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Conventional versus invagination stripping varicose veins: which is better?

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ABSTRACT

Background: Varicose veins are dilated, tortuous veins. It is an extremely common condition causing substantial morbidity. Prevalence of varicose veins ranges between 5% to 30% in adult population. Surgery is preferred over conservative treatment in symptomatic primary varicosis of the great saphenous vein (GSV). This study aims to compare the efficacy of GSV stripping by invagination technique in comparison to the conventional method in terms of time taken to strip the vein, the length of vein stripped, post-operative pain, area of bruising and intra-operative blood loss.

Methods: The study was conducted in Dr. D. Y. Patil Medical College, Hospital and Research Centre located in Pimpri, Pune between July 2017 to September 2019. It is a prospective comparative Study. Subjects were randomly divided into 2 groups alternately where group A and B were operated by conventional and invagination techniques respectively and their outcomes were compared.

Results: The mean age of the cases in Group A (conventional stripping) was 52 years and in group B (Invagination stripping) was 53 years. Blood loss was significantly more in conventional stripping compared to invagination stripping (p<0.001). The post-operative (after 1 week) mean VAS of the cases in Group A was 3.1 and 2.3 respectively while in group B it was 2.9 and 2.1 respectively. Time taken to get back to activity was significantly more in conventional stripping compared to invagination stripping (p<0.001).

Conclusions: From this study we concluded that Invagination stripping is a suitable alternative to time honoured conventional varicose vein stripping with added advantage of less blood loss, less postoperative pain and shorter time span to get back to work.

Keywords: Invagination, Stripping, Varicose veins

INTRODUCTION

Varicose veins are dilated, tortuous veins. It is an extremely common condition causing substantial morbidity. Prevalence of varicose veins ranges between 5% to 30% in adult population. The word "varicose" is derived from the Latin word "varix", which means twisted. The adoption of the erect position by man is thought to have greatly influenced the development of venous diseases of the lower limbs. Methods of

treatment have been under development for more than 2000 years.

Surgery is preferred over conservative treatment in symptomatic primary varicosis of the great saphenous vein (GSV).

However, use of the conventional stripping technique has been criticized for several reasons. The large olive head inevitably causes tissue trauma as it is pulled down the leg. The large space created could then potentially allow the accumulation of blood clot despite adequate compression. Neuralgia and parasthesias may also be caused from damage to the saphenous nerve. Thus, modifications of the conventional stripping have been sought to address these concerns.³

The PIN stripper in contrast to the conventional stripper uses an invagination technique causing less trauma to the surrounding tissue as the vein inverts on itself and therefore reduces the incidence of postoperative hematoma, pain and leaves a smaller exit scar.^{4,5}

This study aimed to compare the efficacy of GSV stripping by invagination technique using PIN stripper in comparison to the optimal use of conventional method in terms of time taken to strip the vein, the length of vein stripped, post-operative pain, area of bruising and intra-operative blood loss.

METHODS

It was a prospective comparative study. The study was conducted in Dr. D.Y. Patil Medical College, Hospital and Research Centre located in Pimpri, Pune between July 2017 to September 2019.

Inclusion criteria

Symptomatic varicosities of GSV, insufficiency of SFJ as determined by duplex ultrasound scanning, age>18 years, clinical, etiological, anatomical and pathological ($C_{>2}$, E_p , A_s , P_r) were included.

Exclusion criteria

Patients with ipsilateral recurrent varicose veins after stripping, SSV insufficiency, previous GSV thrombophlebitis, malignancy, renal insufficiency, uncontrolled diabetes mellitus, immunosuppressive medication, deep vein thrombosis and Klippel Trenaunay syndrome were excluded from the study.

Eligible patients were randomly assigned to the two study groups; conventional stripping group were Group A and invagination stripping were Group B.

The first patient was allotted to either group A or group B by lottery method. Subsequent patients were allotted to either group alternatively.

