

Open bilateral common femoral and popliteal vein aneurysm repair

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ABSTRACT

Although venous aneurysms are rare, typically asymptomatic, and most commonly found incidentally on imaging studies, patients with this pathology can develop pulmonary emboli owing to these aneurysms acting as a nidus for thrombus formation. There is no clear consensus regarding conservative management with anticoagulation vs operative intervention as the best treatment of deep venous aneurysms. We report the clinical course and surgical treatment of a patient presenting with both bilateral common femoral vein and bilateral popliteal venous aneurysms who had a known history of prior symptomatic pulmonary emboli. (*J Vasc Surg Cases and Innovative Techniques* 2020;6:580-4.)

Keywords: Venous aneurysm; Popliteal vein aneurysm; Common femoral vein aneurysm; Aneurysmorrhaphy

Deep venous aneurysms are rare lesions, but prior case reports have described their location throughout the body with no clear consensus on treatment. Venous aneurysms are segments of vein that consist of the tunica intima, tunica media, and tunica externa with dilation of their diameter by 50% when compared to adjacent healthy vein.^{1,2} These were first described in 1915 and the first popliteal venous aneurysm (PVA) was reported in 1968.^{3,4} Common femoral vein aneurysms (CFVA) have much less literature regarding their prevalence and have been described as presenting with femoral neuralgia or groin masses suspicious for inguinal or femoral hernias.⁵

Trauma, inflammation, congenital weakness, and localized degenerative changes are all suspected causes of deep venous aneurysms, with some congenital component believed to be contributing to most cases.⁶⁻⁸ A review of the literature indicates that there is an unpredictable risk of thromboembolic complications or rupture with conservative management of deep venous aneurysms of the lower extremities.⁹ For these locations, surgical intervention with open treatment is the gold

standard to decrease the risk of pulmonary emboli (PE), although only presenting a low chance of adverse outcomes, such as nerve palsy, hematoma, or wound infection.^{10,11} We report the case of 56-year-old man who was treated for bilateral CFVAs and bilateral PVAs. He developed an acute, symptomatic PE postoperatively after a tangential aneurysmectomy with venorrhaphy of the PVAs. The patient provided consent for publication of this case with images.

CASE REPORT

We report a case of a 56-year-old Caucasian man who had history of symptomatic PE secondary to deep venous thrombosis (DVT) during a hospitalization for eosinophilic esophagitis 7 years prior. At that time, he was prescribed 1 year of anticoagulation for this presumed provoked DVT. His most recent PE had occurred 2 years prior while hospitalized for diverticulitis and he had been started on apixaban indefinitely. Venous duplex at that time revealed bilateral common femoral vein partial thrombosis with valvular incompetence but this was not further evaluated, and he was not referred to a vascular surgeon.

The patient's primary care provider noted groin fullness and initially entertained a diagnosis of bilateral inguinal hernias, so his physician ordered a computed topography (CT) scan, which ruled out this diagnosis. Retrospectively, this noncontrast CT scan did demonstrate bilateral CFVAs and recommended ultrasound imaging for better evaluation. However, he was not referred to our vascular clinic for further evaluation until he began to develop lower extremity edema more than 1 year later. We first ordered an ultrasound duplex examination of the inferior vena cava and iliac veins, as well as a lower extremity venous duplex ultrasound, which demonstrated right and left CFVAs, which measured 5.0 cm × 5.4 cm and 4.1 cm × 4.9 cm, respectively (*Fig 1, A, B*). Previously undiagnosed right and left PVAs were also discovered at this time and measured 2.2 cm × 3.0 cm and 2.1 cm × 2.8 cm, respectively (*Fig 1, C, D*). Before surgery, a cardiac dynamic magnetic resonance

