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## Can Bilateral Varicose Vein Surgery be Performed Safely in an Ambulatory Setting?

G. Gemayel, J.T. Christenson\*

Division of Cardiovascular Surgery, Venous Centre, University Hospital of Geneva and Faculty of Medicine, University of Geneva, 4 rue Gabrielle-Perret-Gentil, CH 1211 Geneva, Switzerland

### WHAT THIS PAPER ADDS

- Despite introduction of endovenous treatment for great saphenous vein (GSV) insufficiency, surgery is still performed in many parts of fine world. Unilateral high ligation and stripping is most often performed as an ambulatory procedure, while bilateral surgery frequently is performed with the patient hospitalized. The safety of performing bilateral GSV surgery as an outpatient procedure has been evaluated, demonstrating that bilateral GSV surgery can safely be performed as an outpatient procedure without increased risk of complications and with a high patient satisfaction.

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### ABSTRACT

**Objectives:** Surgery for varicose veins is still the method of choice worldwide. When varicose veins require bilateral surgery, a single procedure often is the preferred choice by the patient. Today, unilateral varicose vein surgery is frequently performed as an outpatient procedure, while in many institutions bilateral surgery is done as an in-hospital procedure.

**Design:** Retrospective comparative study.

**Methods:** Between 1 October 2004 and 31 October 2006, 433 patients underwent surgery for the great saphenous vein as in-patient procedure (303 unilateral and 130 bilateral), period 1. From 1 November 2006 until 31 December 2009, 825 patients had ambulatory great saphenous vein surgery (550 unilateral and 275 bilateral), period 2. We have compared unilateral and bilateral varicose vein surgery (high ligation and stripping of the great saphenous vein) and in-hospital procedures with ambulatory surgery, with regard to postoperative complications, postoperative pain and midterm follow-up.

**Results:** Operation time and total length of stay in the institution following varicose vein surgery were significantly shorter for period 2 compared with period 1 for both unilateral and bilateral surgery, without other differences between the groups. There were few postoperative complications without differences between periods, and between unilateral and bilateral surgery (wound infection 0.5%, haematoma requiring drainage 0.2%, transient paraesthesia 1.1%, superficial localised thrombophlebitis 0.6% and deep vein thrombosis in one unilaterally operated case only).

**Conclusions:** Bilateral varicose vein surgery can be safely performed as an outpatient procedure, without increased risk of postoperative complications, increased postoperative discomfort or midterm adverse effects compared with unilateral surgery.

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Primary varicose veins are a common disease affecting one out of two persons over 50 years of age.<sup>1</sup> A dilated, insufficient great saphenous vein (GSV) is the far most common cause for primary varicose veins, leading to leg pain, heaviness, aching, swelling and

itching.<sup>2</sup> Untreated primary varicose veins can lead to complications such as bleeding, skin changes, thrombophlebitis, varicose eczema, lipodermatosclerosis and venous ulcers,<sup>3,4</sup> which is observed in 17.1% in a general population (C3: 13.5%, C4: 2.9% and C5–6: 0.7%).<sup>5</sup> Complications were not the indication for treatment in the present study.

The classical surgical procedure for treating primary GSV insufficiency is high ligation and stripping (HLS). Until prospective

\* Corresponding author. Tel.: +41 22 3727638; fax: +41 22 3727634.

E-mail address: [jan.christenson@hcuge.ch](mailto:jan.christenson@hcuge.ch) (J.T. Christenson).

controlled randomised trials have convincingly demonstrated the superiority of the novel endovenous treatments for GSV insufficiency, surgery is still widely performed in large parts of the world. Hence, for example in 2008, the Dutch prevalence for HLS was 1.2 per 1000 inhabitants, thus being the top three most performed operations in the Netherlands.<sup>6</sup>

