

RECURRENT VARICOSE VEINS FOLLOWING SMALL SAPHENOUS VEIN SURGERY: A 5-YEAR FOLLOW-UP DUPLEX ULTRASOUND STUDY

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Abstract

Introduction: Chronic venous disease (CVD) of the lower limbs is a very prevalent medical condition with important socioeconomic repercussions. Small saphenous vein (SSV) incompetence, although less frequent than great saphenous vein (GSV) incompetence, presents a more challenging treatment, with higher rates of complication and recurrence.

Objectives: To determine the incidence and associated risk factors of varicose veins recurrence in patients submitted, for the first time and exclusively, to SSV surgery with 5 years of follow-up.

Methods: Retrospective analysis of all exclusively first-time SSV surgeries, at Angiology and Vascular Surgery Service of Hospital Beatriz Ângelo, between January 1st, 2013, and December 31st, 2014. In March 2019, the authors performed clinical and venous doppler ultrasound reassessment of all included patients.

Results: A total of 23 limbs were evaluated, 56.5% were female and the mean age was 51.8 years. All patients were symptomatic and underwent ligation of the saphenopopliteal junction (SPJ), 26.1% and 43.5% had total and partial SSV stripping, respectively. After venous doppler ultrasound at 5-year follow-up, we found that 21.7% did not present a correct SPJ ligation due to failure to identify its location, with a statistically significant association between SPJ ligation and varicose vein recurrence. In follow-up, we also diagnosed GSV incompetence in 21.7% for the first time, which is in agreement with the fact that this is a chronic disease. Finally, we found that all patients with symptomatic recurrence at 5-year follow-up had CVD, however, some asymptomatic patients also had ultrasound changes.

Conclusion: Routine preoperative localization of the SPJ by doppler ultrasound guidance could have an impact in minimizing varicose vein recurrence. Imaging recurrence does not always translate into clinical recurrence. Because this is a chronic disease, patients should keep general care to prevent disease progression, even after surgery.

Keywords: saphenous vein, varicose veins, recurrence, doppler ultrasound

INTRODUCTION

Chronic venous disease (CVD) of the lower limbs is a very common medical condition globally (20 - 60%). In most cases it is responsible for deterioration of patient's quality of life, and important socioeconomic repercussions. The disease itself and its complications can be responsible for chronic and

disabling pain, resulting in the loss of regular working days, and shortening of the active working lifespan.¹

It may or not be symptomatic and includes a wide range of clinical signs ranging from minimal superficial venous dilation to chronic skin changes such as pigmentary dermatitis, lipodermatosclerosis, atrophie blanche or ulcers.¹

The etiology is not yet fully understood, however, some

of the risk factors associated with the development of varicose veins have been identified, such as female gender, advanced age, family history, multiple pregnancies, obesity, some dietary habits and prolonged orthostatism.¹⁻³

The descriptive classification of CVD, developed by Porter and Moneta in 1995, considers its clinical signs (C), etiology (E), anatomical distribution (A) and associated pathological changes (P) - CEAP (Table 1).^{3,4}

Incompetence of the small saphenous vein (SSV), although less frequent than the incompetence of the great saphenous vein (GSV), occurs in about 20% of patients with varicose veins and has been associated as an important cause

and associated risk factors of varicose vein recurrence in patients who underwent, for the first time and exclusively, SSV surgery with 5 years of follow-up.

MATERIALS AND METHODS

Patient population and methods

The authors performed a retrospective analysis of all SSV surgeries performed over a period of two consecutive years (between January 1st, 2013, and December 31st, 2014) at the Angiology and Vascular Surgery Service of Hospital Be-

