



# Superficial Venous Aneurysm (SVA): A Review of Literature and Report of 17 Cases

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## Abstract

**Background:** Superficial Venous Aneurysm (SVA) are rare venous diseases that may be asymptomatic or symptomatic. The major etiology of SVA is still unknown. The study presents 17 cases with no underlying disease or risk factors that presented SVA in uncommon and different veins of the body.

**Methods:** 17 patients with SVA were evaluated and treated in our hospital for 11 years. Clinical presentation, treatment, and complications were evaluated.

**Results:** 6 of the aneurysms were located in the great saphenous vein, 2 in the small saphenous vein, 6 in the external jugular vein, 1 in the dorsal foot vein, and also 2 in the forearm veins. Ten patients suffered from acute tenderness, pain, and edema of the limb and others presented with soft tissue mass. All 17 patients underwent surgical excisional therapy. No pulmonary emboli were reported in the patients.

**Conclusion:** The etiology of SVA is unknown. It may cause occlusion in rare superficial veins in patients with no history of the hyper-coagulopathy state or any major risk factor.

**Keywords:** Aneurysm, Edema, Forearm, Humans, Jugular Veins, Risk Factors, Saphenous Vein

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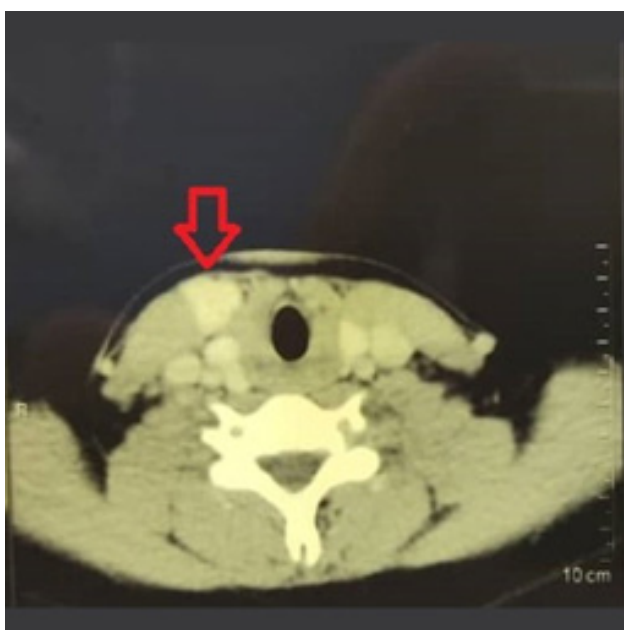
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## Introduction

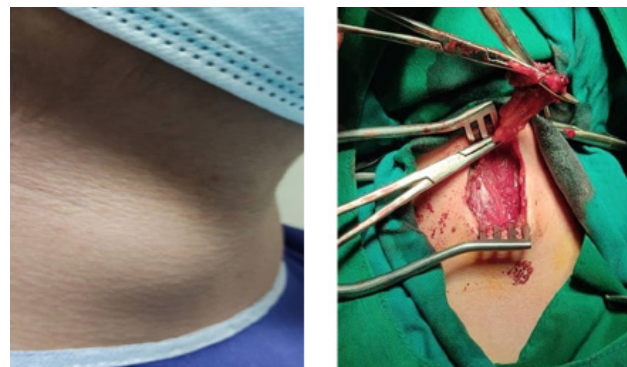
Superficial Venous Aneurysm (SVA) is an extremely rare medical condition with an incidence of about 0.1% (1). SVA is defined as the single and localized dilation of the venous wall that is not connected to varicose segments (2). SVA occur in different segments of the venous system, such as great and small saphenous veins, iliac and femoral veins, internal and external jugular veins, and forearm veins. Patients often are asymptomatic, but they may suffer from limb edema, swelling, pain, and serious complications, including pulmonary emboli and DVT. The main cause of the SVA is unknown, but traumas, inflammation, tumors, and an increase in venous system pressure are the possible risk factors for venous aneurysm formation (3,4). The venous US is the first-line diagnostic