HLS has been performed in many institutions as a short in-hospital procedure in the past. However, with improved surgical techniques and experience, better stripping devices together with fewer and smaller skin incisions and stripping of the GSV only down to knee level, unilateral HLS of the GSV is today the surgery frequently performed as an ambulatory procedure (day surgery).<sup>7</sup> By contrast, bilateral HLS is still in many institutions performed as an in-hospital procedure, where the patient has to stay for 24 h postoperative surveillance prior to discharge. In a recent study, Campbell and associates showed that in patients with bilateral disease the patient preference was rather a single bilateral in-hospital procedure as compared with two separate unilateral outpatient procedures.<sup>8</sup> Their main argument was a shorter total sick leave as well as pain and discomfort only experienced on one single occasion.<sup>8</sup>

There are few studies in the literature comparing bilateral and unilateral GSV surgery, although it has been suggested that bilateral surgery does not increase postoperative complications.<sup>9,10</sup> In addition, no evidence has previously evaluated the safety of performing bilateral GSV surgery as a pure ambulatory procedure, which would have an important socioeconomic impact due to the large volume of this procedure.

In the present study, we have therefore undertaken to compare unilateral and bilateral GSV surgery (HLS) performed as either an in-hospital or an ambulatory procedure (day-care procedure).

## Patients and Methods

This is a retrospective analysis from a local database of prospectively entered data. The study was approved by the hospital's ethical committee (CER:09-177-A R [NAC 09-060-A R]) and signed patient informed consent was waived.

Between 1 October 2004 and 31 December 2009, 1258 consecutive patients underwent HLS for primary GSV insufficiency. Patients with recurrent varicose veins, secondary varicose veins (post-thrombotic syndrome), small saphenous vein insufficiency, acute deep vein thrombosis or superficial thrombophlebitis or isolated perforator insufficiency were not included in this study. Preoperatively, all patients underwent Duplex ultrasonography performed by an angiologist and confirmed by the surgeon. Reflux was defined as retrograde flow of  $>0.5$  s after Valsalva manoeuvre or manual compression and decompression of the distal vein. A total of 853 patients (68%) had unilateral and 405 patients had bilateral GSV insufficiency (42%). The median treated vein diameter was 8 mm (range 6–18 mm), without difference between unilateral (8 mm, range 6–16 mm) or bilateral (8 mm, range 6–18 mm) procedures. For all the patients pre-, per- and postoperative data were prospectively entered into a database and analysed in a retrospective manner. All operations were performed under general anaesthesia, spinal anaesthesia or tumescence anaesthesia, equally distributed between the groups and subgroups analysed. For the purpose of the study, the study population was divided and analysed for two different time periods, with subgrouping according to a unilateral or bilateral procedure.

### Observation period 1: in-hospital surgery

Between 1 October 2004 and 1 October 2006, 433 patients had their surgery as an in-hospital procedure, which was the routine

institutional procedure at that time. The patient was admitted to the hospital during the afternoon the day prior to surgery and discharged during the day following surgery. There were 303 unilateral HLS operations, and 130 patients underwent bilateral HLS (30%).

### Observation period 2: ambulatory surgery

From 1 November 2006 until 31 December 2009, 825 patients underwent HLS for GSV insufficiency, all as an outpatient procedure (ambulatory). During this period, unaccompanied patients or patients who, because of advanced old age, important concomitant diseases or other disabilities, required one night postoperative hospitalisation were excluded from the study (4%, 31/856 patients). There were 550 unilateral operations performed during this period compared with 275 bilateral procedures (33%).