Table 1 CEAP classification for chronic venous disorders

C – Clinical Classification	E – Etiology Classification
C0: No visible or palpable signs of venous disease	Ec: Congenital
C1: Telangiectasias, reticular veins	Ep: Primary
C2: Varicose veins	Es: Secondary
C3: Edema	En: No cause identified
C4: Changes in skin and subcutaneous tissue secondary to chronic venous disease	A – Anatomic Classification
C4a: Pigmentation and/or eczema	As: Superficial venous system
C4b: Lipodermatosclerosis and/or atrophie blanche	Ad: Deep venous system
C5: Healed ulcer	Ap: Perforating venous system
C6: Active venous ulcer	An: No location identified
Each clinical class is characterized by a subscript for the presence of symptoms (s, symptomatic) or absence of symptoms (a, asymptomatic)	P – Pathophysiology Classification
	Pr: Reflux
	Po: Obstruction
	Pr,o: Reflux and obstruction
	Pn: Non identified

of CVD. When compared to GSV, its treatment is more challenging, has higher rates of recurrence (up to 52% at 3 years), and is frequently associated with postoperative complications, such as paresthesia (19% to 31%), nerve injury (1.1% to 6.7%), deep vein thrombosis (up to 1.2%) or pulmonary embolism (rare).⁵⁻¹¹

The classic surgical treatment of varicose veins in the SSV territory is based on the ligation of the saphenopopliteal junction (SPJ). Partial or total stripping of the SSV is not routinely performed, being reserved only for patients in whom the SSV is incompetent.¹¹

OBJECTIVE

The aim of this study was to determine the incidence

of CVD. When compared to GSV, its treatment is more challenging, has higher rates of recurrence (up to 52% at 3 years), and is frequently associated with postoperative complications, such as paresthesia (19% to 31%), nerve injury (1.1% to 6.7%), deep vein thrombosis (up to 1.2%) or pulmonary embolism (rare).⁵⁻¹¹

atriz Ângelo. Subsequently, in addition to the usual follow-up appointments, for the purpose of the study, all patients included were submitted to a clinical and imagiological reevaluation with a venous doppler ultrasound during the month of March 2019.

All patients simultaneously intervened to the GSV, patients submitted to surgery because of varicose recurrence in the territory of the SSV and patients whose follow-up was lost were excluded from the study.

Surgery technique

Although surgeries were performed by five different vascular surgeons, it was possible to compare the results, since all members of the team used a standard surgical technique

Table 2 Sample characterization

Variable	Operated Limbs (n=23)	Non-recurrence group (n=15)	Recurrence group (n=18)	p-value
Gender, n (%)				0.685
Male	10 (43.5)	6 (40)	4 (50)	
Female	13 (56.5)	9 (60)	4 (50)	
Age (years), mean (standard deviation)	51.8 ± 9.9	52.1 ± 10.2	51.4 ± 10.1	0.877
BMI, n (%)				
Underweight (<18.5 Kg/m ²)	1 (4.3)	1 (6.7)	0	1.000
Normal (18.5-24.9 Kg/m ²)	6 (26.1)	4 (26.7)	2 (25)	1.000
Overweight (25.0-29.9 Kg/m ²)	13 (56.5)	9 (60)	4 (50)	0.685
Obese (>30.0 Kg/m ²)	3 (13.0)	1 (6.7)	2 (25)	0.269
Smoking habits, n (%)	7 (30.4)	6 (40)	1 (12.5)	0.345
Use of hormonal therapy, n (%)	0	0	0	-
CEAP Classification				
Clinical, n (%)				
C2	19 (82.6)	13 (86.7)	6 (75)	0.589
C3	1 (4.3)	0	1 (12.5)	0.348
C4	2 (8.7)	2 (13.3)	0	0.526
C6	1 (4.3)	0	1 (12.5)	0.348
Etiology, n (%)				0.589
Primary	19 (82.6)	13 (86.7)	6 (75)	
Secondary	4 (17.4)	2 (13.3)	2 (25)	
Anatomic, n (%)				-
Superficial veins	23 (100)	15 (100)	8 (100)	
Pathophysiology, n (%)				-
Reflux	23 (100)	15 (100)	8 (100)	
Pre-operative symptoms, n (%)	23 (100)	15 (100)	8 (100)	-