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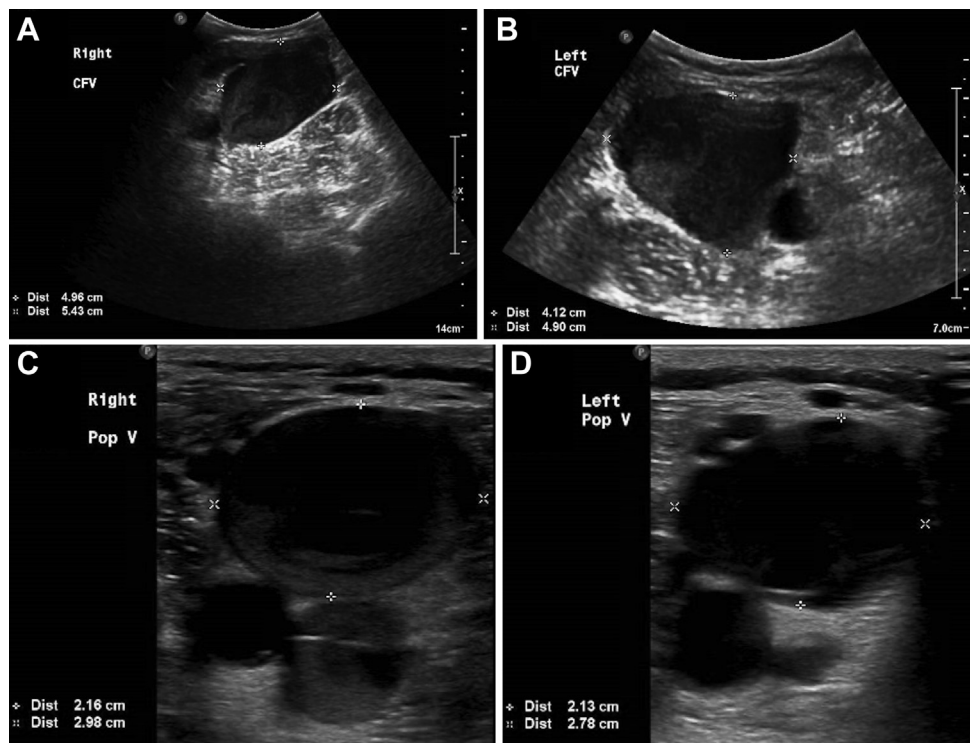


Fig 1. Venous duplex demonstrating large aneurysmal dilations of both the **(A)** right and **(B)** left common femoral veins (CFV), as well as the **(C)** right and **(D)** left popliteal veins (Pop V).

angiogram (MRA) was obtained for surgical planning, which demonstrated bilateral CFVAs and bilateral PVAs that were both fusiform and saccular. The right CFVA measured 5.8 cm in maximum diameter and the left CFVA measured at 5.7 cm (Fig 2). Of note, bilateral greater saphenous veins were also aneurysmal at the saphenofemoral junctions, which measured 2.4 cm on the right and 4.5 cm on the left in maximum diameters. The right PVA measured 3.0 cm in maximal diameter and the left PVA measured at 2.8 cm. No additional venous or arterial lower extremity or abdominal abnormalities were noted on this scan and intervening vein segments were not aneurysmal.

Given the larger size of the CFVAs and that these were symptomatic groin masses, these masses were addressed first. Apixaban was held 48 hours before surgery and the patient was bridged with therapeutic enoxaparin. Once in the operating room, ultrasound imaging was used to guide the incisions. On both sides, the aneurysm was identified and freed from surrounding tissue until normal vein was identified proximally and distally (Fig 3, A). The patient was then heparinized to maintain an activated clotting time of greater than 250 seconds. The confluence of the saphenous, femoral, and profunda femoral veins was controlled with clamps. Tangential aneurysmectomy was performed, removing weakened vein tissue, including the proximal saphenous vein bilaterally (Fig 3, B). Running polypropylene suture was used for venorrhaphy to maintain a venous diameter similar to that of the adjacent healthy vein (Fig 3, C). The clamp was then removed and the venorrhaphies were assessed for hemostasis. Ultrasound examination of the bilateral

common femoral veins confirmed antegrade flow and the absence of DVT. Heparin was reversed and full anticoagulation started later that same day with intravenous heparin. Apixaban was restarted on postoperative day 1. The patient was discharged home on postoperative day 2. He healed uneventfully, but family and social events delayed his next planned procedure.