Patients were preoperatively classified according to the clinical, etiologic, anatomic and pathophysiologic data (CEAP) classification.<sup>11</sup> Preoperative disease severity was evaluated using the Aberdeen Varicose Vein Symptom Severity Score (AVVSS)<sup>12</sup> and the Venous Clinical Severity Score (VCSS).<sup>13</sup>

### Surgical procedure, HLS

Surgical procedure, HLS, was performed through a small groin incision (1–2 cm), ligation of the saphenofemoral confluence together with ligation of all tributary veins. A standard stripper was inserted in the GSV and the vein stripped top down, either to just below the knee (in 90% of the cases) or to the ankle level (small skin incision, 4 mm), as deemed necessary (when the GSV was dilated with severe reflux all the way distally). Phlebectomies of marked varicose branches and ligation of grossly incompetent perforators were performed simultaneously, whenever needed. All surgical procedures were performed by the same surgeon (JTC). There were no changes of surgical techniques between the groups. The groin and distal incisions were closed by an intradermic continuous suture (Monocryl<sup>®</sup> 3/0, Ethicon, Johnson & Johnson, Neuchâtel, Switzerland). After the procedure, the leg/s was/were wrapped in sterile absorbent bandages and covered with a double-layer elastic bandage, which was changed to a single-layer elastic bandage prior to discharge (1–6 h after the treatment). After 48 h, the patient removed the bandage and continued using a Class II (30 mmHg) below-knee elastic stocking (Sigvaris<sup>™</sup>, Ganzzone & Cie AG, St Gallen, Switzerland) for 3 weeks during the daytime only. Thrombosis prophylaxis, using enoxaparin 40 mg (Clexane<sup>®</sup>, Sanofi-Aventis, Meyrin, Switzerland) subcutaneously starting 6 h after termination of surgery and continued for 10 days postoperatively was administered only to patients with high thrombo-embolic risk. No antibiotic prophylaxis was given.

The patients were advised by the surgeon orally and in the information booklet handed to the patient to return to normal activities as rapidly as possible, including immediate mobilisation and walking.

During the first 12 days postoperatively, the patients were asked to indicate the maximum area of haematomas, the exact date of return to normal activity (including driving and return to work) as well as to indicate pain on a daily basis using a Visual Analogue Scale (VAS) from 0 to 10 and to record intake of analgesics. In addition, the patients were specifically asked if any neurological symptoms (paraesthesia or numbness) had occurred after the procedure. This information was entered into the database at the postoperative control on day 12 postoperatively.

Patient satisfaction was evaluated during the two study periods, using a questionnaire given to the patients prior to discharge and returned and dropped in sealed box by the patient himself at the

**Table 1**

Preoperative patient demographics and clinical severity of their venous disease in patients with primary varicose veins operated upon as in-hospital procedure (period 1) or as ambulatory surgery (period 2) either as a unilateral procedure or a bilateral procedure. Mean  $\pm$  SD, median and range.

Parameters	Period 1 N = 433		Period 2 N = 825	
	Unilateral n = 303	Bilateral n = 130 (260 limbs)	Unilateral n = 550	Bilateral n = 275 (550 limbs)
Age	48 $\pm$ 14	49 $\pm$ 14	49 $\pm$ 14	48 $\pm$ 13
Median	47	48	48	47
Range	(20–87)	(24–88)	(14–90)	(21–85)
Females	70%	69%	67%	66%
BMI	26.1 $\pm$ 5.3	25.4 $\pm$ 5.8	26.3 $\pm$ 5.1	26.7 $\pm$ 4.8
Median	26	25	25	25
Range	(16.2–38.2)	(15.7–41)	(15.8–45)	(18.8–44.3)
CEAP (C-class)				
C2	142 (46.9%)	123 (47.3)	229 (41.6%)	228 (41.5%)
C3	78 (25.8%)	69 (26.5%)	146 (26.5%)	154 (28.0%)
C4	72 (23.6%)	59 (22.7%)	137 (24.9%)	135 (24.6%)
C5	1 (0.5%)	2 (0.8%)	4 (0.8%)	7 (1.3%)
C6	10 (3.2%)	7 (2.7%)	34 (6.2%)	26 (4.6%)
VCSS	6.2 $\pm$ 3.0	6.4 $\pm$ 2.9	8.8 $\pm$ 4.8	8.0 $\pm$ 3.7
Median	6	6	7	7
Range	(2–19)	(3–20)	(2–28)	(2–29)
AVVSS	22 $\pm$ 8	23 $\pm$ 12	23 $\pm$ 9	23 $\pm$ 7

postoperative visit, to ensure a completely anonymous response, only indicating whether the operation performed was unilateral or bilateral. The questionnaire covered the pre- and perioperative period as well as measured patient satisfaction during the recovery period.