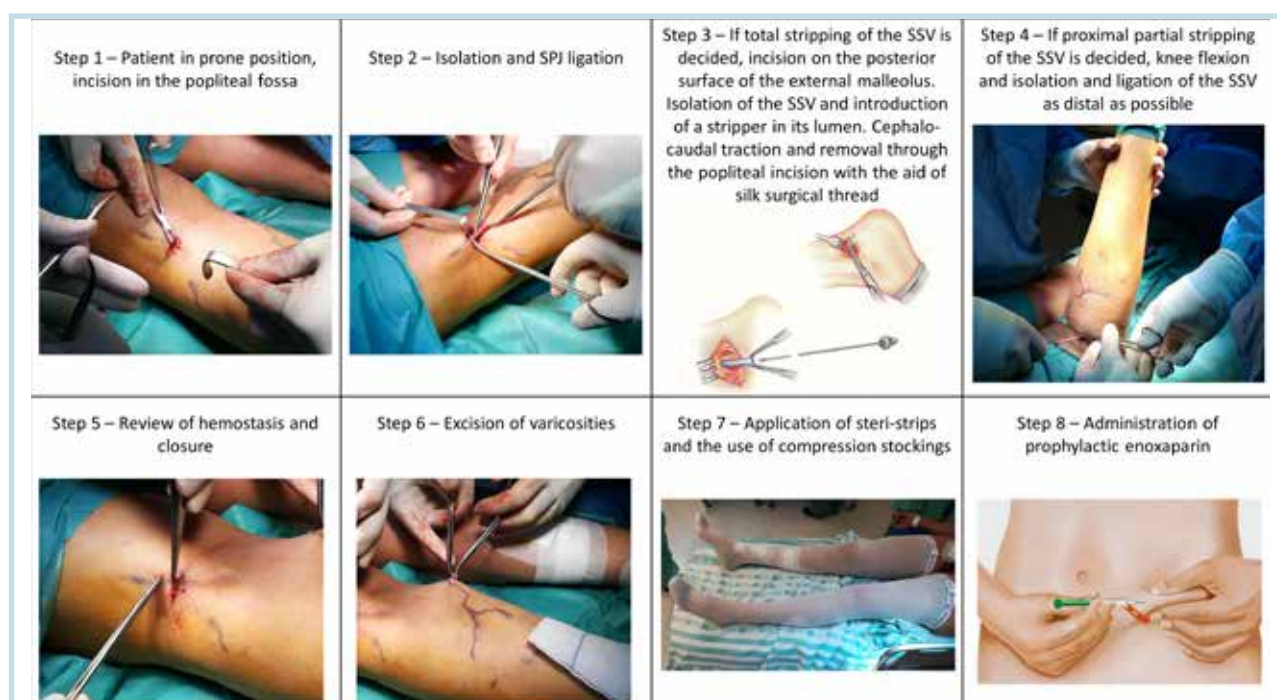
(Figure 1). With patient in prone position, the popliteal fossa was explored formally through a transverse incision (step 1). The SPJ, popliteal artery and major nerves were identified, and the junction was ligated with absorbable suture material (step 2). If total stripping of the SSV was decided the surgeon performed an incision on the posterior surface of the external malleolus, isolated the SSV and introduced a stripper in its lumen. The SSV was stripped from proximal to distal to avoid nerve injuries and removed through the popliteal incision with the aid of silk surgical thread (step 3). On the other hand, if proximal partial stripping of the SSV was decided the surgeon proceeded with knee flexion, isolation and ligation of the SSV as distal as possible (step 4). Then the hemostasis was reviewed and the incision of the popliteal fossa was closed

(step 5). SSV varicose tributaries were avulsed through multiple stab incisions (step 6). Postoperative care included the use of compression stockings and administration of prophylactic enoxaparin (step 7 and 8).

Statistical analyses

Categorical variables are presented as frequencies and percentages, and continuous variables as means and standard deviations or medians and interquartile ranges for variables with skewed distributions. Normal distribution was checked using the Shapiro-Wilk test.

Categorical variables were compared with the use of Fisher's exact test or the chi-square test, as appropriate. Continuous variables were compared with the use of unpaired Student's t-test or Mann-Whitney test, as appropriate. A p-val-


Figure 1

Classical surgical technique for treating varicose veins in the SSV territory (Step 1 – Patient in prone position, incision in the popliteal fossa; Step 2 – Isolation and SPJ ligation; Step 3 – If total stripping of the SSV is decided, incision on the posterior surface of the external malleolus. Isolation of the SSV and introduction of a stripper in its lumen. Cephalo-caudal traction and removal through the popliteal incision with the aid of silk surgical thread; Step 4 – If proximal partial stripping of the SSV is decided, knee flexion and isolation and ligation of the SSV as distal as possible; Step 5 – Review of hemostasis and closure; Step 6 – Excision of varicosities; Step 7 – Application of steri-strips and the use of compression stockings; Step 8 – Administration of prophylactic enoxaparin).

