Original article

The outcome of the Trendelenburg procedure with stripping *vs.* no stripping in the management of varicose veins

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ABSTRACT

Background: Varicose veins is a common problem in Pakistan with multiple treatment options. One of its recommended and commonly performed surgical treatment includes the flush ligation of Saphenofemoral junction (Trendelenburg procedure) with stripping of great saphenous vein and avulsion of varicosities which is a cumbersome process. This study aims to evaluate the effect of stripping of great saphenous vein on the recurrence rate.

Patients and methods: A randomized controlled trial was conducted in the Surgical Unit I, Services Hospital, Lahore over a period of 22 months from 20-09-2016 to 20-07-2018. Seventy patients were divided equally into two groups of 35 patients each i.e. Trendelenbrug procedure and avulsion of varicosities with stripping down to the knee, (Group A) versus Trendelenbrug procedure and avulsion of varicosities without stripping (Group B). Recurrence at 12 weeks was noted. SPSS version 17.0 was used to analyze data. Comparison of recurrence and stratified confounding factors such as age, gender, and BMI were assessed by the chi-square test (significant p-valve ≤0.05).

Results: In group A, 32 out of 35 patients were male (91.43%) and 3 (8.57%) were female. While in group B, 31 out of 35 patients were male (88.87%) and 4 (11.43%) were female. Four out of 35 (11.43%) patients in group A whereas 6 (17.14%) group B patients (p-value=0.494) had a recurrence in the perforators below the knee at 12 weeks. Stratification (p-values) of recurrence rate with respect to age (<40 years: 0.41 versus ≥ 40 years:0.905), gender (female: p-value not applicable versus male: 0.96) and BMI was done (<25 kg/m^2: 0.36 versus ≥ 25 kg/m^2: 0.901)

Conclusions: Stripping does not significantly affect the outcome of varicose vein surgery in relation to the recurrence rate at 12 weeks and recurrence was independent of age, gender, and BMI of patients.

Keywords:

Varicose vein, Trendelenburg procedure, Avulsion of varicosities, Stripping, Recurrence rate

INTRODUCTION

Varicose veins are defined as dilated tortuous veins in a subcutaneous plane having a diameter of ≥3 mm in an erect posture associated with reflux due to incompetent valves. Great saphenous vein (GSV) is more frequently affected than small saphenous vein (SSV). This disease is seen in 30 to 50% of adults with a higher prevalence in women as compared to men.[1] Other risk factors include age, ethnicity, weight, height, pregnancy, family history, and occupation involving prolonged standing.[2] It is classified in terms of Clinical-Etiology-Anatomy-Pathophysiology (CEAP).[3] Duplex scan is the imaging of choice for varicose veins.[4]

Indications for interventions include bleeding C2 disease, superficial thrombophlebitis, poor quality of life, or C3-6 class. Besides compression stockings,ultrasound-guided foam sclerotherapy, endovenous laser, and radiofrequency ablation, surgical intervention remains one of the main treatment options at centers where advanced modalities are still not available. Furthermore, novel techniques such as CHIVA (cure Conservatrice et Hémodynamique de l'Insuffisance Veineuse en Ambulatiore [ambulatory conservative hemodynamic management of varicose veins]) and ASVAL (Ablation Sélective des Varices sous Anesthésie Locale [ambulatory selective varicose vein ablation under local anesthesia]) are becoming common that advocate only phlebectomy of tributaries while preserving the saphenous vein.[5] Objective of surgery is to obliterate the point of junctional incompetence (Trendelenburg procedure) and to excise the dilated tributaries ± refluxing trunk.[6] Stripping can be done by conventional Myer's Stripper, Babcock technique, or invagination technique and usually done in an upward direction.[7,8] Stripping of the great saphenous vein (GSV) is associated with complications such as saphenous nerve injury (decreased risk if partial

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stripping is done), hematoma formation, post-operative pain and delayed return to work.