The patient returned 6 months later for surgical treatment of his bilateral PVAs. Again, apixaban was held for 48 hours and therapeutic enoxaparin was used perioperatively. Using a posterior approach to the knee, the popliteal fossa was exposed and both popliteal veins were isolated. The patient was heparinized with intraoperative monitoring of ACTs and tangential aneurysmectomy with venorrhaphy was performed in the same fashion as the CFVAs. In areas of larger tributaries with aneurysmal confluences, these veins were preserved when possible and the weakened areas treated with imbrication of the tissue to reduce the caliber of the veins to more normal appearance. At the termination of the case, ultrasound examination of the bilateral popliteal fossa identified no thrombus and sluggish flow through the right popliteal vein. Wounds were closed in layers over 15F drains in the popliteal fossa. Sequential compression devices were placed on his calves in the recovery room and a prophylactic dose enoxaparin started. Full anticoagulation was delayed owing to moderate bloody fluid output in the drains. On the evening of postoperative day 2, he developed acute, symptomatic PE, as demonstrated on CT scan, with evidence of right heart strain on transthoracic echocardiogram. Venous

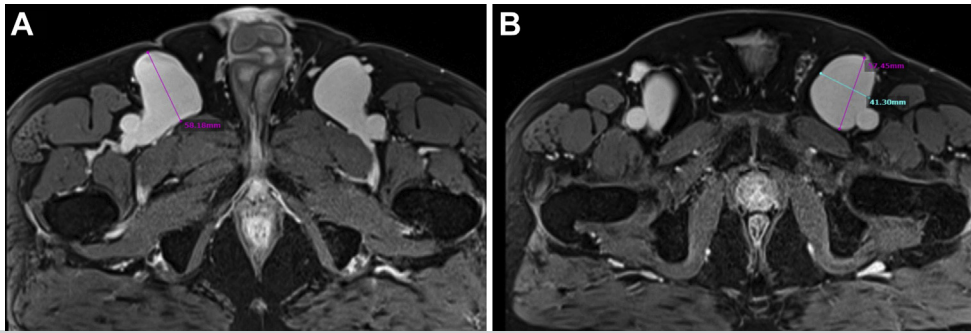


Fig 2. Axial projections from a cardiac dynamic magnetic resonance angiography demonstrating bilateral dilations of the common femoral vein with the largest anteroposterior diameter of the **(A)** right-sided venous aneurysm at 5.8 cm and **(B)** left-sided venous aneurysm at 5.7 cm.

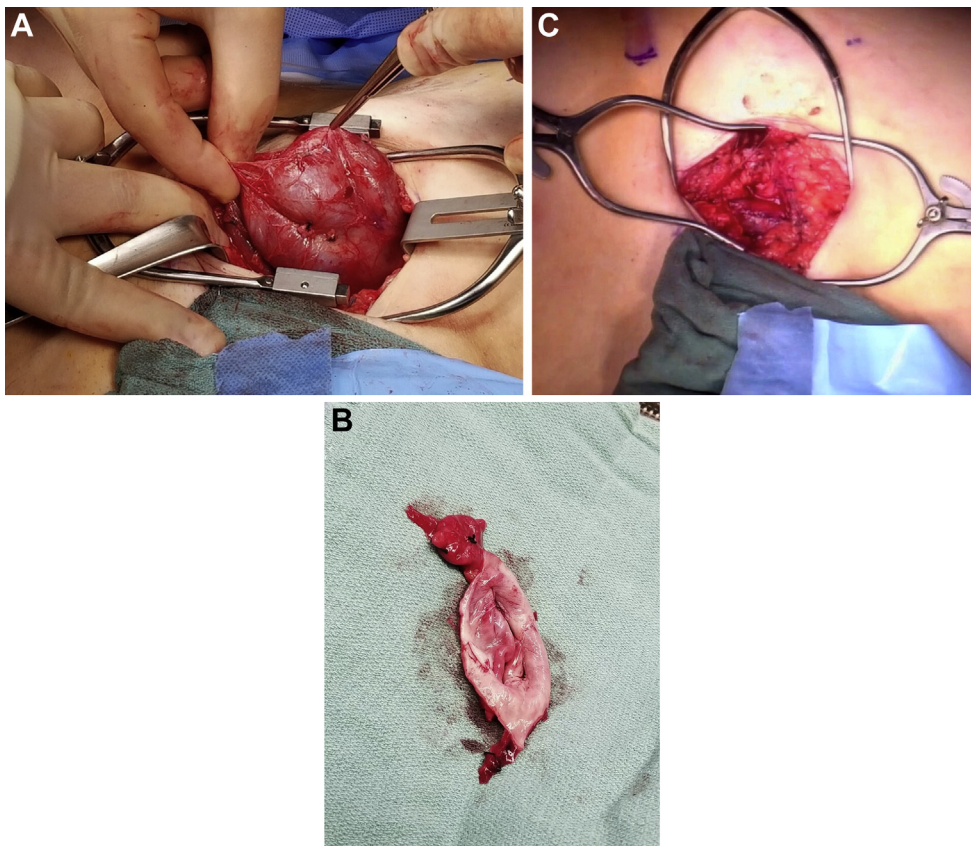


Fig 3. Surgical repair of common femoral vein aneurysm (CFVA). **A**, Isolated CFVA in situ. **B**, Resected aneurysmal segment. **C**, Common femoral vein status post repair during tangential aneurysmectomy with lateral venorrhaphy.