Table 3
Surgery and postoperative results

Variable	Operated Limbs (n=23)	Non-recurrence group (n=15)	Recurrence group (n=8)	p-value
Limb, n (%)				1.000
Right	11 (47.8)	7 (46.7)	4 (50)	
Left	12 (52.2)	8 (53.3)	4 (50)	
Surgical technique, n (%)				
SPJ Ligation	23 (100)	15 (100)	8 (100)	-
SSV Total Stripping	6 (26.1)	5 (33.3)	1 (12.5)	0.369
SSV Partial Stripping	10 (43.5)	5 (33.3)	5 (62.5)	0.221
Postoperative symptomatic improvement, n (%)	23 (100)	15 (100)	8 (100)	-
Postoperative use of compression stockings, n (%)				
Yes	18 (78.3)	12 (80)	6 (75)	1.000
No	2 (8.7)	2 (13.3)	0	0.526
Intermittent	3 (13.0)	1 (6.7)	2 (25)	0.269
Postoperative complications, n (%)				
Paraesthesia at the site of incision	2 (8.7)	2 (13.3)	0	0.526
Haematoma	1 (4.3)	1 (6.7)	0	1.000
Hyperpigmentation	1 (4.3)	1 (6.7)	0	1.000
Consultation discharge (months), median (range)	6.5 (1-61)	13.5 (0.5-47)	14.4 (0.5-61)	0.771

ue between the non-recurrence and recurrence group below 0.05 was considered statistically significant.

Statistical analyses were performed using SPSS 23.0 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY, USA).

RESULTS

Sample characterization

From January 1st, 2013 to December 31st, 2014, 33 limbs in 31 patients were submitted to vascular surgery exclusively on non-recurring varicose veins in the territory of the SSV, of which 10 limbs were excluded due to lack of follow-up.

Thus, 23 limbs were evaluated, 56.5% were female and the mean age was 51.8 ± 9.9 years. Most patients had a body mass index (BMI) > 25 kg / m², only 7 (30.4%) were smokers, none were taking hormone therapy and all patients were symptomatic. As for the CEAP classification, 19 (82.6%) were clinically classified as C2, 1 (4.3%) as C3, 2 (8.7%) as C4 and 1 (4.3%) as C6. Only 4 patients (17.4%) had secondary etiology, with the remaining presenting primary etiology. According to the study design, all patients had an anatomical classification of superficial veins, and all had reflux as pathophysiological classification. There was no statistically significant association between any

variable and varicose vein recurrence (Table 2).

Surgery and postoperative results

Regarding surgical procedure, all patients underwent ligation of the SPJ. In 6 cases (26.1%) it was associated with total stripping of the SSV due to incompetence of the entire vein and in 10 cases (43.5%) partial stripping of the SSV due to the presence of proximal incompetence only. All patients reported improvement of typical CVD symptoms in the postoperative period and 18 (78.3%) used compression stockings on a regular basis during the first 6 months after surgery. In regard to complications in the postoperative period, there were 2 cases of local paraesthesia at the site of the incisions, 1 case of haematoma and 1 case of hyperpigmentation. No other complications such as injury to the sural, common, or tibial nerves, deep venous thrombosis or pulmonary thromboembolism occurred. Patients were discharged from consultations, at a median of 6.5 months. Once more, there was no statistically significant association between any variable and varicose vein recurrence (Table 3).

