



# International Journal of Surgery Science

E-ISSN: 2616-3470

P-ISSN: 2616-3462

© Surgery Science

www.surgeryscience.com

2019; 3(3): 09-12

Received: 06-05-2019

Accepted: 10-06-2019

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## Outcomes of knee-groin great saphenous vein stripping in patients with chronic venous insufficiency

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DOI: <https://doi.org/10.33545/surgery.2019.v3.i3a.03>

### Abstract

**Background:** The clinical importance of the remaining part of the great saphenous vein (GSV) after knee-groin (Short) stripping is not clearly understood. The aim is to compare long (Ankle-groin) and short GSV stripping methods in terms of symptoms, quality of life, recurrence and complications.

**Methods:** A total of 26 patients with chronic venous insufficiency were classified as long and short GSV stripping groups.

**Results:** Preoperatively, the two groups were similar in terms of all scoring systems. Patients with short GSV stripping had better scores in general health category of SF-36 (At postoperative 1st month), in categories of general health and emotional well-being (At postoperative 3rd month), and in the parameters of night cramps and heaviness in the legs (At postoperative 6th month), compared to those with long GSV stripping.

**Conclusions:** Short GSV stripping may be considered as the first step surgical option in such patients.

**Keywords:** Chronic venous insufficiency, great saphenous vein, short stripping, long stripping

### Introduction

Varicose vein is one of the most common vascular diseases affecting the adult population. Although various conservative or minimal invasive techniques such as limb elevation, compression stocking, endovenous laser ablation, cryotherapy, heat-mediated obliteration, and ultrasound-guided sclerotherapy have gained popularity in recent years, stripping of the great saphenous vein (GSV) remains the standard treatment in most parts of the world [1-5]. Long stripping of GSV, that is from groin to ankle, is the traditional surgical approach in the treatment of venous insufficiency. However, it is an invasive method associated with relatively high rates of complication. These concerns have also led to increase use of other endovenous procedures. In these techniques, an ablative therapy is usually performed for the venous segment between knee and groin. The major concern associated with these procedures is the clinical importance of the remnant GSV below the knee. Although there are many studies comparing the long GSV stripping and those minimal invasive procedures, only a few clinical studies comparing the long and short GSV stripping in the literature [6-9].

In this study, the clinical outcomes and recurrence rates of short GSV stripping were compared with the classical long stripping of GSV.

### Materials and Methods

#### Patients

A total of 26 patients who were operated with a diagnosis of varicose veins plus GSV reflux at general surgery department of Ankara University were included in this study. The study was approved by the ethics committee of Ankara University. The diagnosis of GSV insufficiency was based on both clinical symptoms and doppler ultrasonographic findings. All patients were informed about the aim and steps of the study in detailed, and consent forms were taken from all. Approval of the consent form, being between 18 and 80, presence of >0.5 venous reflux in GSV are the inclusion criteria of the study. Presence of deep venous obstruction, deep vein thrombosis, or peripheral artery disease, previous surgery for varicose vein at the same side, duplex or very convoluted BSV, presence of accessory saphenous vein insufficiency are the exclusion criteria.

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### Preoperative diagnostic work-up

Preoperative clinical statuses of the patients were classified according to Clinical Severity, Etiology or Cause, Anatomy, Pathophysiology (CEAP) classification [10]. Venous clinical severity score (VCSS) is mainly used for the evaluation of postoperative outcomes in venous surgery [11]. It is an easy-to-use and highly objective scoring model, and is also used in the evaluation of preoperative clinical status. In this model, there are 10 parameters such as pain, varices, edema, pigmentation, inflammation, induration, number/duration/diameter of active ulcers, and presence of compression therapy. High mean scores show worse clinical status. After the evaluation of patients clinically by using CEAP and VSSC scores, two-dimensional ultrasound examination was used to confirm the presence of saphenofemoral reflux and diameters of the GSV. The varicose veins and perforated veins were also marked preoperatively. The Short Form-36 (SF-36), the most widely used health-related quality-of-life assessment tool in all fields of medicine, was used to assess the globally health status of the patients participated in this study. All patients was evaluated in terms of eight SF-36 scales including physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional well-being, social functioning, pain, and general health. A disease-specific quality of life instrument for use in venous diseases, The Venous Insufficiency Epidemiological and Economic Study Quality of Life (VEINES-QOL), was also used to measure the quality of life. It contains a rating score similar to that of the SF-36 form; however, its properties are more spesific to venous diseases and more useful in the postoperative follow-up [12].