Patients included in the study as per the inclusion criteria mentioned above were subjected to routine haematological and biochemical investigations and Venous Doppler of the lower limb following which they were divided into groups A and B. Both techniques of stripping were then compared in terms of time taken to strip the vein, the length of vein stripped, postoperative pain, area of bruising and intra-operative blood loss.

Statistical analysis

Data from each patient will be collected and tabulated using Microsoft Excel. Each corresponding variable from both groups will be compared separately using the Unpaired T-Test. Results will then be assessed for significance (p-value) using SSPS.

RESULTS

The mean age of the cases in Group A (conventional stripping) was 52 (SD 4) year and in group B (Invagination stripping) was 53 (SD 5) year. The difference in age between two group was statistically not significant (p>0.05) (Table 1).

Table 1: Comparison of age between both groups.

Study group	Age (mean± SD) in years
Group A (n=30) Conventional stripping	52±4
Group B (n=30) Invagination stripping	53±5
P value (using independent t test)	0.396

There were 14 (46.7%) male in Group A (conventional stripping) and 12 (40%) male in group B (Invagination stripping). There were 16 (53.3%) female in Group A and 18 (60%) female in group B. The difference in gender between two group was statistically not significant (p >0.05) (Table 2).

Table 2: Comparison of gender between two groups.

Sex	Grou (n=30		Gro (n=3		P value*
	Conv stripp	entional oing	Inva strip	gination ping	
Male	14	46.7%	12	40.0%	0.602
Female	16	53.3%	18	60.0%	

^{*}P value calculated using Chi square test.

Table 3: Comparison of blood loss in both groups.

Study group	Blood loss in ml (mean±SD)
Group A (n=30) Conventional stripping	32±4
Group B (n=30) Invagination stripping	16±3
P value	< 0.001

P value is calculated using unpaired t test; p value is significant.

The mean blood loss (ml) during surgery of the cases in Group A was 32 (SD=4) ml and in group B was 16 (SD=5) ml. The difference in Blood loss (ml) during surgery between two group was statistically significant

(p<0.001). Blood loss was significantly more in conventional stripping compared to invagination stripping (Table 3).

The mean Operative time (min) of surgery of the cases in Group A was 36 (SD=2) min and in group B was 35 (SD=3) min. The difference in blood loss (ml) during surgery between two group was statistically not significant (p>0.05) (Table 4).

Table 4: Comparison of operative time between both groups.

Study group	Operative time in min (mean±SD)
Group A (n=30) Conventional stripping	36±2
Group B (n=30) Invagination stripping	35±3
P value (using independent t test)	0.134

Table 5: Comparison of pain VAS between both groups.

Pain VAS (mean±SD)	Group A (n=30) Conventional stripping	Group B (n=30) Invagination stripping	P value*
48 hours	2.8 ± 0.4	2.2 ± 0.5	< 0.001
1 wk	2.3±0.4	2.1±0.5	0.092
4 wk	0.8 ± 0.3	0.9 ± 0.3	0.202
12 wk	0.7±0.3	0.5±0.2	0.003

^{*}P value calculated using independent t test

The post-operative (after 1 week) mean VAS of the cases in Group A was 3.1 and 2.3 respectively while in group B it was 2.9 and 2.1 respectively. The difference between postoperative (after 1 week) VAS between two group was statistically not significant (p>0.05). After 12-week pain was significantly less in invagination group compared to conventional stripping (p<0.01).

Table 6: Comparison of area of bruising between both groups.

Study group	Area of bruising (cm)
Group A (n=30) Conventional stripping	32±4
Group B (n=30) Invagination stripping	32±4
P value (calculated using independent t test)	1.000

The mean area of bruising during surgery of the cases in Group A was 32 (SD=4) and in group B was 32 (SD=4). The difference in area of bruising during surgery between two group was statistically not significant (p>0.05) (Table 6).

The mean Length of vein strapped during surgery of the cases in Group A was 13.2 (SD=4.1) cm and in group B was 17.1 (SD=5.7) ml. The difference in length between two group was statistically significant (p<0.01). Length of vein strapped was significantly more in invagination stripping compared to conventional stripping (Table 7).

Table 7: Comparison of length of vein strapped between both groups.

