

# Incidence of saphenous nerve injury after total stripping of greater saphenous vein: Its severity and effect on life

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## ABSTRACT

**Introduction:** Total stripping of great saphenous vein is common practice since it reduces the need for reoperation. However, the incidence of saphenous nerve damage is higher in total stripping than in the conventional stripping.

**Methods:** Fifty-seven patients who underwent total stripping of great saphenous vein were studied to find out the incidence of saphenous nerve damage, its severity and effect on day-to-day activities. Data was collected using an interviewer administered questionnaire and a detailed neurological examination of the leg. The questionnaire included questions on symptoms of saphenous nerve damage, its severity and its impact on their day-to-day life and Aberdeen Venous Severity Score (AVSS) to assess outcome of surgery for varicosities.

**Results:** The age of patients ranged from 17 to 79 years with mean age of 44.7 (SD 15.80) years. Men comprised 56.1% of the sample. Fifteen out of 57 legs (26.3%) had evidence of saphenous nerve damage either by symptoms or by sensory deficit or by both. Patients with saphenous nerve damage were not significantly different in terms of age, gender, pre-operative Clinical Aetiological Anatomical and Pathophysiology (CEAP) class, post-operative CEAP class, post-operative AVSS, follow up interval or presence of recurrent varicosities when compared with those who didn't have saphenous nerve damage. Among those who had evidence of saphenous nerve damage, only one had persistent symptoms with minimal discomfort in day-to-day activities. Thirteen (22.4%) patients had recurrent varicosities generally presenting as isolated clusters and none of them necessitated to have reoperation with median follow up of 12 months. The acceptance of the operation among patients seems to be encouraging.

**Conclusions:** According to the findings of this study, total stripping of great saphenous vein can be safely undertaken by general surgeons with acceptable risk of saphenous nerve damage. Most of saphenous nerve damages are subclinical and transient and have negligible effect on day-to-day activities.

**Keywords:** *Saphenous nerve injury, saphenous vein, stripping below knee vein, varicose vein.*

## Introduction

Total stripping of great saphenous vein up to ankle is now becoming popular among vascular surgeons in treating patients with saphenofemoral valve incompetence or great saphenous vein incompetence with perforator incompetence, as it reduces the need for reoperation (1, 2). Though the need for

reoperation is very low, the risk of saphenous nerve damage when stripping great saphenous vein below knee joint is significantly higher because of its close anatomical relation below knee up to ankle (Figure 1) (3, 4). Incidence of saphenous nerve damage is variable from institutions to institutions

and between various standard of practices (5, 6). Despite the higher incidence of saphenous nerve damage in total stripping than in the conventional stripping up to just below knee joint, it has been shown to be less importance as far as its impact on day-to-day activities are concerned (2, 7). In this context, we studied a group of patients who underwent total stripping of great saphenous vein during a period of one year from 1<sup>st</sup> of October 2009, with regards to the incidence of saphenous nerve damage, its severity and effect on day-to-day activities.

## Methods

The study was designed as a retrospective descriptive study. Contact details of the patients, who have undergone total stripping of greater saphenous vein, during the period from 01.10.2009 to 31.09.2010 were collected from the surgical operation register and the admission register. They were sent letters requesting them to visit the clinic for their follow up. Of the patients who attended the clinic, a total of 57 patients expressed willingness participate in the study with informed written consent.

All patients were interviewed individually. The data were collected using an interviewer administrated questionnaire comprising Aberdeen Venous Severity Scale (AVSS) and questions for identifying symptoms of saphenous nerve damage and its effect on quality of life.

Details of operation and pre-operative CEAP (Clinical Etiological Anatomical & Pathological) Classification and post-operative complications were collected from clinic books and diagnosis cards.

A general examination was performed to identify surgical site infection. They were then evaluated for saphenous nerve deficit with simple neurological tests. A single examiner performed all neurologic evaluations.

Nociception was evaluated by asking the patient to differentiate between sharp and blunt ends of a safety pin. Light touch was evaluated with the tip of a small piece of gauze. Vibratory sensation was assessed by placing a tuning fork on the bony prominences of the leg. A complete sensory

examination of both lower extremities from mid-thigh downward was undertaken. Any regions demonstrating altered sensation (anaesthesia, hypoesthesia or dysesthesia) were recorded on a chart of the lower extremities. The regions of sensory deficit were measured with a measuring tape, and the size of the affected region was calculated as a rectangular area. Patients were considered to have had a saphenous nerve injury if they had either symptoms consistent with nerve injury or a currently identifiable saphenous nerve deficit (patch of anaesthesia, hypoesthesia or dysesthesia at medial aspect of leg and ankle region). Recurrent varicose veins were noted and tabulated.

