Asimptomatic vein aneurysms: important findings or not?

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Learning objectives

To have young radiologists acquainted with the entity of venous aneurysms (VAs) and to provide better insights into clinical presentation, diagnosis and possible complications.
Background

The VAs of the extremities can be classified into two types: aneurysms of the deep and of the superficial venous system. This distinction is important, because aneurysms of the deep system have a greater association with thromboembolism and more severe venous morbidity than those of the superficial system (1). Historically, superficial VAs of lower extremities are considered rare (1), but Pascarella et al. (2) showed they are more common than previously thought with the incidence of approximately 0.1% (2). The precise prevalence of the deep and the superficial VAs is still unknown (3).

The first characterization of this entity was from the autopsy by Osler in 1915, while the first true venous aneurysm of the popliteal vein was described in 1968 by May and Nissel (4). Dahl et al. describing symptomatic popliteal VA with pulmonary embolism were the first to report complications of VA in 1976 (5).

VA have been reported in all major veins.

A wide variety of venous aneurysms clinical presentations of the lower extremities are reported in the literature. They may present initially as an episode of deep venous trombosis (DVT) or pulmonary embolism (PE) (6-9). Many are mistaken for soft tissue masses of the lower extremities either with or without pain (10-12). VAs have also been misdiagnosed as inguinal or femoral hernias or limphadenopathy (13-15). A case of posterior tibial vein aneurysm presenting as tarsal tunnel syndrome has been described (16). Abdominal pain, lower limb oedema and palpable mass in the iliac area have been described in a case of iliac vein aneurism - only 8 of these have been described in the literature so far (17). In the recent literature a case of missed superficial venous aneurysm at the saphenofemoral junction on preoperative duplex scanning in a patient with lower extremity venous stasis ulcers was reported (18). Patients may present only with varicose veins or with superficial vein insufficiency, as a part of a chronic venous disease (1). It is of great importance to recognize this entity due to possible complications and appropriate treatment.

The definition of a VA still remains controversial and there are no precise criteria as to vessel diameter to define a venous dilatation as aneurysmal. VA definition regarding size and other morphology characteristics differs widely in the literature. In general, term aneurysm is used to indicate a permanent and irreversible localized vascular dilatation that involves all three layers of the blood vessel wall. It may develop in any part of the circulatory system, including veins. In 1997 Gillespie at al. described VA as a solitary area of venous dilation that communicates with a main venous structure by a single channel, and it must have no association with an arteriovenous communication or a pseudoaneurysm. Most importantly, it should not be contained within a segment of varicose vein (19). Later, in 2011 more concise definition of VA as a solitary area of
fusiform or saccular dilatation occurring in the course of a major vein or connected by a single channel to a major venous structure was defined by Perrotta (20). In some studies VAs are defined as a persistent isolated dilatation of twice the normal vein diameter (21) or three times in its normal size (22). In 2009 Chen suggested definition of VA as a segment that is 1.5 times the diameter of the vein on either side (1). Regardless of its definition, it is important to diagnose VAs, due they could be a source of significant morbidity and even death if left untreated.

Venous system aneurysms are reported at any age, irrespective of gender (19). There is no consensus in the literature about the most frequent location of venous aneurysms. Perler et al. (23) claimed that they are more frequent in upper than in lower limbs. On the other hand, Perotta et al., showed that venous aneurysms are more frequent in lower extremities, with popliteal vein being the most common site (20). Legnani also reported that popliteal VAs are the most frequent in lower limbs, followed by great saphenous vein aneurysms and VAs in the foot (24).

The pathogenesis of the VAs is uncertain; several mechanisms have been proposed and the most accepted theory is the focal normal connective tissue components loss of the vein wall due to a congenital underdevelopment or to a degenerative connective tissue loss with age. Other proposed causes include trauma, inflammation or other processes causing venous wall weakening. Two commonly reported histopathological findings are a reduction of smooth muscle cells in the media and a thickened and fibrous intima (19, 25).