### Surgical procedure

The patients were randomly allocated to two surgical groups; long GSV stripping (Group 1) and short/partial GSV stripping (Group 2). All procedures were performed in the supine position by the same surgeon team under general or spinal anesthesia. Long GSV stripping was performed via two standard incisions: a 6 cm oblique incision beneath the femoral and a 2 cm transverse incision above the internal malleolus. In the short stripping method, the distal stripping level was a 2 cm transverse incision about 2 cm below the knee joint.

After the operation, an elastic compression bandage was applied from the the base of the foot to the groin, and extremities were elevated by 10-15 degrees to mobilization.

### Postoperative follow-up

Numeric pain scores (NPS) of the patients were recorded during the first 15 days postoperatively. Sensory examinations of the lower extremities were performed on the 3rd and 15th days, 1st and 6th months postoperatively, and VEINES-QOL and SF-36 forms were fulfilled. All postoperative complications were also noted.

At 6th month, patients were examined by venous duplex ultrasonography to assess the ablation in BSV and the development of recurrent varices. Sense examinations were also repeated in patients whose previous sensory examinations were abnormal.

### Statistical analysis

All numerical values are given as average and standard errors. The categorical and numerical variables were analyzed by using chi-square and student-t test, respectively. A p value less than 0.05 are considered as significance level.

## Results

### Patient data and preoperative findings

Twenty six patients (14 males and 12 females) with a mean age of 40.5 years were included in the study. Nineteen of the patiets had a disease localized on one extremity while seven patients had bilateral disease. As a result, 33 extremities were included in the study. The VCSSs at the time of diagnosis were; no pain (two patients), mild (13 patients), moderate (9 patients), and severe (two patients). All patients were evaluated according to the CEAP classification (Table 1).

**Table 1:** Preoperative CEAP classification of the patients

Scale	Parameters	n (%)
C (Clinic)	C0	2 (% 6.06)
	C1	1 (% 3.03)
	C2	8 (% 24.24)
	C3	17 (% 51.51)
	C4a	4 (% 12.12)
	C4b	-
	C5	-
E (Etiology)	Econgenital	2 (% 6.06)
	Eprimary	31 (% 93.93)
	Esecondary	-
	Eundetermined	-
A (Anatomical)	Asuperficial	23 (% 69.69)
	Aperforant	-
	Adeep	10 (% 30.30)
	Aundetermined	-
P (Pathophysiology)	Preflux	32 (% 96.96)
	Pobstruction	-
	Preflux and obstruction	1 (% 3.03)
	Pundetermined	-

On doppler US examinations of the extremities, 28 (%84.4) had insufficiency throughout the entire GSV with saphenofemoral junction, 3 (%9) had insufficiency in GSV above the knee with saphenofemoral junction, and 2 (%6) had insufficiency in common femoral vein, entire, and saphenofemoral junction. None of the extremities had any evidence of failure in small saphenous vein. All doppler US findings were given in Table 2.