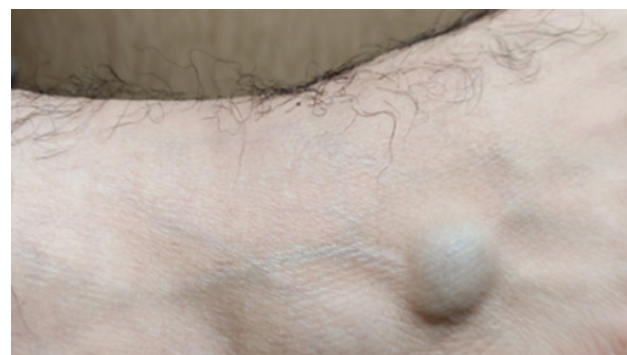
**Figure 1:** Pre-Operative and intra-operative imaging of a 13-year-old patient with EJV aneurysm.



**Figure 2:** Pre-Operative and intra-operative imaging of a 13-year-old patient with EJV aneurysm.



**Figure 3.** pre-operative and intra-operative imaging of a 13-year old patient with EJV aneurysm.

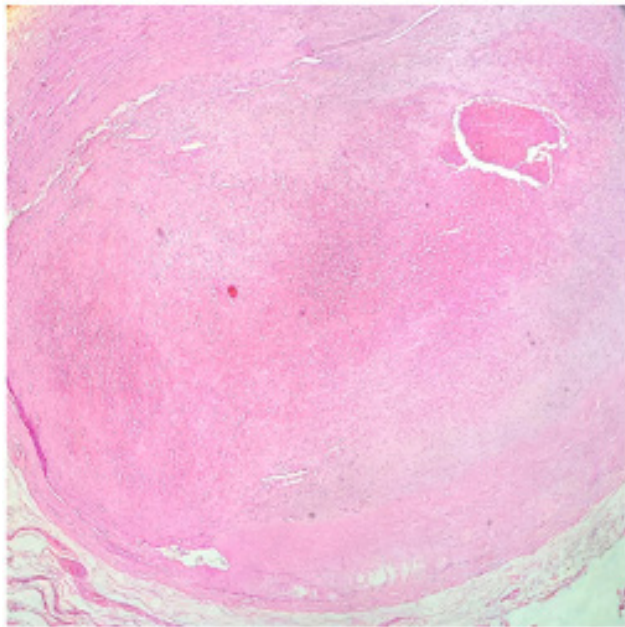


**Figure 4.** preoperative image of SVA in the dorsal foot vein of right lower extremity.

modality that precisely elucidates the size of the aneurysm and its characteristics, and also reveals the presence of any thrombus in the aneurysm (5). CT venography or magnetic resonance venogram can be performed to show the extent of the lesion if the venous US was not helpful (6).

## Materials and Methods

17 patients (10 male and 7 female) aged between 10 and 38 (with a mean age of 21,94) diagnosed as having SVA were studied. The diagnosis was confirmed by clinical examination and venous duplex ultrasonography. Inclusion criteria included symptomatic patients and asymptomatic patients that were indicated for therapeutic surgery. Exclusion criteria consisted of the presence of the arteriovenous fistula or diffuse venous dilation. Patients underwent follow-up evaluations which were clinical examinations and imaging studies for 3 months.



**Figure 5.** Histopathological examination showed dilated blood vessel containing organized thrombosis.

### Case series

In this case series, we studied 17 patients diagnosed with SVA that received proper therapeutic interventions within a period of 11 years. All of the patients had a negative history of the hyper-coagulopathy state, previous DVTs, major surgeries, or any provoked risk factors. Also, they denied the consumption of any anti-coagulants.