Study group	Length (mean±SD) in cm
Group A (n=30) Conventional Stripping	13.2±4.1
Group B (n=30) Invagination Stripping	17.1±5.7
P value (calculated using independent t test)	0.003

Table 8: Comparison of time taken to get back to activity between two groups.

Study group	Time taken to get back to activity (mean±SD) days
Group A (n=30) Conventional Stripping	15±3
Group B (n=30) Invagination Stripping	12±4
P value (Calculated using independent t test)	< 0.001

The mean Time taken to get back to activity of the cases in Group A was 15 (SD 3) days and in group B was 12 (SD 4) days. The difference in Time taken to get back to activity between two group was statistically significant (p<0.001). Time taken to get back to activity was significantly more in conventional stripping compared to invagination stripping (Table 8).

DISCUSSION

One century of studies on saphenous vein varicosis has left us with some unanswered questions. The traditional methods in place to manage great saphenous vein varicosities include Trendlenberg's procedure i.e. Juxtafemoral ligation of saphenofemoral junction and tributaries of GSV (both named and un-named) in the groin followed by stripping of great saphenous vein from groin upto just below the knee joint.

In the current study we have compared conventional stripping and invagination stripping techniques for GSV varicosities. In invagination technique of varicose vein stripping an incision (2-3 cms) is taken at the groin crease. The GSV, femoral vein and saphenofemoral junction along with its tributaries are exposed adequately using blunt dissection.

The tributaries of SFJ are identified and ligated flush to prevent recurrence. The stripper is then inserted into the GSV and is coarsed through the GSV and is brought out through an infraguenal incision (1-2 cms) about 1cm from the tibial tuberosity at the knee joint.⁵⁻¹¹

The end of the stripper is then attached to the proximal end of the vein. The vein inverts into itself as the stripper is withdrawn through the groin wound. In conventional stripping the same procedure is employed except in the use of a larger acorn attached to the stripper while pulling the vein out (Figure 1).

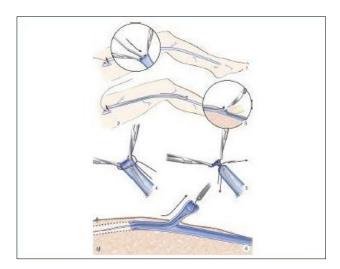


Figure 1: Procedure of invagination stripping of varicose veins using PIN stripper.

The mean age of the cases in Group A was 52 (SD=4) year and in group B was 53 (SD=5) year. The study groups are comparable by age because the difference in age between two group was statistically not significant. Mean age in a study done by Scheltinga et al, was 48 (SD=2) year in conventional stripping and was 46 (SD=2) years in invagination stripping. Mean age was lower than the present study. 12 There were 14 (46.7%) male in Group A and 12 (40%) male in group B. There were 16 (53.3%) female in Group A and 18 (60%) female in group B. The study groups are comparable by gender because the difference in gender between two groups was statistically not significant. In a study done by Scheltinga et al, there were 3 males in conventional stripping and 43 males in Invagination stripping.¹² There were 6 females in conventional stripping and 40 females in Invagination stripping). In comparison to my study, there was wide difference in male female ratio in a study done by Scheltinga et al.¹²

The mean blood loss (ml) during surgery of the cases in Group A was 32 (SD=4) ml and in group B was 16 (SD=5) ml. The difference in blood loss (ml) during surgery between two group was statistically significant (p<0.001). Blood loss was significantly more in conventional stripping compared to invagination stripping. Similar findings were found in a study done by

Scheltinga et al.¹² In a study done by Scheltinga et al, mean blood loss during surgery of the cases in conventional stripping was 28 (SD 4) ml and in Invagination stripping was 15 (SD 2) ml.¹²

The mean Operative time (min) of surgery of the cases in Group A (conventional stripping) was 36 (SD=2) min and in group B (Invagination stripping) was 35 (SD=3) min. The difference in blood loss (ml) during surgery between two group was statistically not significant. In a study done by Scheltinga et al, mean Operative time (min) of surgery of the cases in conventional stripping was 26 (SD=1) minutes and in Invagination stripping was 24 (SD=1) minutes. ¹² Operative time was higher in my study in comparison to study done by Scheltinga et al. ¹²

