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

Jibran Mohsin1, Muhammad Haris Janjua2, Jumana Fatima3, Muhammad Usman Siddique4, Muhammad Yasir Naseem5, Imdad Ahmad Zahid6

1Resident of Surgical Oncology, Shaukat Khanum Memorial Hospital, Lahore, 2Senior Registrar, East Surgical Ward, Mayo Hospital, Lahore, 3Trainee Registrar Surgery, Sheikh Zayed Hospital, Lahore, 4Senior Registrar Surgery, South Surgical Ward, Mayo Hospital, Lahore, 5Consultant Surgeon, Government Mian Meer T H Q Hospital, Lahore, 6Assistant Professor of Surgery, Surgical Unit 4, Services Hospital Lahore

Correspondence to: Dr. Muhammad Haris Janjua, Email: dr.harisiam@gmail.com

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. T his 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. Trendelenburg procedure and avulsion of varicosities with stripping down to the knee, (Group A) versus Trendelenburg 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 I were assessed by the chi-square test (significant p-value ≤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 I was done (<25 kg/m²: 0.36 versus ≥ 25 kg/m²: 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 I 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). T his 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 Ambulatoire [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

Conflict of Interest: The authors declared no conflict of interest exists.
Citation: Mohsin J, Janjua MH, Fatima J, Siddique MU, Naseem MY, Zahid IA. T he outcome of the Trendelenburg procedure with stripping vs. no stripping in the management of varicose veins. J Fatima Jinnah Med Ed Univ. 2020; 14(3): 110-113.

DOI: www.doi.org/10.37018/wd1d8444

© 2020 Fatima Jinnah Medical University, Lahore, Pakistan.
J Fatima Jinnah Med Ed Univ 2020; 14: 110-113
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. Different surgical techniques are usually compared in terms of recurrence rate. Cheatel 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. 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). According to W interborn 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.

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- Trendelenburg 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/m² and in Group B was 24.90 ± 2.97 kg/m².
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/m² (p-value=0.36). On the other hand, for BMI ≥ 25 kg/m², 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 T rendelenburg 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% vs. 11%).13,14

Hence, this study results favor the preservation of great saphenous vein (GS V). 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 T rendelenburg 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 T rendelenburg procedure with stab avulsions is

---

**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       | N/A     |
| Male            | 4       | 4       | 0.96    |

**BMI**

| BMI (<25 kg/m²) | 3 | 5 | 0.36 |
|-----------------|---|---|------|
| BMI (≥25 kg/m²) | 1 | 1 | 0.901 |
considerable and GSV stripping can be avoided, as it is posing no additional benefit. Moreover, the known complications associated with stripping can be avoided.

REFERENCES

1. Chetter IC, Carradice D. Venous disorders. In: Williams NS, O’Connell PR, McCaskie AW, editors. Bailey & Love’s short practice of surgery. 27th ed. Boca Raton: CRC Press; 2018 p. 969-94.

2. Yun MJ, Kim YK, Kang DM, Kim JE, Ha WC, Jung KY, et al. A study on prevalence and risk factors for varicose veins in nurses at a university hospital. Saf Health Work 2018; 9(1): 79-83.

3. Lurie F, Passman M, Meisner M, Dalsing M, Masuda E, Welch H, et al. The 2020 update of the CEAP classification system and reporting standards. J Vasc Surg Venous Lymphat Disord. 2020; 8(3): 342-352.

4. Manzoor I, Bacha R, Gilani SA. The significance of doppler ultrasound in the causes of varicose veins. J Vasc Ultrasound. 2017; 41(4): 159-164.

5. Onida S, Davies AH. CHIVA, ASVAL and related techniques: concepts and evidence. Phlebology. 2015; 30(2) Suppl:42-45.

6. Jundt JP, Liem TK, Moneta GL. Venous and lymphatic disease. In: Bruniciardi FC, editor-in-chief. Schwartz’s principles of surgery.10th ed. New York: McGraw-Hill; 2010. p. 915-39.

7. Naik GC, Chandrashekarah KC. Comparative study of conventional stripping versus invagination stripping in varicose vein surgery. Int J Surg Sci. 2020; 4(3): 175-177.

8. Papakostas JC, Douitsis E, Sarmas I, Avgos S, Kyritsis A, Matsakas M. The impact of direction of great saphenous vein total stripping on saphenous nerve injury. Phlebology. 2014; 29(1): 52-57.

9. Mül I, Alm J. Feasibility and technique of endovenous laser ablation (EVLA) of recurrent varicose veins deriving from the sapheno-femoral junction—A case series of 35 consecutive procedures. 19(7): e023566.

10. Ginesini S. Predicting and preventing varicose vein recurrence. Endovasc Today. 2018; 17(3): 45-49.

11. Saveljev VS, Pokrovsky AV, Kirienko AI, Bogachev YY, Zolotukhin IA, Sapelkin SV. Stripping of the great saphenous vein under micronized purified flavonoid fraction (MPFF) protection (results of the Russian multicenter controlled trial D E F A N C E). Phlebolymphology. 2008; 15(2): 45-51.

12. Chealt T. The long saphenous vein: to strip or not to strip?. Semin Vasc Surg. 2005; 18(1): 10-14.

13. Sarin S, Scurr JH, Coleridge Smith PD. Stripping of the long saphenous vein in the treatment of primary varicose veins. Br J Surg. 1994; 81(10): 1455-1458.

14. Winterborn RJ, Foy C, Earnshaw JJ. Causes of varicose vein recurrence: late results of a randomized controlled trial of stripping the long saphenous vein. J Vasc Surg. 2004; 40(4): 634-639.

15. Zamboni P, Cisno C, Marchetti F, Mazza P, Fogato L, Carandina S, et al. Minimally invasive surgical management of primary varicose ulcers vs. compression treatment: a randomized clinical trial. Eur J Vasc Endovasc Surg. 2003;25:313-318.

16. Carandina S, Mari C, De Palma M, M arcellino MG, Cisno C, Legnaro A, et al. Varicose vein stripping vs haemodynamic correction (CHIVA): a long term randomised trial. Eur J Vasc Endovasc Surg. 2008;35:230-237.

17. Facci ni FP, Ermini S, Franceschi C. CHIVA to treat saphenous vein insufficiency in chronic venous disease: characteristics and results. J Vasc Bras. 2013; 18:e20180099.

18. Arendt AL, Faccini FP. Nerve Injury in venous procedures: Malpractice, characteristics, and strategies to avoid it. J Theor Appl Vasc Res 2018; 3(2): 73-83.