SCIENTIFIC LETTER

GREAT SAPHENOUS VEIN ANEURYSMS: A CASE SERIES AND SURGICAL APPROACH

ABSTRACT

Great saphenous vein aneurysms (GSVA) are an uncommon condition that presents a diagnostic challenge, often mistaken for other inguinal masses. Given their low prevalence and the potential risk of serious complications such as local thrombosis and pulmonary embolism, their correct identification and management are crucial. This article presents a series of three cases of GSVA in patients with chronic venous insufficiency, diagnosed using color Doppler ultrasound. In all cases, a proactive surgical approach was employed, resulting in favorable postoperative outcomes. This work highlights the importance of including GSVA in the differential diagnosis. It advocates that early detection and definitive surgical treatment are the preferred strategy to mitigate the risk of complications and ensure a favorable long-term prognosis.

Keywords: *venous aneurysm, venous insufficiency, pulmonary embolism.*

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INTRODUCTION

Venous aneurysms (VA) are defined as localized, abnormal, and permanent dilations of a vein segment, characterized by the presence of all three histological layers of the venous wall.[1] Unlike their arterial counterparts, venous aneurysms are considerably rare and often underdiagnosed. They may occur in any vein of the body. Still, their presence in the superficial venous system—particularly in the great or small saphenous vein—is of special clinical interest, as they may mimic other inguinal or crural conditions, such as inguinal hernias or soft tissue tumors.

Although Osler first described this entity in autopsies in 1915, the first documented symptomatic venous aneurysm leading to pulmonary embolism was reported by Dahl et al.,[2] involving a popliteal vein aneurysm.

The etiology of venous aneurysms is multifactorial and not always clear. Abbot et al.[3] proposed a classification that distinguishes between primary aneurysms (congenital or degenerative due to venous wall weakness) and secondary aneurysms (resulting from trauma, infections, arteriovenous fistulas, or states of chronic venous hyperflow). In the context of the great saphenous vein (GSV), its association with chronic venous insufficiency (CVI) is an important area of study, as both conditions may coexist and promote the development of these dilations.

Despite their rarity, the correct identification and management of GSV aneurysms are crucial due to the potential risk of severe complications, including local thrombosis (leading to pain, swelling, and induration of the mass), rupture (although rare, it can cause severe bleeding), and pulmonary embolism from thrombus migration within the aneurysmal sac.

The advent of non-invasive imaging techniques, such as color Doppler ultrasonography, has revolutionized the diagnosis of these lesions, allowing a detailed assessment of venous flow and confirmation of their vascular nature. This diagnostic tool is fundamental in differentiating venous aneurysms from other masses and in guiding appropriate treatment.

This article presents three cases of patients with CVI who consulted for lower limb masses, managed at our institution, highlighting the diagnostic challenges and surgical outcomes.

This review aims to enhance the understanding of this rare but clinically significant vascular pathology, contributing to early diagnosis and the implementation of treatment strategies that minimize complications and improve patient outcomes.

CASE REPORTS

Case 1

A 62-year-old male, with no relevant medical history, presented with persistent lower limb pain in the context of chronic venous insufficiency.

Physical examination revealed varicose collaterals in the inner aspect of the left leg.

Color Doppler ultrasonography of the lower limbs showed incompetence and dilation of the great saphenous vein (8 mm), with a saphenofemoral junction of 12 mm.

A left saphenectomy with resection of varicose collaterals was performed.

Left internal saphenectomy and resection of varicose collaterals were scheduled (*Figures 1A and B*).

Histopathology confirmed two saccular dilatations (0.8 cm) of the GSV, consistent with venous aneurysms, with intimal thickening replaced by fibrous connective tissue.

Case 2

A 68-year-old female patient, with no relevant medical history, presented with a mass in the right lower limb associated with pain. She brought an ultrasound of the skin and soft tissues of the inguinal region, which suggested a probable aneurysm of the great saphenous vein.

FIGURE 1. A: Preoperative surgical marking. Note the tumor marked with an oval on the inner aspect of the right thigh.