Follow-up

At a 5-year follow-up, 4 patients (17.4%) reported

Table 4

Clinical and imagiological evaluation at 5 years of follow-up results

Variable	Operated Limbs (n=23)	Non-recurrence group (n=15)	Recurrence group (n=8)	p-value
Symptomatic improvement, n (%)				0.103
Yes	19 (82.6)	14 (93.3)	5 (62.5)	
No	4 (17.4)	1 (6.7)	3 (37.5)	
Use of compression stockings, n (%)				
Yes	6 (26.1)	5 (33.3)	1 (12.5)	0.369
No	11 (47.8)	7 (46.7)	4 (50)	1.000
Intermittent	6 (26.1)	3 (20)	3 (37.5)	0.621
Visible varicose veins in the SSV territory, n (%)				0.131
Yes	6 (26.1)	2 (13.3)	4 (50)	
No	17 (73.9)	13 (86.7)	4 (50)	
Confirmed SPJ Ligation, n (%)				0.033
Yes	18 (78.3)	14 (93.3)	4 (50)	
No	5 (21.7)	1 (6.7)	4 (50)	
Recurrence, n (%)				
Without recurrence	15 (65.2)	15 (100)	0	
Residual varicose veins	3 (13.0)	0	3 (37.5)	
Neovascularization	1 (4.3)	0	1 (12.5)	
Progression of SSV disease	4 (17.4)	0	4 (50)	
GSV Incompetence	5 (21.7)	4 (26.7)	1 (12.5)	0.621

symptomatic recurrence, only 6 (26.1%) maintained the use of compression stockings on a regular basis and 6 (26.1%) presented visible varicose veins in the SSV territory. Regarding the imaging reassessment with venous doppler ultrasound, 5 patients (21.7%) did not present ligation at the level of the SPJ, thus presenting a more distal ligation. 4 patients (17.4%) presented progression of SSV disease, 3 (13.0%) presented residual varicose veins responsible for varicose veins in the SSV territory and 1 patient (4.3%) had neovascularization responsible for varicose veins in the SSV territory. Five cases (21.7%) of GSV incompetence were also identified, not present in the preoperative period (Table 4). When assessing recurrence, we found that there is only a statistically significant association with the ligation of the SPJ ($p = 0.033$). Of the 18 cases in which a correct SPJ ligation was observed on venous doppler ultrasound, only 4 presented recurrence at a 5-year follow-up. But, of the 5 cases in which a correct SPJ ligation was not performed, only 1 did not present varicose recurrence in the SSV territory. All others presented recurrence: 3 due to low ligation (leaving a portion of SSV that originates collateral vessels responsible for varicose veins) and 1 due to low ligation and neovascularization (Table 5).

DISCUSSION

Although, in recent years, thermal techniques have emerged as an effective alternative to open surgery, the classical surgical technique of SPJ ligation, with or without SSV stripping, is still the most used in Portuguese public hospitals. International recommendations for endovenous saphenous ablation are heterogeneous, particularly for SSV treatment. The 2011 American Venous Forum (AVF) guidelines did not mention thermal treatments, but rather surgery, with level 1B evidence. The 2013 National Institute for Health and Care Excellence (NICE) guidelines recommend thermal treatment and foam over surgery, but considered all the saphenous axes together, without making a specific analysis of the small vs the great saphenous vein. The 2015 European Society for Vascular Surgery (ESVS) guidelines gave endovenous thermal ablation of the SSV a grade 2B recommendation but access to the SSV should be gained no lower than mid-calf.¹²⁻¹⁵ More studies and guidelines are needed for the specific treatment of SSV, including cost analysis, in order to a similar worldwide treatment in the future.

In this study, all evaluated patients were approached with a popliteal fossa incision for aesthetic reasons, however, it is known that the SPJ may have different locations depending on the patient.^{5, 8, 9, 16} Despite this, none of the patients were evaluated by ultrasound on the day of surgery, for preoperative localization of the SPJ, which may justify the 5 cases of failure to identify it.

In fact, when SPJ ligation and varicose recurrence are compared, there is a statistically significant association between the variables. It means that distal ligation of the SPJ is associated with recurrence of the disease.