duplex ultrasound examination revealed acute thrombosis of the left mid peroneal vein, as well as partial thrombosis of the right popliteal vein. There was no visualized thrombus extension. He was started on a heparin drip and clinically improved over the next 2 days. He was transitioned to apixaban and discharged home on postoperative day 9, after recovery and repeat echocardiogram showed resolution of right heart strain.

At his 3-month follow-up appointment after repair of the PVAs, venous duplex ultrasound examination showed residual partial venous thrombosis of his right popliteal vein and left mid peroneal without thrombus extension, similar to the findings of the postoperative duplex imaging. Clinically, his shortness of breath from the PE fully resolved and his lower extremity edema was improving. He continued to take daily apixaban and wear compression stockings.

DISCUSSION

The natural history of deep venous aneurysms is unknown. A problem with rare diseases is that much of the knowledge is based solely on case reports. Ultrasound imaging is the diagnostic method of choice and venous aneurysms will become more common with the widespread use of imaging in patients with suspected venous thromboembolism or insufficiency. Venous aneurysms involving the popliteal veins are the most commonly studied and reported, and a case of bilateral PVAs has been previously reported.¹² CFVAs are described much more infrequently and are most commonly reported as simulating an inguinal hernia.¹³ One case of bilateral CFVAs has recently been reported and the immediate postoperative course was complicated by a PE.¹⁴ No cases of a patient with bilateral deep venous aneurysm in both of these locations have been reported.

Regarding PVAs, around 70% have been described as saccular, 40% have been described to have intraluminal thrombus, and 50% of those with thrombus develop PE. In those treated with anticoagulation alone, 43% have incidence of PE.¹⁵ Thrombus burden localized to PVAs has been shown to predispose to PE even when patients are therapeutically anticoagulated. No reports of CFVA or PVA rupture have been reported, but rupture of an external iliac vein aneurysm presenting with shock has been previously described.¹⁶ The risk of rupture was considered in this case owing to the size and number of venous aneurysms.

Prior reports have indicated that asymptomatic patients with PVAs of less than 20 mm can be serially monitored with ultrasound imaging to evaluate for progression; symptomatic patients should be treated regardless of aneurysm size.^{17,18} Owing to their rarity and the paucity of literature on CFVAs, there are few reports available to guide their treatment. Based on the literature available and this case, we feel that extrapolating from the results of PVAs is appropriate and that guidelines to treat CFVAs and the methods of surgical treatment should be the same as a PVA. Thus, any CFVA in a symptomatic patient or a CFVA larger than 20 mm in an asymptomatic patient should be considered for repair, most commonly with tangential aneurysmectomy with lateral venorrhaphy for saccular aneurysms and aneurysmectomy with venous interposition for fusiform aneurysms.

However, surgical repair is not without complication. There is a high rate of postoperative venous thrombosis, with prior studies suggesting at least 50% of cases could be complicated by deep venous occlusion or hematoma.^{5,19} The postoperative course after our patient's bilateral common femoral vein aneurysmectomy was uncomplicated, but he did sustain symptomatic bilateral PE after treatment of his bilateral PVAs. This case

report is the first of acute PE that developed after aneurysmectomy with lateral venorrhaphy of a PVA that we have found in the literature. Thus, these operations are not without risk and, despite several studies promoting surgical intervention, there are no prospective studies comparing nonoperative and operative management with serial outpatient follow-up. For our patient, we believe repair was justified to decrease the risk of future venous thromboembolic events and would recommend the same treatment if a similar patient presented.

In conclusion, we present a unique case of both bilateral CFVAs and PVAs. Although deep venous aneurysms are rare, they can present with potentially serious complications when thrombotic material in the aneurysm embolize or when the aneurysm ruptures. The diagnosis should be considered in patients presenting with sequelae of DVT without thrombophilia or obvious DVT. The goal of surgical management for deep venous aneurysms is to eliminate the thromboembolic source, while maintaining adequate venous caliber and outflow.

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