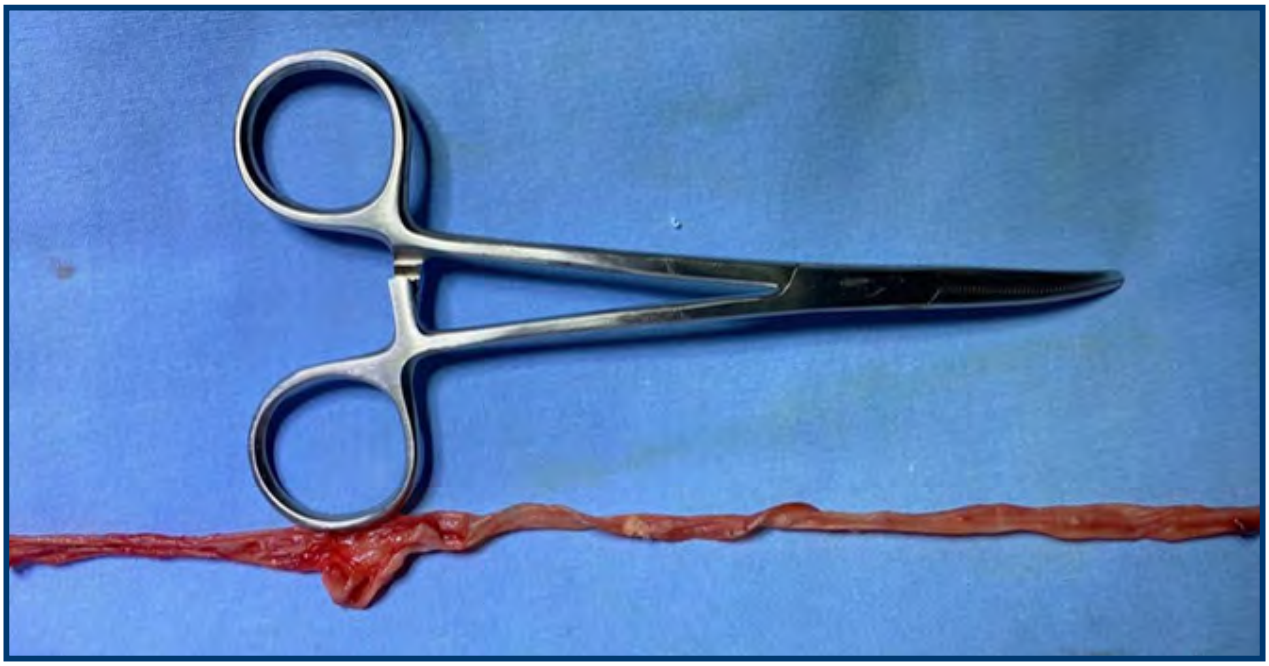

FIGURE 1. B: Surgical specimen showing aneurysmal dilatation of the great saphenous vein.

On physical examination, the right great saphenous vein was palpable along its entire course, appearing enlarged and associated with a mass in the inguinal region.

Venous Doppler ultrasound revealed a 14 mm right great saphenous vein junction with incompetence and dilatation along its course, as well as a 25 mm aneurysmal dilatation in the mid-thigh (Bush II). A dilated perforating vein with incompetence was also observed 18 cm from the plantar margin on the medial side. In addition, incompetence of the small saphenous vein (SSV) measuring 3 cm was identified, together with incompetence along the entire length of the left great saphenous vein, with a 3 mm junction.

A right great saphenectomy and resection of varicose collaterals were scheduled.

Pathological anatomy reported findings consistent with the great saphenous vein showing ectasia and luminal dilatation.

Case 3

A 70-year-old female patient presented with a mass in the left inguinal region, without any specific associated symptoms. A soft tissue ultrasound of the left crural region revealed a dilated vascular structure with aneurysmal characteristics, measuring approximately 30 × 15 mm. Additional evaluation with a Doppler study was recommended, and the patient was referred to the phlebology department for further assessment.

On examination, an inguinal mass of firm–to–elastic consistency was noted, non-reducible, with changes in size depending on the patient's position.

Venous Doppler ultrasound of the lower limbs reported the following:

Right side: Saphenofemoral junction: 7 mm, incompetent, great saphenous vein: 6 mm, incompetent, with collaterals in the thigh and leg re-entering via a perforating vein 34 cm from the sole. Small saphenous vein: 2 mm, competent. Deep venous system: competent.