In the present study, we have compared unilateral and bilateral varicose vein surgery (HLS of the GSV), as well as in-hospital procedures (period 1) with ambulatory surgery (period 2), with regard to postoperative complications, postoperative pain and early follow-up results, with the aim to evaluate whether bilateral great saphenous surgery can safely be performed as an ambulatory procedure.

#### Statistical analysis

All quantitative data are presented as mean  $\pm$  standard deviation as well as median data. Continuous variables were analysed with the Student's *t*-test and categorical variables using the  $\chi^2$  test. A *p* value  $<0.05$  was considered statistically significant.

#### Results

The proportion of unilateral and bilateral treated GSV was similar comparing period 1 and period 2.

There were no differences in preoperative age and sex distribution or body mass index (BMI) between the groups or subgroups (Table 1). During period 2, significantly more patients were in C-class 5 and 6 compared with period 1, both for unilateral and

**Table 2**

Operation time (skin incision to bandages applied), recovery room stay (minutes) and total institutional stay (hours) in patients with primary varicose veins operated upon as in-hospital procedure (period 1) or as ambulatory surgery (period 2) either as a unilateral procedure or a bilateral procedure. Mean  $\pm$  SD.

Parameters	Period 1 N = 433		Period 2 N = 825	
	Unilateral n = 303	Bilateral n = 130	Unilateral n = 550	Bilateral n = 275
Operating time, min	38 $\pm$ 12	63 $\pm$ 15	32 $\pm$ 13	54 $\pm$ 18
Recovery room stay, min	153.6 $\pm$ 71.3	159.0 $\pm$ 66.6	122.5 $\pm$ 42.2	124.1 $\pm$ 37.3
Total stay in the institution, h	38.9 $\pm$ 12.8	39.4 $\pm$ 11.5	8.6 $\pm$ 2.8	8.7 $\pm$ 2.2

**Table 3**

Postoperative complications (complication/patient) following high ligation and stripping of the great saphenous vein, in patients with primary varicose veins, comparing unilateral and bilateral surgical procedures.

Parameters	Unilateral	Bilateral
N	853 patients (853 limbs)	405 patients (810 limbs)
Wound infection	3 (0.4%)	2 (0.5%)
Haemorrhage	0	0
Haematoma drained	2 (0.2%)	1 (0.3%)
Paraesthesia	6 (0.7%)	3 (0.7%)
Neuralgia	0	0
Superficial phlebitis	2 (0.2%)	3 (0.7%)
Deep vein thrombosis	1 (0.1%)	0
Total complications <sup>a</sup>	13 (1.5%)	10 (2.2%)

<sup>a</sup> A non statistically significant difference.

bilateral surgery. Preoperative VCSS was significantly higher during period 2 compared with period 1, both for unilateral and bilateral disease. VCSS was higher for unilateral compared with bilateral disease during period 2 (Table 1).

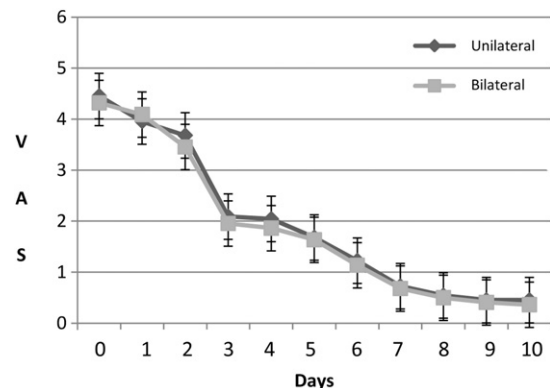
The operation time was significantly longer for bilateral surgery compared with unilateral surgery in both periods studied ( $p < 0.001$ ), but highly significantly shorter in both subgroups during period 2 compared with period 1, for unilateral ( $p < 0.0010$ ) and bilateral surgery (Table 2). Postoperative recovery room stay revealed no differences when unilateral surgery was compared with bilateral surgery in either study period but was significantly shorter in period 2 compared with period 1. This was also true for the total length of stay in the institution (Table 2).