The location of the aneurysms was as follows:

A total of 6 aneurysms were located in the Great Saphenous Vein (GSV) (Figure 1).

2 aneurysms were located in the Small Saphenous Vein (SSV).

6 aneurysms were located in the External Jugular Vein (EJV) (Figures 2 and 3).

1 aneurysm was located in the dorsal foot vein (Figure 4).

And also 2 aneurysms were located in the forearm veins.

10 patients presented with symptoms associated with the acute thrombosis formed in the aneurysm and 7 patients presented with soft tissue mass. None of the patients suffered from serious complications such as pulmonary emboli and aneurysm rupture.

All the patients underwent excisional surgery and were managed by regular follow-ups. All the patients received pre-operative heparin and post-operative

therapeutic warfarin. Warfarin bridged to LMWH until INR became therapeutic.

In 3-month follow-ups, the patients underwent Doppler ultra-sonography and no pathology was reported in any of them. Table 1 summarizes the patients' information.

### Discussion

SVA are rare venous diseases that are divided into primary (congenital) and secondary (acquired) groups (5). SVAs are misdiagnosed most of the time due to the rarity of the disease, its unknown etiology, and unspecific symptoms (3). SVA may occur in patients with no history of any predisposing factor such as hyper-coagulopathy state, traumas, or major surgeries.

As histopathology test of the patients confirmed dilated thin vessel with organized thrombosis (Figure 5), the main cause of aneurysm formation is that the vessel wall loses smooth muscles and elastic fibers and becomes thinner, which makes the segment prone to developing a venous aneurysm. However, in varicose veins, smooth muscle tissue increases, and the vessel wall becomes thicker (5,7).

In a novel study by Irwin *et al*, the expression of Matrix Metalloproteinase (MMP) was studied in the endothelial and smooth muscle cells of the venous aneurysm as the MMPs play an important role in the degradation of collagen fibers. They confirmed that MMPs 2, 9, and 13 were expressed higher in the VA and varicose veins compared to normal veins (8). This finding may suggest the cause of elastic fibers degradation in venous aneurysms.

SVA mostly occur in four regions of the venous system which are: 1-intracranial 2-the neck and thorax 3-visceral veins 4-upper and lower extremities are the least common areas for SVA (3,5). SVA in the lower limb is not common and it makes the disease challenging to diagnose. Symptoms of the SVAs vary based on the location and the type of the aneurysm. Patients with SVAs are often asymptomatic, but a thrombus in the aneurysm may cause local pain, swelling, and inflammation. Incidence of serious complications, including DVT or pulmonary embolism due to thrombosis in the venous aneurysm, is extremely rare (9,10).

Aneurysms of the great saphenous vein are

**Table 1.** Information of the patients

Cases	Aqe	Sex	Anatomical Site	Right/Left	Complications
1		M	GSV	left	Thrombosis
2		M	GSV	left	Mass
3	25	F	GSV	left	Mass
4	12	M	GSV	left	Mass
5	10	M	GSV	left	Mass
6	14	F	GSV	Right	Mass
7	26	F	SSV	Right	Thrombosis
8	13	F	SSV	Left	Thrombosis
9	16	M	EJV	Right	Thrombosis
10	15	M	EJV	Right	Thrombosis
11	25	F	EJV	Right	Thrombosis
12	32	M	EJV	Right	Thrombosis
13	13	M	EJV	Right	Thrombosis
14	23	F	EJV	Right	Thrombosis
15	19	F	Forearm veins	Left	Thrombosis
16	35	F	Forearm veins	Left	Mass
17	37	M	Dorsal foot		

GSV: Great Saphenous Vein, SSV: Small Saphenous Vein, EJV: External Jugular Vein.

anatomically divided into 4 types: type 1 includes the aneurysms that occur in the proximal third of the great saphenous vein. These aneurysms are the most common type. Type 2 is the aneurysm that occurs in the distal third of the GSV. Type 3 is the aneurysm that happens in both proximal and distal segments of the GSV in the same lower extremity. Type 4 is the aneurysm that occurs in the short saphenous vein. These types of aneurysms are the least common (11,12). Patients with GSV aneurysms are often presented with swelling, pain, and edema of the lower extremity (12), and patients with SSV often complain of neurological manifestations due to compression of the aneurysm to the sural nerve (13).