Left side: Saphenofemoral junction: 10 mm, incompetent. Great saphenous vein: aneurysmal at 14 cm from the saphenofemoral junction, measuring 34 × 23 mm (**Bush Ia**) (*Figures 2A and B*), incompetent from the saphenofemoral junction down to the infrapatellar level. Epifascial collateral vein arising from the upper thigh, running along the medial thigh and leg. Incompetent perforating vein on the medial thigh, 54 cm from the sole, draining into the great saphenous vein at that level. At the medial aspect of the knee, the great saphenous vein is dilated (12 mm), incompetent, with collaterals in the thigh and leg. One collateral drains into the small saphenous vein 30 cm from the sole, which becomes incompetent from this point. Re-entry perforating vein in the posterior aspect of the leg, 28 cm from the sole. Additional re-entry perforating veins on the medial aspect at 32, 24, and 15 cm from the sole. Small saphenous vein: 2 mm, competent until it receives the collateral mentioned above (30 mm). Deep venous system: competent.

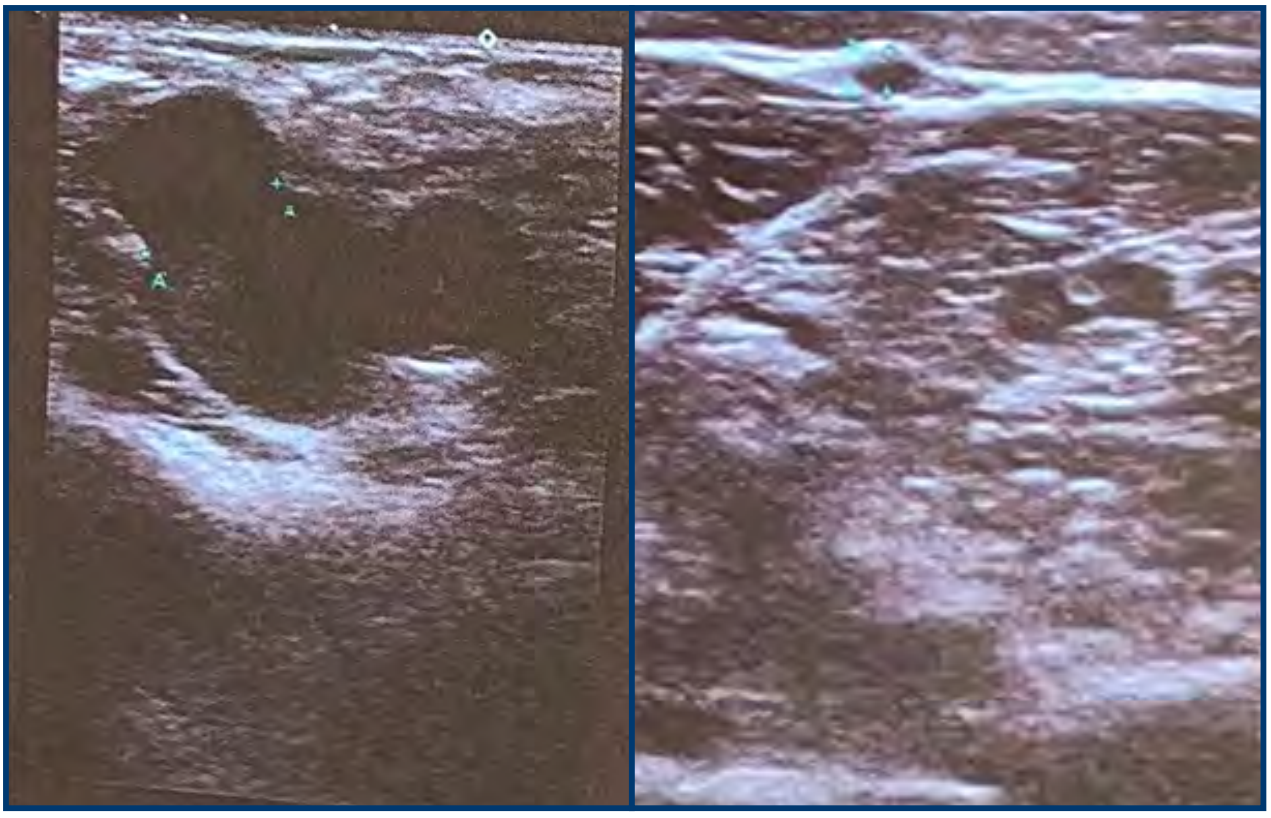

FIGURE 2. A: Axial view of the saphenofemoral junction, showing aneurysmal dilatation on the right side. **B:** Longitudinal view demonstrating venous wall dilatation consistent with an aneurysm.