The literature shows higher rates of recurrence in the treatment of varicose veins of the SSV, with the ligation of the

SPJ, than in the treatment of varicose veins of the GSV, with the ligation of the saphenofemoral junction (SFJ), respectively 52% and 20% at 3 years.^{6, 17} The main cause of recurrence is attributed to the failure in the identification of the SPJ, however, there are few studies that analyse the recurrence of varicose veins of the SSV with the adequate technique of SPJ ligation.^{7, 11} A retrospective study by Rashid, in 2002, revealed that only 59% of the incompetent SPJ was successfully disconnected, with failure to locate and ligate the SPJ being the main cause of recurrence of varicose veins.⁵ Tong and Royle presented similar conclusions, with recurrence of varicose veins in patients undergoing SSV surgery attributed to non-ligation of the SPJ in 28% of cases.⁸ In our study, a slightly higher success rate was achieved, with 78.3% (18 cases) of SPJ ligation and 21.7% (5 cases) of non-ligation.

The recurrence observed in patients with a correct SPJ ligation is related to the progression of the disease since all these patients had only underwent partial SSV stripping, highlighting the fact that this is a chronic disease, whose symptoms can be improved, and progression delayed but not hindered. In this study, we were also able to assess that the progression of SSV disease (4 cases) was responsible for the recurrence of varicose veins in the same proportion as the incorrect SPJ ligation (4 cases), both 50% of the recurrence group.

According to the inclusion criteria, no patient had incompetence of the GSV prior to the surgery, and the surgeries were performed exclusively on the SSV. At 5 years of postoperative follow-up, 5 cases (21.7%) of GSV incompetence were identified. There was no statistically significant association between the progression of the disease in the GSV and the use of compression stockings or the recurrence of symptoms. However, these cases of new diagnosis of GSV incompetence and progression of SSV disease even after successful surgery showed the need to maintain general care to prevent the progression of CVD of the lower limbs, such as the regular use of compression stockings, regular exercise, less hours standing or sitting (especially with legs crossed), avoiding hot places or tight clothes and adopting healthy dietary habits to avoid overweight.^{2, 18}

Regarding the symptoms of CVD after 5 years of surgery, of the 4 cases in which there was symptomatic recurrence, 3 had recurrence of varicose veins in the territory of the SSV and 1 had progression of the disease of the GSV. However, there was no statistically significant association between symptoms and recurrence of varicose veins at 5 years of follow-up. Of the 19 cases in which symptomatic improvement was maintained 5 years after surgery, 8 presented changes in the venous doppler ultrasound (4 had recurrence of varicose veins in the SSV territory, 1 had simultaneously recurrence in the SSV territory and progression of the GSV disease and 3 had disease progression in the GSV without recurrence in the SSV territory), implying that imaging recurrence is not always related to clinical recurrence, and most patients may be treated conservatively.

Although some studies have identified 1.1% to 6.7% of peripheral nerve damage during total stripping of the SSV (most frequent in the sural nerve and common peroneal

Table 5

SPJ ligation and recurrence association at 5-year follow-up (p = 0.03)

		Recurrence		
		Yes	No	Total
SPJ Ligation	Yes	4	14	18
	No	4	1	5
	Total	8	15	23

nerve), in this study, no nerve damage was identified, which may be related to a correct and careful identification and dissection.¹⁹ Other major postoperative complications, such as deep vein thrombosis or pulmonary embolism, were also not identified in this study. Despite the good postoperative results of this study, major complications related to surgery are well known and the patient should be informed when choosing the surgical treatment.

LIMITATIONS

The main limitation of our study is the fact that it is a retrospective study, based on a small sample (given the tight inclusion criteria), increasing the risk for type II error for variables that we believe could contribute to varicose vein recurrence, such as gender, age, obesity, use of hormone therapy, smoking habits or use of compression stockings on a regular basis in the postoperative period and in the follow-up. Another limitation is the fact that the patients did not undergo a venous doppler ultrasound evaluation in the immediate postoperative period in order to compare, in a more reliable way, with the results obtained after 5 years of surgery.

CONCLUSION

Although, in recent years, new minimally invasive techniques have been developed, the classical surgical technique of SPJ ligation, with or without SSV stripping, is still the most used in Portuguese public hospitals.

Routine preoperative localization of the SPJ by doppler ultrasound guidance could have an impact in minimizing varicose vein recurrence. Imaging recurrence does not always translate into clinical recurrence.

Because this is a chronic disease, patients should keep general care to prevent disease progression, even after surgery.

Additional studies are necessary, with larger samples, to verify that other measures can be taken to reduce the recurrence of varicose veins in the SSV territory.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare.

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