The mean Length of vein strapped during surgery of the cases in Group A was 13.2 (SD 4.1) cm and in group B was 17.1 (SD 5.7) ml. The difference in length between two group was statistically significant (p<0.01). Length of vein strapped was significantly more in invagination stripping compared to conventional stripping. The post-operative (after 1 week) mean VAS of the cases in Group A was 3.1 and 2.3 respectively while in group B it was 2.9 and 2.1 respectively. After 12 weeks pain was significantly less in invagination group compared to conventional stripping (p<0.01). Pain levels significantly diminished over time in both groups in an identical fashion.⁶

The mean time taken to get back to activity of the cases in Group A was 15 (SD=3) days and in group B was 12 (SD=4) days. The difference in Time taken to get back to activity between two group was statistically significant (P <0.001). Time taken to get back to activity was significantly more in conventional stripping compared to invagination stripping. In the contrary, in a study done by Scheltinga et al, return to work was not different between the two groups (CON: 13 (SD=2) days, INVAG: 11 (SD=2) days. The mean area of bruising during surgery of the cases in Group A was 32 (SD=4) and in group B was 32 (SD=4). The difference in area of bruising during surgery between two group was statistically not significant.

Butler CM et al compared the postoperative morbidity of conventional stripping with inverting stripping of the long saphenous vein in a randomised prospective trial. One hundred and thirty-six patients with primary uncomplicated long saphenous vein incompetence were randomised to either conventional or inverting stripping of the long saphenous vein. Blood loss, operating time and length of vein stripped were measured intra-operatively. Number and size of haematomas, bruising and diameter of the thrombosed channel were assessed 1 week postoperatively by clinical examination and by duplex ultrasonography. Pain, mobility and analgesia consumption were noted in a daily diary for the postoperative week.¹³

Blood loss was significantly lower in the inverting group than in the conventional group, with a median of 50 ml for the conventional group and 20 ml in the inverting group (p<0.0001, Mann-Whitney U-test). Operating time in the inverting group (median: 20 min, interquartile range (IQR): 15-25 min) was shorter than in the conventional group (median: 25 min, IQR 20-30 min; p = 0.0001). The percentage of length of vein removed was greater in the inverting group (p<0.05). There was no difference between the groups as regards size of haematoma, bruising, or diameter of thrombosed channel, nor was there a difference in postoperative pain, mobility or analgesia consumption. Inverting stripping used less operating time and there was less blood loss perioperatively. There did not appear to be any further benefits to inverting stripping of the long saphenous vein during the early perioperative period. Durkin MT et al carried out a prospective, randomised trial to examine the efficacy of perforate invagination (PIN, Credenhill Ltd, Derbyshire, UK) stripping of the long saphenous vein (LSV) in comparison to conventional stripping (Astratech AB, Sweden) in the surgical management of primary varicose veins. Eighty patients with primary varicosities junction sapheno-femoral secondary to incompetence and LSV reflux were recruited. Patients were randomised to PIN or conventional stripping with all other operative techniques remaining constant. Follow-up was performed at 1 and 6 weeks postoperatively. There were no statistically significant differences between the two techniques in terms of time taken to strip the vein, percentage of vein stripped or the area of bruising at 1 week. The size of the exit site was significantly smaller with the PIN device (p<0.01). Optimal use of the conventional stripper provides results comparable to the PIN device. Choice of stripping device remains the surgeon's, bearing in mind that the PIN stripper achieves slightly better cosmesis.¹⁴

CONCLUSION

Both techniques, Conventional stripping and invagination technique of stripping for varicose veins have comparable short and long- term outcomes in terms of duration of surgical procedure. Invagination stripping is a suitable alternative to time honored Conventional varicose vein stripping with added advantage of less blood loss, less postoperative pain and shorter time span to get back to work.

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Institutional Ethics Committee

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