Scheduled for left great saphenous vein stripping and resection of varicose tributaries (*Figures 3A and B*).

DISCUSSION

Venous aneurysms, particularly those affecting the superficial venous system, such as great saphenous vein aneurysms, are a rare entity that often poses a diagnostic challenge. Although the popliteal vein is the most common site, lesions in the superficial venous system are estimated to account for only 0.1% of cases.[4] Due to their low prevalence, these conditions are frequently underdiagnosed and misinterpreted as hernia-related masses; in some cases, they may even present as solitary masses without associated venous insufficiency. The variable presentations observed in Cases 1, 2, and 3 highlight the importance of timely identification and surgical management to achieve favorable postoperative outcomes.

A valuable tool for characterizing these lesions is the classification proposed by Bush et al.,[5] which groups superficial venous system aneurysms into six categories (Table 1). The cases reported in this study describe true dilatations corresponding to groups Ia (saphenofemoral junction) and II (mid or distal segment of the great saphenous vein), consistent with the predominant distribution of cases reported in the literature. The etiology of these dilatations is considered multifactorial. Irwin et al.[6] evaluated 8 patients with venous aneurysms to determine matrix metalloproteinase expression and suggested a potential causal role in the pathogenesis of these conditions. Their findings concluded that overexpression increases elastic fiber degradation, thereby promoting aneurysmal dilatation of the vessel wall.

FIGURE 3. A: In-situ great saphenous vein aneurysm.

FIGURE 3. B: Surgical specimen following internal saphenectomy and aneurysmectomy.

TABLE 1. Classification of superficial venous aneurysms

Classification	Description
Ia	Involving the saphenofemoral junction
Ib	Distal to the subterminal valve
II	Involving the mid or distal segment of the great saphenous vein
IIIa	Various degrees of involvement of the saphenofemoral junction
IIIb	
IVa	Involving the saphenopopliteal junction
IVb	Lesions located more distally than the saphenopopliteal junction
Va	Involving the proximal anterior accessory saphenous vein
Vb	Involving the distal anterior accessory saphenous vein
VI	Not grouped within any of the other categories

Source: Adapted from Bush and Bush, 2014.

The diagnosis of great saphenous vein aneurysms fundamentally depends on clinical suspicion, detailed physical examination, and imaging techniques. Duplex color Doppler ultrasound of the lower limbs remains the gold standard among complementary tests, as it provides information regarding aneurysm size, flow characteristics, and its relationship with the deep venous system. In our cases, although ultrasound enabled the initial characterization of the lesions, it was during the physical examination that a venous aneurysm of the great saphenous vein emerged as a differential diagnosis. Computed tomography angiography (CTA) or magnetic resonance venography (MRV) may also be helpful, as suggested by Sessa et al.,[7] to confirm diagnosis and plan surgical management, particularly in relation to the saphenofemoral junction.

From a histopathological standpoint, findings can be highly variable, ranging from normal tissue to disorganization of the medial layers with or without inflammation, wall hypertrophy (preceding increased flow), and ultimately aneurysmal dilatation with sclerosis or calcification.[8]

Although several treatment options exist, no clear consensus has been established in the literature due to the low prevalence of this condition. Friedman et al.[9] described procedures such as aneurysmectomy with end-to-end anastomosis or venorrhaphy. However, in our patients with concomitant chronic venous insufficiency, complete aneurysm resection combined with internal saphenectomy was chosen. This decision is supported by evidence from Sessa et al.,[7] who suggested that aneurysmal dilatation may be associated with a state of chronic hyperflow and underlying venous ectasia. Furthermore, in 2022, Patel et al.[10] concluded that aneurysms occupying more than 25% of the venous lumen carry a high risk of thromboembolic complications, making surgical intervention particularly necessary in this group.

CONCLUSION

Great saphenous vein aneurysms are a rare condition (0.1%) that must be considered in the differential diagnosis of inguinal masses. Our case series demonstrates that, despite variable

clinical presentation, early diagnosis by Doppler ultrasonography is fundamental. Due to the potential risk of severe complications such as thrombosis and pulmonary embolism, proactive surgical management —consisting of aneurysm resection with concomitant saphenectomy in cases with chronic venous insufficiency—remains the treatment of choice to ensure a favorable prognosis and improved patient quality of life.

Declarations
The authors declare no conflict of interest.

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