Postoperative complications were rare, not reaching statistical significance comparing period 1 (in-hospital procedure) with period 2 (ambulatory surgery).

Postoperative complications following HLS did not reveal a statistically significant difference comparing unilateral and bilateral surgery (Table 3).

Postoperative pain as recorded by the patients using a Visual Analogue Scale from 0 to 10 did not reveal any statistically significant difference during the first 10 postoperative days, comparing unilateral and bilateral HLS of the GSV (Fig. 1). Furthermore, there was no statistically significant difference between unilateral and bilateral surgery regarding postoperative intake of analgesics and return to normal activity. The median time for return to normal activity was 5 days, ranging from 2 to 14 days.

Residual veins requiring additional treatment during the first 6 months postoperatively were less frequent during period 2 (1.2%, 13/1100 limbs) than during period 1 (3.2%, 18/563 limbs). However, when comparing initial unilateral (16/853 limbs, 1.9%) and bilateral (15/810 limbs, 1.9%) surgery no differences were detected.



**Figure 1.** Pain score during the first 10 days in patients treated by high ligation and stripping of the great saphenous vein as a unilateral or bilateral procedure.

Ninety-eight per cent of the patients (1232/1258) completed the questionnaire without group differences. Patient satisfaction was excellent, without differences between study periods and comparing unilateral and bilateral procedures (Fig. 2).

**Discussion**

Even though endovenous ablation of an insufficient GSV for treatment of varicose veins is gaining ground, surgical HLS of the GSV remains the procedure of choice in many hospitals around the world. Unilateral HLS is most frequently performed as an ambulatory procedure, while still in many countries bilateral varicose vein surgery is performed as an in-hospital procedure. Bilateral GSV disease requiring varicose vein treatment is reported to be as frequent as approximately 20%.<sup>14</sup>

Whether varicose vein surgery for GSV insufficiency should be performed on one leg at a time or as bilateral surgery is still without a clear consensus amongst surgeons. Bilateral surgery has its advantages, such as one procedure requiring only one anaesthetic and a single episode of convalescence. On the other hand, bilateral surgery may result in a prolonged procedure with a prolonged convalescence and might not be regarded suitable for ambulatory surgery, which is now the preferred treatment modality of varicose veins.<sup>15</sup> Hence, for example, in a recent survey of surgeons in the UK in 2006, a considerable variation was observed regarding bilateral varicose vein surgery, where a significant number of surgeon were reluctant to perform bilateral varicose vein surgery as an ambulatory procedure.<sup>7</sup> By contrast, Campbell et al. stated that a majority of patients in a questionnaire-based study was reported to prefer a single bilateral intervention, based on one anaesthesia, a single hospital admission, less time off work and discomfort on one occasion only.<sup>8</sup>