The recurrence rates after varicose veins surgery account for 62% at a follow up of 11 years.[9] Different surgical techniques are usually compared in terms of recurrence rate.[10-14] Cheatle and coworkers findings favored additional stripping over ligation only, with equal patient satisfaction but high risk of nerve damage and subsequent litigation in case of stripping.[12] Sarin and coauthors reported that 65% of patients were satisfied and only 35% had a recurrence in the group of GSV stripping as compared to 37% satisfaction and 83% recurrence rate in the group of GSV without stripping (p-value<0.05 and p-value<0.001).[13] According to Winterborn and colleagues, 62% of legs developed clinically recurrent varicose veins. A comparison of ligation and avulsion only and stripping groups showed no statistically significant difference. About 29% of cases of ligation and avulsion only, had second surgery versus 11% cases having additional stripping.[14]

Stripping has its own merits and demerits thus some prefer to do it while others not. Determining the most appropriate surgical technique is necessary because surgery is still the treatment of choice in regions where other modalities are either not available or expensive and secondly most of the patients belong to occupations demanding prolonged standing that can't be changed due to economic conditions. The objective of this study was to evaluate the effect of stripping of great saphenous vein on the recurrence rate.

PATIENTS AND METHODS

A randomized controlled trial (RCT) was performed at the General Surgery Department, Unit I, Services Hospital, Lahore over a period of 22 months from 20-09-2016 to 20-07-2018. Using 80% power of the test and 95% confidence level sample size of 70 (35 each group) was calculated. The study included 20 to 60 years patients, both genders with normal BMI and C2-C5 class unilateral varicose veins. Disease with incompetent perforator(s) was clinically determined by the presence of blow out(s) and pit(s) in deep fascia as well as positive multiple tourniquet tests. The varicose veins with incompetent saphenofemoral junction were determined by the presence of expansile cough impulse at the saphenous opening and positive Trendelenburg test. These clinical findings were further confirmed by duplex ultrasound scan.

Those with previous ipsilateral venous surgery or surgery for a pelvic mass, small saphenous vein insufficiency including incompetent lower valves complicated varicose vein i.e. active venous ulcer, superficial vein thrombophlebitis, deep venous thrombosis, pregnant females, history of diabetes mellitus, hypertension, malignancy, deranged renal or hepatic functions, altered coagulation profile, and history of anticoagulation medication were excluded. Approval of the hospital ethical committee was obtained. Recruitment was done via a general surgery outpatient clinic. Random number tables were used to divide the cases into 2 equal groups i.e. Group A- Trendelenburg procedure and avulsion of varicosities with stripping and Group B- Trendelenbrug procedure and avulsion of varicosities without stripping. Preoperative preparations involved detailed history, clinical examination, baseline investigations, and written informed consent. Bias was controlled by ensuring the same surgical team for all cases. All patients were operated on by an expert consultant surgeon in similar perioperative conditions under spinal anesthesia. Similar postoperative care was provided to both groups. A comprehensive discharge letter consisting of postoperative advice and instructions regarding wound care, diet, work hours (i.e. avoidance of long-standing), and lifestyle modifications (i.e. prohibition of smoking and other addictions) was handed over to all the patients of both groups. A follow-up of 12 weeks was done to look for clinical recurrence. This early recurrence was confirmed with a weekly clinical review by a consultant surgeon and a duplex ultrasound scan in the third month.

SPSS (version 17.0) was used to assess the data. Quantitative parameters (age, body mass index – BMI) and qualitative parameters (gender, recurrence) were assessed in terms of mean/standard deviation and frequency/percentage, respectively. Comparison of recurrence rate done via chi-square test (significant p-value ≤ 0.05).

Post-stratification chi-square test (significant p-value≤0.05) was applied to confounding factors like age, gender, and BMI.

RESULTS

In group A, 32 out of 35 patients were male (91.43%) and 3 (8.57%) were female. While in group B, 31 out of 35 patients were male (88.87%) and 4 (11.43%) were female. (Figure 1) Mean age (years) in Group A was 33.82 ± 7.65 versus 32.66 ± 9.09 in Group B. Mean BMI (Body Mass Index) of patients in group A was 24.52 ± 3.01 kg/m^2 and in Group B was 24.90 ± 2.97 kg/m^2.

