

## Popliteal Vein Aneurysm as Rare Cause of Recurrent Pulmonary Embolism

### Abstract

We present a case of popliteal venous aneurysm causing recurrent pulmonary embolism successfully treated by surgical resection.

**Keywords:** Baker's cyst, popliteal venous aneurysm, pulmonary embolism

### Introduction

Peripheral venous aneurysms, defined as focal dilatation of the vein twice as normal, are rare and usually with uncomplicated clinical course. Venous aneurysms are more frequent in the upper extremities. However, popliteal venous aneurysms (PVAs) are the most frequently reported in the lower extremities<sup>[1]</sup> and often associated to thromboembolic events. Imaging techniques, including ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI), are usually necessary for diagnosis.

We present a case of recurrent pulmonary embolism (PE) diagnosed with PVA using CT venography (CTV) of the lower limbs following pulmonary CT angiography (CTA). This case highlights the importance of PVA in the differential diagnosis of recurrent PE from obscure sources.

### Case Report

A 57-year-old male presented with 3-day history of chest pain and shortness of breath. He had a history of recurrent PEs 1 year and 4 months before the current event, for which he had been receiving anticoagulation therapy. Apart from a suspected Baker cyst on the right side, the patient's history was nonspecific with no risk factors for PE. Pulmonary CTA followed by CTV of the lower extremities revealed central bilateral PEs [Figure 1] and a 3 cm × 4 cm × 5.5 cm mass of with inhomogenous attenuation and slight mural

enhancement in the superior popliteal region [Figures 2 and 3]. The mass was associated to the popliteal vein rather than femorotibial joint. Color Doppler ultrasound confirmed the diagnosis of saccular PVA with intraluminal thrombosis [Figure 4]. The patient received an Optease® optional vena cava filter (Cordis, Cashel, Ireland). The aneurysm was completely resected and the resulting venous defect was reconstructed by venous homograft [Figure 5]. The patient was discharged 1 week later, after retrieval of the vena cava filter. He received therapeutic dose of low molecular heparin for 2 weeks, and then, long-term therapeutic dose of warfarin. During 12-month follow-up, the patient reported no further PEs. Follow-up Doppler ultrasound documented patency of the popliteal vein and no recurrence of PVA.

### Discussion

PVA is defined as a popliteal vein diameter larger than 2 cm. The incidence of PVA is estimated 0.1%–0.2% with a slight female and left-sided preponderance as reported in patients presenting with various symptoms of venous disease.<sup>[2-4]</sup> PVA etiology is unknown, but congenital, (micro-) traumatic and inflammatory hypotheses are encountered in the literature<sup>[5]</sup> and the solitary dilatation is not to be contained within a portion of varicose vein.<sup>[5]</sup> Histologic analysis shows intimal hypertrophy, loss of smooth muscle, and elastic tissue with replacement by fibrous tissue and increased expression of matrix metalloproteinases.<sup>[6]</sup> Of the 91 cases reported in the literature after 2000, the

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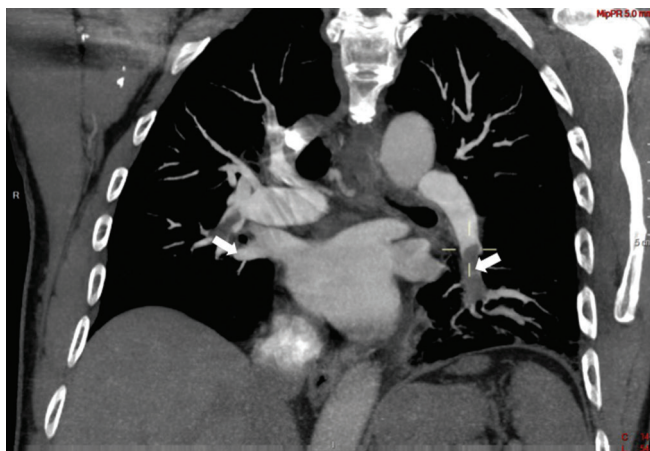


Figure 1: Coronal computed tomography maximum intensity projections (5 mm thickness) of the thorax in pulmonary arterial phase, clearly demonstrating bilateral thromboembolism (arrows)

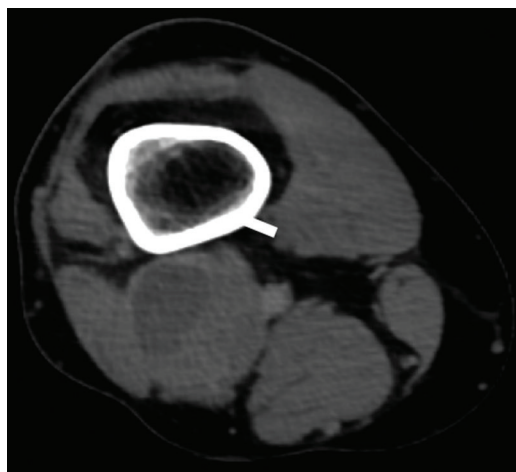


Figure 2: Axial view of venous phase computed tomography of the aneurysm in the right popliteal region. Note the inhomogenous intraluminal thrombotic material (arrow)