Statistical analysis was performed with SPSS 15.0 statistical package for calculation and statistical analysis. Two sample *t*-tests were used to compare numeric data, and Chi-square ( $\chi^2$ ) for Fisher exact tests were used for categorical data where appropriate.

Ethical clearance was obtained from the Ethics Review Committee, Faculty of Medicine, University of Ruhuna.

## Results

The total number of eligible patients were 64 and out of them 57 patients had consented to participate in this study. The patients who refused to return for follow up visit were not included in the analysis. All participants had varicose vein surgery only for one side, either right or left (32-right, 25-left). Therefore, the number of legs operated is similar to the number of patients. All patients were able to understand the questions and able to come out with their opinion or concern and all cooperated well in the clinical examination. Modes of presentation of the patients are summarized in Table 1. Minor surgical site infection especially in the groin region was reported by a few patients. One had a groin wound infection which necessitated re-admission for a wound toilet.

The median age of study participants was 45 years (range 17- 79 years). Median time since surgery was 12 months (range 6 to 17 years). Thirty-two patients (56.1%) were men, with a mean pre-operative CEAP clinical score of 3.4 (range 0 to 6).

Fourteen patients had preoperative perforator incompetence, and none of them had deep venous insufficiency as determined by venous duplex evaluation. The mean AVSS score was 7.91 at the time of the clinic visit. Fourteen legs (24.6 %) had recurrent varicosities generally presenting as isolated cluster varicosities. Varicosities had not recurred at all in 43 legs (75.4%). None of the patients had varicosities sufficiently symptomatic or cosmetically displeasing to cause them to seek a second surgical procedure for recurrence. Initial success of surgery was rated as “Excellent” (total resolution of all varicose vein and symptoms) in 49.1% of participants while “Good” (total resolution of symptoms but one or several varicose veins remaining in 29.8% and “Fair” (symptoms improved but not eliminated, some large varicose veins remaining) in 12.3%.

Symptoms suggestive of saphenous nerve injury were reported in 7 legs (12.3%) (Table 2). Out of them, numbness or reduced sensation on the inside of the calf was reported by 2 patients. Tingling sensation was reported by 2 patients and shooting pain by 3 patients. Out of the 7 patients, two patients reported moderate discomfort characterised by “substantially troublesome but few effects on lifestyle.” Five of them reported minimal discomfort characterised by “noticeable, but no effect on lifestyle.” Symptoms had resolved in 5 patients with median period of 2.6 weeks and two patients reported persistent symptoms with minimum discomfort in their day-to-day activities (one with persistent numbness and the other with minimal shooting pain at ankle region).

On neurological examination, saphenous nerve sensory deficits were found to have in 13 legs (22.8%). The median area of deficit was 15 cm<sup>2</sup> (range 10 - 60 cm<sup>2</sup>).

Most of the deficit area was around the surgical site at the medial malleolus and upper part of the calf on medial side just below the knee. Interestingly most of these patients (8/13 legs, 61%) were not aware about this reduced sensation. Of the 13 legs with deficits, a history of symptoms existed in 5, and only 2 (3.5%) of them still had their symptoms at the time of the study.

Fifteen out of 57 legs (26.3%) had evidence of saphenous nerve damage either by symptoms only or by sensory deficit only or by both symptoms and sensory deficit.

Patients with symptoms suggestive of nerve damage and patients with evidence of saphenous nerve damage with a sensory deficit were not significantly different in terms of age, gender, pre-operative CEAP class, post-operative CEAP class, post-operative AVSS score, follow up interval or presence of recurrent varicosities when compared with those who did not have evidence suggestive of saphenous nerve damage (Table 3, 4 & 5).