Table 1. Stratification of recurrence at 12 weeks

Characteristics	Group A	Group B	p-value
Age			
<40 years	2	4	0.41
>40 years	2	2	0.905
Gender			
Female	0	2	Not applicable
Male	4	4	0.96
Body Mass Index(BMI)			
<25kg/m^2	3	5	0.36
>25kg/m^2	1	1	0.901

In group A, recurrence at 12 weeks was seen in 4 out of 35 patients (11.43%) and 31 out of 35 patients (88.57%) remained disease-free. In group B, the recurrence rate at 12 weeks was seen in 6 out of 35 patients (17.14%) and 29 out of 35 patients (82.8%) remained disease-free (p-value=0.494). It is noteworthy that recurrence was noted in the perforators below the knee in both groups.

Recurrence was noted in two cases of group A (8%) and four cases of group B (15.38%) in patients aged less than 40 years (p-value=0.41). In contrast recurrence was present in 2 cases in both groups each (20% and 22.2% respectively) (p-value=0.905) in patients aged more than 40 years.

In female patients, recurrence at 12 weeks was seen in no patient in group A (total 3 cases; 0%) and 2 out of total 4 cases in group B (50%). In male patients, recurrence at 12 weeks was seen in 4 patients in both group A (total 32 cases; 12.5%) and group B (total 31 cases; 12.9%) (p-value=0.96). BMI stratification showed recurrence in 3 patients of group A (12.5%) versus 5 patients in group B (22.73%) for BMI < 25 kg/m^2 (p-value=0.36). On other hand, for BMI ≥ 25 kg/m^2, 1 patient in both groups each had recurrence (9.09% and 7.69% respectively) (p-value=0.901)

DISCUSSION

Besides being a cosmetic problem, venous insufficiency also affects physical well-being in terms of disability leading to pain, absence from the workplace, and emotional well-being causing the low quality of life (QOL). In extreme cases, it may end in loss of limb or life. Duplex scan has revolutionized the assessment of venous insufficiency. Likewise, treatment modalities have also evolved from open surgery (under general/spinal anesthesia) with associated complications of pain, wound infection/hematoma, loss of working days, to novel techniques like percutaneous endovenous ablation techniques, including endo-venous laser therapy (EVLA), radiofrequency ablation (RFA), and liquid or foam sclerotherapy, which can be done on an outpatient basis under local or tumescent anesthesia with similar short term outcomes i.e. less discomfort, improved QOL, and earlier return to work.

CHIVA technique was found superior to standard compression treatment in terms of ulcer recurrence prevention (9% *vs*. 38%; p-value<0.05) or equivalent to stripping group in patients with specific anatomic patterns of reflux (types I and III shunts).[15,16] In another study, the CHIVA technique was even superior to stripping with 10 years' follow-up in which it was associated with less recurrence than the stripping technique.[17] After saphenous vein stripping, saphenous nerve injury is reported at rates from 27% to 40%.[18]

Despite the newer management options, open surgical treatment is, still, the modality of choice in settings where new modalities are not available or are too expensive if available like Pakistan. Standard open venous surgery for varicose veins includes high ligation and division (previously labeled as Trendelenburg procedure) and stripping along with phlebectomies (stab avulsions).

In this study, the recurrence rate after 12 weeks of surgery was not statistically significantly different in group A (with stripping) against group B (without stripping) (p-value=0.494). Sarin and coworkers favored stripping in terms of recurrence rate (83% *vs*. 35%) while Winterborn and colleagues compared ligation (and avulsion) only versus the stripping group and found no significant difference in terms of recurrence (29% v*s*. 11%).[13,14]

Hence, this study results favor the preservation of great saphenous vein (GSV). Because omitting stripping also removes the complications associated with stripping e.g. hematoma, nerve injury, etc. Study results also showed no effect of age, gender, and BMI of patients on recurrence rate at 12 weeks. Hence, it is recommended that open venous surgery should only involve the Trendelenburg procedure and stab avulsions without stripping. One of the limitations of this study was that only recurrence rate was studied over a period of 3 months. Due to certain factors like patients' noncompliance, financial hindrances, and social restrictions, most of the patients did not maintain a follow-up for more than 3 months.

CONCLUSIONS

Stripping of great Saphenous vein does not significantly affect the outcome of varicose vein surgery with respect to the clinical recurrence rate at 12 weeks. The recurrence rate was independent of age, gender, and BMI of patients. Therefore, venous surgery involving Trendelenburg procedure with stab avulsions is

considerable and GSV stripping can be avoided, as it is posing no additional benefit. Moreover, the known complications associated with stripping can be avoided.

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