**Table 2:** Preoperative doppler US findings

	insufficiency	n (%)
Superficial US	SFJ + entire GSV	28 (%84.4)
	SFJ + GSV above the knee	3 (%9)
	SFJ + entire GSV + FV	2 (%6)
Deep US	Superficial FV	2 (%6)
	None	31 (93.3%)
Perforated system US	Cocet vein (C2)	10 (30.3%)
	Paratibial perforated vein	4 (12.1%)
	At least two perforated vein above knee	5 (15.1%)
	None	14 (42.4%)

SFJ: saphenofemoral junction, GSV: great saphene vein, FV: femoral vein

### Operative data

Twenty patients (%76.93) were operated under general anesthesia while spinal anesthesia were used in the remaining six patients (%23.07). Complete and short BSV stripping were used for 19 (%57.6) and 14 ekstremities (%42.4), respectively. plebectomy was done for 31 ekstremities (%93.93). Perforated vein ligation was performed in 6 ekstremities (18.18%). Among those, three were C2 ligation (9.09%) and three were C2 plus C3 ligation (9.09%). The two groups were similar in terms of operated

extremity side and plebectomy (Table 3).

**Table 3:** Operated extremity sides and number of plebectomies of the two groups

	Long GSV stripping	Short GSV stripping	Total
Extremity side			
Right	10	6	16
Left	9	8	17
Plebectomy			
done	18	13	31
none	1	1	2

### Comparison of patients with long GSV stripping and those with short GSV stripping

Preoperatively, the two groups were similar in terms of all VCSS parameters and mean VCSSs ( $p > 0.05$ ). In the statistical evaluation of postoperative 6th month VCSSs, the parameter of varices was only found to be significantly different in patients with short GSV stripping than others who underwent long GSV stripping ( $p = 0.01$ ).

NPSs of each extremities were also recorded throughout the 15 days postoperatively. No statistical difference in NPSs was found between the two groups ( $p > 0.05$ ).

Preoperatively, the two groups were similar in terms of all eight categories of SF-36 ( $p > 0.05$ ). At postoperative 1st month,

patients with short GSV stripping had better scores in general health category compared to those with long GSV stripping ( $p = 0.01$ ). At postoperative 3rd month, patients with short GSV stripping had better scores in categories of general health and emotional well-being compared to those with long GSV stripping ( $p = 0.01$ ). At postoperative 6th month, the two groups became similar in each category of SF-36 ( $p > 0.05$ ).

Preoperatively, VEINES-QOL/Sym scores were similar between the two patient groups ( $p > 0.05$ ). At postoperative 6th month, patients who underwent short stripping of GSV had better scores in the parameters of night cramps ( $p = 0.04$ ) and heaviness in the legs ( $p = 0.049$ ) compared to those with long GSV stripping. Total VEINES-QOL score was also statistically higher in patients who underwent short stripping of GSV than in others.

At postoperative 6th month, development of recurrent varicose veins were also evaluated. recurrent varices were detected in six patients (two were in short GSV stripping group and four were in long GSV group). However, there was no statistical difference in the development of recurrent varice between the groups ( $p > 0.05$ ).

Finally, in order to evaluate the efficacy of surgical treatments, preoperative and postoperative 6th month data of VCSS, SF-36, and VEINES-QOL/Sym score were compared between the two patient groups. Significant improvement was observed in almost all parameters at the end of six months (Table 4).

**Table 4:** Comparison of preoperative and postoperative (6th month) data of VCSS, SF-36, and VEINES-QOL/Sym scores in the entire study population

Score	Parameters	Preoperative	Postoperative	p
VCSS	pain	1.42±0.13	0.51±0.10	<0.001
	varices	1.72±0.17	0.39±0.08	<0.001
	edema	1.42±0.16	0.45±0.10	<0.001
	pigmentation	0.39±0.10	0.06±0.04	0.003
	inflammation	0.18±0.08	0	0.032
	physical functioning	22.2±0.9	26.06±0.7	<0.001
	role limitations due to physical health	5.3±0.2	6.6±0.2	<0.001
SF-36	role limitations due to emotional problems	4.2±0.2	5.1±0.2	<0.001
	energy/fatigue	14.03±0.4	14.48±0.5	<0.001
	emotional well-being	17.5±0.5	18.7±0.4	<0.001
	social functioning	6.1±0.1	5.9±0.1	<0.001
	pain	6.1±0.3	4.4±0.3	0.441
Veines	general health	15.6±0.4	16.2±0.4	0.001
	total QOL	70.1±2.2	80.9±2.1	0.001
	total Sym	27.2±1.2	33.1±1.2	<0.001

