aneurysm, making the resection of communicating aneurysmal branches impossible. Huang et al. reported that reconstruction with an SVG via the medial approach achieved good results and concluded that this procedure should be applied as the gold standard.¹⁾ Jones et al. performed 3 patterns of surgery via the medial approach and investigated the postoperative aneurysmal state.¹¹⁾ They indicated that a bypass using SVGs above and below the aneurysm via ligation above and below it achieved good results.¹¹⁾ However, when aneurysmal sac replacement via central ligation alone or central anastomosis was performed on the central side of the superficial femoral artery, aneurysmal expansion was sometimes observed after surgery.¹¹⁾

The posterior approach facilitates the resection of aneurysms and communicating branches. However, it becomes difficult when the aneurysm is not localized in the popliteal region.¹⁵⁾ Beseth and Moore reported that aneurysmal resection via the posterior approach and reconstruction with artificial blood vessels achieved good results.¹⁶⁾ They indicated that when the aneurysm was not present beyond the adductor canal, surgery via the posterior approach was possible and that 3 bifurcations

of the lower thigh could be exposed.¹⁶⁾ Furthermore, the results of short-distance reconstruction with artificial blood vessels were good.¹⁶⁾

We also selected techniques in accordance with individual patients. In Case 1 we performed surgery via the posterior approach. However, the artery at the peripheral anastomotic site was thin, and the replacement distance was short. Therefore an ipsilateral SVG was collected for reconstruction. When the distance is short, as is often employed in the posterior approach, an SVG can be collected without changing the posture; even when employing the posterior approach, reconstruction with an SVG is possible. In Case 2, we used an artificial blood vessel because no SVG was available.

Conclusion

Popliteal artery aneurysms are relatively frequent among peripheral aneurysms. However, the overall incidence is 0.01% or less in inpatients.¹⁾ There are few opportunities for consultation, and it is sometimes difficult for physicians other than specialists to make a diagnosis. However, they can consult specialists via an inquiry and examination of the ABPIs.

Even the posterior approach facilitates SVG collection and short-distance reconstruction without postural changes. It may achieve better results compared to procedures with artificial blood vessels.

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