**Table 1:** Mode of presentation of patients

Symptom	N (%)
Ulcer	17 (29.8%)
Swelling	9 (15.8%)
Cosmetic concern	9 (15.8%)
Others	7 (12.3%)
Pain and cosmetic concern	2 (3.5%)
Ulcer and oedema	1 (1.8%)

**Table 2:** Symptoms suggestive of saphenous nerve injury

Type of symptom	N (%)
No symptoms at all	50 (87.7%)
Shooting pain on the inside of the calf or tip of the foot	3 (5.3%)
Numbness or reduced sensation on the inside of the calf	2 (3.5%)
Tingling sensation on the inside of the calf	2 (3.5%)

**Table 3:** Comparison of patients with and without symptoms suggestive of saphenous nerve injury

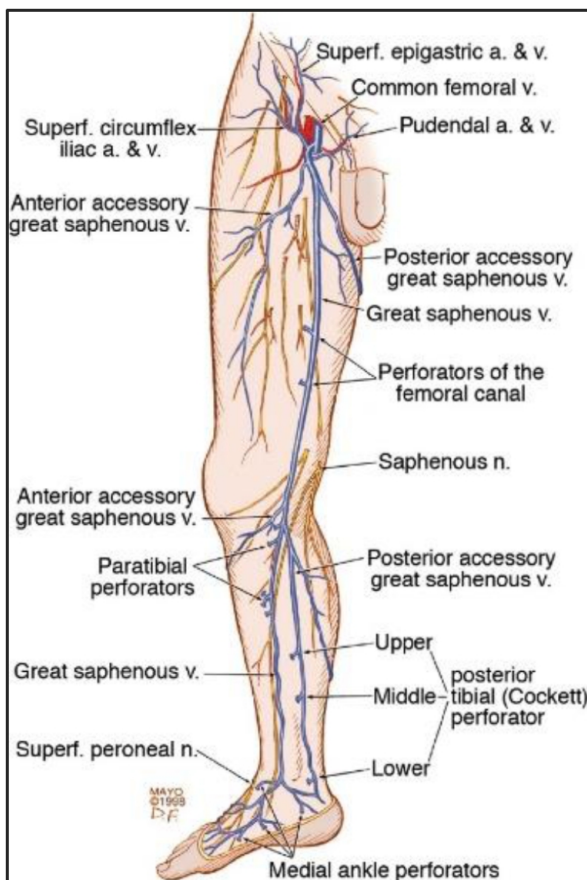
	<b>Symptomatic (n=7)</b>		<b>Asymptomatic (n=50)</b>		<b>p</b>
Age (years)	38.70	SD 12.70	45.60	SD 16.10	0.281
Gender (F/M)	4/3		21/29		0.687
Preoperative CEAP	3.71	SD 1.79	4.50	SD 2.31	0.357
Postoperative CEAP	2.14	SD 2.19	3.26	SD 2.35	0.240
AVSS	5.63	SD 6.55	8.22	SD 8.68	0.452
Follow-up interval (years)	13.43	SD 2.76	11.84	SD 3.40	0.244
Recurrent veins	3		10		0.333

**Table 4:** Comparison of patients with and without documented nerve deficits

	<b>Sensory deficit (n=13)</b>		<b>No deficit (n=44)</b>		<b>p</b>
Age (years)	46.50	SD 16.40	44.27	SD 15.80	0.654
Gender (F/M)	7/6		18/26		0.409
Pre-operative CEAP	4.00	SD 2.04	4.52	SD 2.12	0.434
Postoperative CEAP	2.23	SD 2.09	3.39	SD 2.37	0.118
AVSS	7.62	SD 10.90	7.99	SD 7.73	0.891
Follow-up interval (years)	11.31	SD 3.12	11.95	SD 3.45	0.742
Recurrent veins	4		9		0.436

**Table 5:** Comparison of patients with and without nerve deficits/ nerve symptoms

	<b>Symptoms or deficit (n=15)</b>		<b>No symptoms of deficit (n=42)</b>		<b>p</b>
Age (years)	46.20		44.29		0.691
Gender (F/M)	8/7		17/25		0.389
Pre-operative CEAP	4.00	SD 2.20	4.55	SD 2.06	0.390
Postoperative CEAP	2.47	SD 2.23	3.36	SD 2.33	0.208
AVSS	7.54	SD 10.17	8.04	SD 7.88	0.845
Follow-up interval (years)	12.47	SD 2.97	11.88	SD 3.50	0.566
Recurrent veins	5		8		0.258



**Figure 1:** Anatomical relations of great saphenous vein and the saphenous nerve. *Journal of Vascular Surgery*. 2011; 53(5): Supple 2S-48S.