### Discussion

In the present study, the surgical and clinical outcomes of long and short GSV stripping methods were compared between each other. At the end of the study, both methods were found to be clinically effective. Although long stripping caused more neurological symptoms and deterioration in the quality of life postoperatively, all these disadvantages were improved within six months. In other words, when the healing of varicess and related symptoms were evaluated as the main surgical success, this result could be achieved by both methods, with less complication rates of short stripping.

Short GSV stripping is a less invasive procedure, but a remnant venous segment is leaved under the knee, which is likely to cause a reflux. The main concern about this procedure is the clinical significance of the remnant safenous vein. The effects of the remnat GSV on clinical symptoms, quality of life, and recurrence were not clearly demonstrated. There is limited number of studies comparing long and short GSV stripping methods in the literature, with conflicting results [16, 7, 9]. In the

study by Holme *et al.* no difference in recurrence rate was found between these two stripping methods, but short GSV stripping was reported to be associated with less saphenous nerve injury [6]. It should be noted here that the follow-up time was only three months in the mentioned above study. In their next study with 5-year follow-up outcomes, the two patient groups had also similar recurrence rates [7]. Although the duration of follow-up was six months in our study, the results were consistent with the study by Holmes *et al.* However, the clinical improvement between the groups in those studies was not compared. Additionally, partial and complete stripping methods were compared regardless of reflux level in those studies. For this reason, we think that those studies were not homogeneous in terms of the patient groups and were far to answer the question that should be asked in reality.

The possible effects of the remaining saphenous vein were also investigated in other studies. Fischer *et al.* reported in their study that short stripping may be a factor of recurrent saphenofemoral reflux after after GSV stripping procedures [8]. In another

prospective study comparing complete and partial stripping, there was no difference in recurrence between the two procedures. However, the authors also reported that patients with tibial varicess and saphenous venous reflux had a higher recurrence rate when performing short GSV stripping<sup>[9]</sup>. These findings are inconsistent with the results of the studies by Holme and colleagues<sup>[6, 7]</sup>. The study reported by Kostas *et al.* was quite sufficient in terms of number of patients and follow-up time, but had two major limitations: patient groups were not randomized and the reflux level in the patients who underwent partial stripping was restricted to the segment of removed BSV<sup>[9]</sup>. Short GSV stripping is less invasive than long GSV stripping, making it an effective surgical method in terms of quality of life and other scales. The results obtained from our work also supported this situation. It is well known that sensory disorders following GSV stripping is mainly associated with injuries of saphenous nerve or its medial cutaneous branches. This nerve supplies sensory innervation to the medial and anteromedial sides of the lower extremity from femoral region to the foot. Nerve injury during GSV stripping is not an uncommon complication, and resulted in various sensorial disorders including hypoesthesia, hyperesthesia, paresthesia, and a burning sensation<sup>[13]</sup>. Holme K. and colleagues found in their second study that nerve injury was more frequent in long GSV stripping three years after surgery. In our study, paresthesia was found to be less common in patients with short GSV stripping. However, the two groups became similar in terms of paresthesia at the sixth month. It should be noted that the follow-up time and the number of patients were less than that study. The most important difference of our study from similar studies in the literature is the evaluation of patients with various quality-of-life scales. In general, the patients who underwent short GSV stripping had significantly better scores compared with their preoperative scores.

### Conclusion

Stripping of GSV remains one of the most effective therapeutic options in the treatment of chronic venous insufficiency. According to the findings obtained from the present study, short GSV stripping can be considered as a safe and effective surgical option in such patients. Further studies with larger-scale and long-term follow-up may be useful for validation of the results.

**Funding:** No funding sources

**Conflicts of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee.

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