Lower extremity VAs diagnosis requires a high index of suspicion. Because of the small number of cases reported by most individual series, no single diagnostic method has been reported to be superior to another. Most series do report duplex imaging as initial diagnostic modality to be extremely valuable in the VAs diagnostics to determine aneurysm size and identify the presence of mural thrombus (19). Colour flow function allows differentiation of nonvascular pathology such as Baker cyst. Other noninvasive diagnostic modalities include CT and MR imaging (1). Nowadays phlebography is an outdated method.

Treatment is usually influenced by the anatomical location. With the exception of the internal jugular vein aneurysms, the majority of VAs should be treated surgically to avoid potential complications and, sometimes, death. Aneurysms of the superficial venous system of lower extremities should be excised. Deep venous aneurysms treatment is more complex. Simple anticoagulation therapy has been tried by some investigators, with poor outcome. Surgical treatment is recommended. Surgical intervention may include ligation, tangential excision with lateral venorrhaphy or autologous vein patch, and complete resection and interposition grafting (19, 23).
Findings and procedure details

Between May and September 2017 we encountered 4 patients with VAs of lower extremities. Conventional B-mode ultrasound and duplex Doppler imaging was performed using a Logiq Expert 7 ultrasound scanner (General Electric Co., Fairfield, Connecticut, USA) with linear array transducers 11L-D (5-13 MHz) and 9L-D (3-8 MHz) by radiologists with five years of experience in the performance of duplex.

One aneurysm was located in the great saphenous vein and mimicking inguinal hernia (case 1). One aneurysm - in popliteal vein (case 2) - and two of them - in posterior tibial veins - were asymptomatic (case 3).

Case 1.

52-year-old man presented with inguinal mass, without oedema of affected leg. Patient noticed that the mass would change its size during the day. Venous duplex imaging demonstrated saccular venous aneurysm of the proximal segment of VSM, measuring 3.8 x 2.1 x 1.6 cm, with visible slow intraluminal flow, pattern to-and-fro. The aneurysm was completely compressible, without any signs of thrombosis. The remaining findings on deep and superficial venous system were within the physiological limits.

Case 2.

79-year-old man without significant medical history presented with mild varicose veins of VSM bilaterally below the knee level. Venus duplex imaging demonstrated fusiform aneurysm of the middle part right popliteal vein measuring 2.2 x 1.6 x 1.8 cm, completely compressible, without thrombosis (Figure 2,3). The remaining finding on deep venous system was normal. There was no reflux in saphenofemoral junction on both legs, only mild varicose veins on the medial aspect of the calf bilaterally. There was a mild oedema of the right calf but without chronic skin changes.

Case 3.

85-year-old woman presented with bilateral varicose veins of VSM. Venous duplex imaging demonstrated reflux of the proximal and middle portions of the left VSM, while there was no reflux in the right saphenofemoral junction. Right posterior tibial veins were noted to have two venous aneurysm measuring 8 x 6 x 4 mm and 7 x 5 x 4 mm, completely compressible, without thrombosis (Figure 4). The remaining finding was normal.
All patients were referred to a vascular surgeon. However, none of the follow up examinations were made. All patients are still alive, without any complications.
**Fig. 1:** Saccular venous aneurysm of the proximal segment of great saphenous vein (VSM), measuring 3.8 x 2.1 x 1.6 cm, with visible slow intraluminal flow, pattern to-and-fro. The aneurysm was completely compressible, without any signs of thrombosis.

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**Fig. 2:** Fusiform venous aneurysm of the midle part right popliteal vein measuring 2.2 x 1.6 x 1.8 cm, completely compressible, without thrombosis.

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**Fig. 3:** Fusiform venous aneurysm of the middle part right popliteal vein measuring 2.2 x 1.6 x 1.8 cm, completely compressible, without thrombosis.

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Fig. 4: Venous aneurysm of posterior tibial vein, completely compressible, without thrombosis.

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Conclusion

Once thought to be exceedingly rare, VAs in the lower extremity are recognized more commonly nowadays. This is likely due to an increased use of duplex ultrasound imaging. VAs could mimic mass in the affected extremity, inguinal hernia or could be a source of trombosis and pulmonary embolism what should be considered in everyday clinical practice. Because of their potential morbidity, management should be surgical in the majority of the cases.
References