The exact etiology of the GSV and SSV aneurysms is unknown, but a study by Pascarella *et al* (14) reported that reflux of blood through incompetent valves causes turbulent and pulsatile blood flow. This phenomenon makes the venous wall susceptible to weakening and aneurysm formation.

Over-weighted and obese patients are more at risk of venous reflux due to their high intra-abdominal pressure. Venous reflux seems to be a risk factor for

VA, so VA has been related to a high Body Mass Index (BMI) (14).

Jugular vein aneurysm is a rare venous condition due to low pressure of the vena cava system (4) that is defined as the cervical mass that is unilateral, soft, and non-pulsatile, and enlarges with crying, sneezing, or Valsalva maneuver (15). Jugular vein aneurism may have a mass effect on the surrounding structures and be painful due to the thrombus of an aneurysm (4,6,16).

Aneurysms of the neck are usually congenital and are diagnosed and detected during childhood (16). Internal jugular aneurysm is more common than external jugular aneurysm (4). Venous aneurysms in adults are mostly acquired and they occur more commonly on the left side (6). The exact etiology of the jugular venous aneurysm is yet unknown. Tumors, traumas, inflammation, and degeneration are the possible factors in the formation of venous aneurysms; however, it seems that congenital defect of the venous wall is the main cause (4,6,16). A jugular venous aneurysm can be easily misdiagnosed with any pathologies presenting as cervical swelling such as lymphocele, hygroma, hemangioma, and other tumors (5). Diagnosis is usually made based on the

patient's signs and symptoms, clinical examinations, and imaging studies.

Venous duplex ultrasonography is the first modality of choice in detecting neck, GSV and SSV, and forearm venous aneurysms, because it is available, non-invasive, and reveals good information about the aneurysm details (3,4,16). Ultrasound imaging elucidates the presence of any thrombus and shows the exact location of the lesion and the surrounding structures (6,15). CT Venography (CTV) is the modality of choice when venous sonography fails to reveal precise information regarding the extent of the aneurysm (3,4,16).

According to some studies, the therapeutic approach for patients with SVA is based on the fact that only symptomatic patients with complicated aneurysms or serious complications (mass effect, rupture, or thrombus) and patients with cosmetic concerns are indicated for surgical intervention.

Asymptomatic patients can be managed by regular follow-ups (6,15,17).

However, some other studies suggest that even asymptomatic patients must receive surgical interventions because they are at risk of lethal complications including Deep Venous Thrombosis (DVT) and Pulmonary Emboli (PE). It also has been proven that an anti-coagulation regimen without any surgical intervention is insufficient in the prevention of such complications in asymptomatic patients (3-5,16).

## Conclusion

A superficial venous aneurysm is a rare medical condition. The etiology of the disease is unknown

yet. It is recommended to consider SVA as one of the differential diagnoses in patients suffering from unspecific symptoms such as local pain, tenderness, inflammation, or even asymptomatic patients because SVA may occur in patients with no history of using catheters, hyper coagulopathy state, or any major and predisposing risk factors.

Due to the presence of thrombosis, the aneurysm may remain undiagnosed, thus the patients should be managed by the regular US in follow-ups.

Surgical excision as the main therapeutic intervention is effective and should be used as a first-line treatment. Also, SVA may cause DVT and PE, so SVA should be considered as one of the rare and uncommon causes of PE and DVT.

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## Conflict of Interest

The authors did not have any conflict of interest to declare.

## Ethical approval

All the patients were aware that their clinical data would be used for research and publication purposes.

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