## Discussion

A comparatively lower Incidence of saphenous nerve damage in our study after total stripping of great saphenous vein was prominent finding when compared to previous studies available (1, 8). The only randomized controlled prospective study which compared the incidence of saphenous nerve damage among patients who had undergone complete versus partial stripping gives a value of 39% incidence among patients underwent total stripping, and 7% incidence in patients underwent partial stripping (8). Another retrospective study gives an incidence of 71% during total stripping of great saphenous vein with minimal effect on their day-to-day activities (1). In our study, the incidence of saphenous nerve injury was 26% (15/57).

This can be attributed to our practice of strict downward stripping (stripping the long saphenous vein downwards where the upper end of the vein is tied to the head of stripper and pulled from the foot end of the patient) with invaginated stripping (using relatively smaller head attached to stripper therefore the upper part of the vein invaginates with the head of the stripper inside lower part of the vein preventing direct damage to nerves around the vein by the head of the stripper) whenever possible (1, 5, 9). The thigh vein and calf vein were stripped separately in our practice. Thigh vein was stripped from groin to just below the knee with a medium or big sized head, while a separate stripper with smaller head passed to the calf vein and stripping done in downward manner (Figure 2). In instances where stripper does not pass through the vein from above downwards, the great saphenous vein was explored at the anterior border of medial malleolus and the stripper passed upwards, and this had been successful most of the time. In such instances the whole vein was stripped in downward manner with a smaller head attached to the top of stripper, thereby achieving an invaginated stripping. According to Wellwood and Martin (10), stripping in an upward direction may lead to avulsion of the nerve by engagement of the head of the stripper in a bifurcation (10). Stripping from above downwards tend to cause less severe nerve injuries with earlier recovery. They also speculated that, however greater the area of loss after stripping downwards, by three months the difference in area become not significant when compared the group to the upward tripping group (10). In our study the mean area of sensory deficit was only 15 cm<sup>2</sup> (range 10 to 60) cm<sup>2</sup>. This was comparatively low when compared to the previous studies (3, 6) probably due to longer follow up period.

Studying the effects of saphenous nerve damage in patient's day to day activity correlates well with the only study available which addressed this issue (1). In this study authors conclude, that the saphenous nerve injuries are common after total stripping of long saphenous vein but have little overall clinical importance as they have negligible impact on patients' quality of life, which is evident in our study as well.





**Figure 2:** Different sizes of stripper heads used separately for above knee vein and below knee veins

As far as recurrence of varicosities is concerned, our results are consistent with the findings of a larger trial comparing stripping to the knee with high ligation and stab avulsion that reported a 34% recurrence rate at 5 years in the patients undergoing the stripping procedure (11). But, in our study recurrence rate was 24.6% (14/57) over a mean follow up period of one year. In the same study, 6% had undergone upper leg reoperation for recurrent varicosities and 4% had treatments for calf veins, and none of our patients had recurrent varicosities severe enough to warrant reoperation. Even though recurrent veins were more in the group of patients who had features of saphenous nerve damage, statistically it was not found significant.

This study was designed to find out incidence of saphenous nerve damage at our setting and to assess patients' acceptance with regard to its effect on their quality of life. In this regard it has served the purpose and has clearly shown our adopted practice of strict downward stripping and invaginated stripping (whenever possible) within the available resources had benefitted the patients and the results are comparable with the international standards.

The limitations in this study are response and recall bias. Data were collected by interviewer administered questionnaire as this can facilitate the patients in understanding each question. But this could have led to bias to some extent from interviewer side because of stereotyping. Moreover our study population's age ranged from 17 to 79 and 19.3% of them were above 60 years. So, there could have been a chance for recall bias among older patients, especially recalling post-operative transient nerve symptoms and minor wound complications.

In conclusion, our results are consistent with those previous studies and support fact that the impact of saphenous nerve damage on patients' quality of life is negligible when comparing the benefit of total stripping of great saphenous vein in reducing the reoperation. In our study, we had only two patients who had persistent symptoms suggestive of saphenous nerve damage at the time of study and they are not bothered with their day-to-day activities. The patients are generally satisfied with the results, and although recurrent varicosities do occur, they were generally not sufficiently severe for patients to seek further surgical intervention.

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