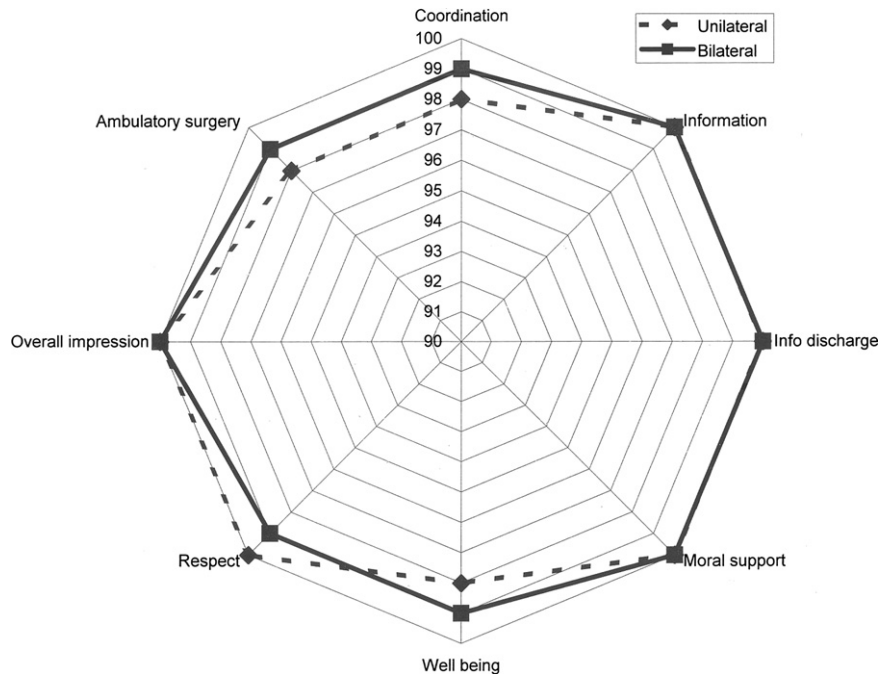
It has been thought that the length of a surgical intervention is a risk factor for venous thrombo-embolism (VTE).<sup>16</sup> However, the incidence of VTE in the present study was very low and did not increase if surgery was performed bilaterally. This corresponds well with Enoch and associates,<sup>17</sup> who reported a very low incidence of

symptomatic VTE, 0.18%, following varicose vein surgery, and Bounameaux in his retrospective review of 1063 varicose vein operations quoted a risk of 0.56% (95% confidence interval 0.21–1.23) for the development of pulmonary embolism.<sup>18</sup>

In the present study, we encountered very few postoperative complications and without differences regardless of whether the surgery was bilateral or unilateral. Our results are contradictory to a previous report by Defly and associates, where postoperative complications were more frequent and more common following bilateral surgery than those observed after unilateral procedures.<sup>10</sup> The reason for our low complication rate could be that all surgery in our series was performed by an experienced surgeon (JTC), which in its turn also resulted in shorter operating times. To shorten operating times further, synchronous surgery could be performed. Other factors that may influence the good results could be the use of standardised protocols (clinical pathway and the change of stripper to an invagination stripper during period 2).

In a study by Shamiyeh et al. on a small cohort of patients ( $n = 73$ ), bilateral ( $n = 33$ ) and unilateral ( $n = 40$ ) varicose vein surgery was compared and they reported that there were no statistically significant differences between the two groups in postoperative pain, analgesic consumption, median postoperative stay, return to work and physical activity or cosmetic results.<sup>9</sup> Their findings correspond very well with what we report in the present study.

Patient information is a key issue particularly in ambulatory surgical practice. All our patients receive written and extensive oral information regarding the procedure and what to expect in the postoperative period. This information is given during the first preoperative visit as well as just before and just after the surgical procedure. We strongly believe this is a contributing factor to the high patient satisfaction and the early return to normal physical activity observed in the present study. Our findings are in contrast to a recent report by Darwood and associates who found that return to work and other activities after varicose vein surgery in UK was very variable and little influenced by advice from specialists.<sup>19</sup>



**Figure 2.** Patient satisfaction evaluated through questionnaire (% positive response) in various quality domains comparing patients undergoing unilateral and bilateral high ligation and stripping of the great saphenous vein.

The limitations of the present study were a single-centre study, a retrospective analysis (from a prospectively collected database), one surgical team with a high volume activity and not being a prospective controlled randomised study.

## Conclusion

In conclusion, bilateral GSVs surgery (HLS) can safely be performed as an outpatient procedure without increased risk for postoperative complications and with an excellent patient satisfaction. Bilateral surgery does not increase postoperative pain or analgesic consumption and has a clear economical benefit.

## Conflict of Interest

None.

## Funding

None.

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