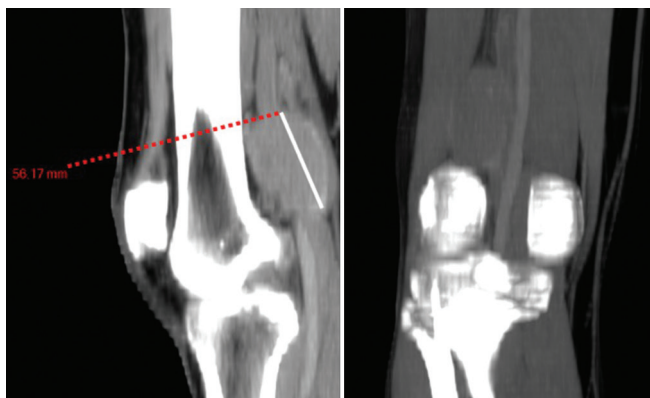


Figure 3: Sagittal and coronal view of venous phase computed tomography maximum intensity projections (10 mm thickness sagittal, 25 mm coronal) of the aneurysm demonstrating a maximal craniocaudal diameter of 5.6 cm. The sacciform shape of the aneurysm is best visible on the coronal reconstruction

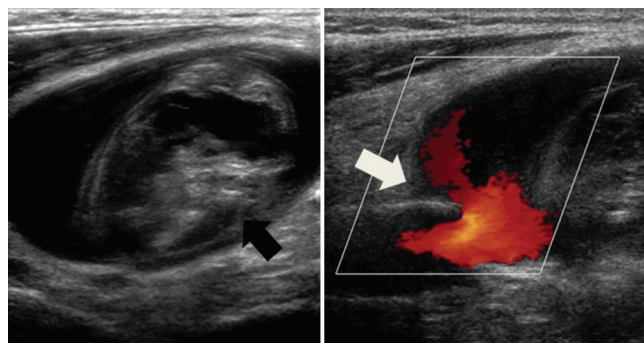


Figure 4: Sagittal echography without and with color Doppler demonstrating the intraluminal echoinhomogenous thrombus (black arrow) and venous flow around the thrombus (white arrow)

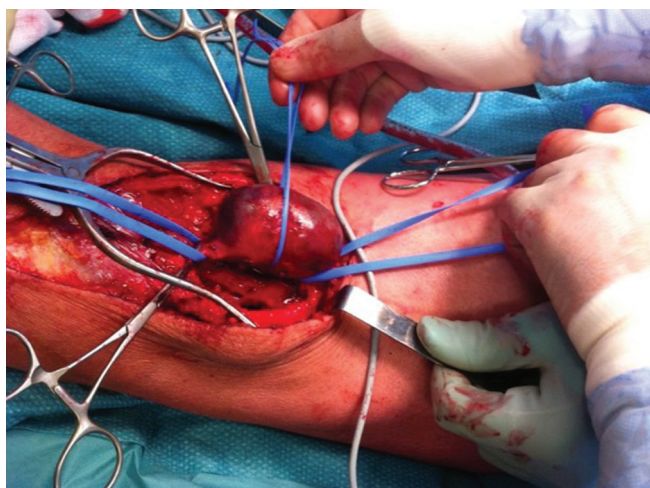


Figure 5: Intraoperative image after preparation and before resection of the venous aneurysm in the right popliteal region from a dorsolateral perspective. The sacciform shape of the aneurysm as recognized on computed tomography images is clearly visible

morphology was predominantly saccular (62%) and rarely fusiform (12%).<sup>[7]</sup> The most common and potentially

life-threatening complication is PE that can be fatal despite anticoagulation.<sup>[8-11]</sup>

The diagnosis is established in the majority of cases in patients with PE, but also during assessment of venous insufficiency and in a few cases after clinical palpation of a popliteal mass.<sup>[12]</sup> There are no reported cases of aneurysm rupture. Ultrasound without and with color Doppler is the diagnostic method of choice as it enables determining size and morphology of the PVA as well as detection of thrombus<sup>[13]</sup> and exclusion of differential diagnoses like Baker's cyst. CTV combined with pulmonary CTA protocol may help detecting the aneurysm. PVA may be detected incidentally on knee MRI while MR venography may provide valuable information of the aneurysm size, intraluminal thrombus, and surrounding structures.

Complicated PVA and PVA with endoluminal thrombus larger than 2 cm should primarily be treated surgically.<sup>[6,12]</sup> PVA of <2 cm, fusiform shape and no intraluminal thrombus can be followed up by Doppler ultrasound.<sup>[6]</sup>

For surgical treatment, tangential aneurysmectomy with lateral venorrhaphy is increasingly used (78%), and – to a minor extent – bypass techniques (14% of

cases) or end-to-end anastomosis (4%). After surgery, initial anticoagulation with low molecular heparin and overlapping vitamin K antagonists treatment is indicated for 3–6 months.<sup>[6]</sup>

In conclusion, PVA is a rare entity that should be considered as potential cause of recurrent PE, especially in the lack of other risk factors.

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### Conflicts of interest

There are no conflicts of interest.

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