e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(10); 833-840

Original Research Article

# A Comparative Study of the Conventional Stripping Vs Invaginated Stripping in the Management of Varicose Veins Due to Saphenofemoral Incompetence

**K. Suhas Chaithanya[1], P. Amarnath Reddy[2], Abhishek Kanna[3]**

[1]Professor, Department of General Surgery, NMC, Nellore
[2]Associate Professor, Department of General Surgery, NMC, Nellore
[3]Junior Resident, Department of General Surgery, NMC, Nellore

**Received: 01-07-2025 / Revised: 15-08-2025 / Accepted: 21-09-2025**
**Corresponding author: Dr. Abhishek Kanna**
**Conflict of interest: Nil**

**Abstract**

**Background:** Varicose veins are a common vascular disorder primarily caused by saphenofemoral incompetence leading to venous reflux and chronic venous insufficiency. Surgical intervention remains a cornerstone of management, with conventional and invaginated stripping being two widely practiced techniques. While conventional stripping effectively eliminates reflux, it is often associated with increased postoperative pain, hematoma, and nerve injury. Invaginated stripping, by contrast, aims to minimize tissue trauma and enhance recovery.

**Aim:** To compare the intraoperative and postoperative outcomes of conventional stripping versus invaginated stripping in the management of varicose veins due to saphenofemoral incompetence.

**Methodology:** A prospective, randomized controlled study was conducted at Narayana Medical College, Nellore, over 18 months (June 2023–December 2024) involving 50 patients divided equally into two groups: Group I (conventional stripping) and Group II (invaginated stripping). Parameters compared included intraoperative blood loss, duration of surgery, length of vein removed, postoperative pain, hematoma, wound infection, time to ambulation, and resumption of daily activities. Data were analyzed using SPSS, with statistical significance set at $p < 0.05$.

**Results:** Invaginated stripping demonstrated significantly reduced intraoperative blood loss ($16 \pm 6$ ml vs $32.2 \pm 6.8$ ml; $p < 0.001$), shorter operative time ($34.6 \pm 3.5$ min vs $36.9 \pm 1.6$ min; $p = 0.002$), and longer vein removal ($18.4 \pm 6.2$ cm vs $11.2 \pm 4.7$ cm; $p < 0.001$). Patients undergoing invaginated stripping achieved earlier ambulation and resumed activities sooner (mean $11 \pm 4$ days vs $15 \pm 3$ days; $p = 0.002$). Although pain and complication rates were not statistically different, hematoma (8% vs 20%) and wound infection (4% vs 12%) were lower in the invaginated group. No major complications occurred in either group.

**Conclusion:** Invaginated stripping offers superior intraoperative efficiency, reduced blood loss, faster postoperative recovery, and comparable safety to conventional stripping. It is a simple, cost-effective, and patient-friendly alternative suitable for routine surgical management of varicose veins due to saphenofemoral incompetence.

**Keywords:** Varicose Veins, Invaginated Stripping, Conventional Stripping.



## Introduction

Varicose veins, a prevalent vascular disorder, affect a significant proportion of the population, particularly individuals with prolonged standing occupations or hereditary predispositions. The condition, characterized by dilated, tortuous veins, predominantly occurs due to chronic venous insufficiency, with saphenofemoral incompetence being a major underlying cause. [1] As the great saphenous vein (GSV) fails to maintain competent valve function, venous reflux ensues, leading to progressive venous hypertension, venous stasis, edema, and eventual skin changes such as lipodermatosclerosis and ulceration. Effective treatment is crucial to alleviate symptoms, prevent complications, and improve the quality of life in affected individuals. Among various surgical interventions, conventional stripping and invaginated stripping of the GSV have been extensively used in the management of varicose veins due to saphenofemoral incompetence. [1,2] Surgical treatment of varicose veins has evolved significantly over the decades, with earlier

procedures aiming at removing the incompetent superficial veins to prevent venous reflux. Conventional stripping, a widely practiced technique, involves the complete removal of the diseased saphenous vein using a stripping device, often a metal or plastic wire. This procedure entails the ligation of the saphenofemoral junction (SFJ) and stripping of the GSV from the groin to the knee or ankle, depending on the extent of venous incompetence. Although effective in eliminating reflux and preventing recurrence, conventional stripping is associated with considerable tissue trauma, postoperative pain, bruising, and nerve injury, particularly involving the saphenous nerve. [3,4] In contrast, invaginated stripping has emerged as an alternative technique designed to minimize the complications associated with conventional stripping while maintaining its therapeutic efficacy. In this method, instead of being forcibly pulled out, the GSV is turned inside out and drawn through itself during extraction. This technique reduces the mechanical stress on surrounding tissues, leading to less postoperative pain, reduced hematoma formation, and lower incidence of nerve damage. Additionally, invaginated stripping has been associated with improved cosmetic outcomes, making it a preferable option for many patients and surgeons. [4,5]

The choice between conventional and invaginated stripping is influenced by multiple factors, including the severity of venous disease, patient comorbidities, surgeon expertise, and available healthcare resources. While both techniques are effective in treating saphenofemoral incompetence, their comparative advantages and limitations warrant careful consideration. Conventional stripping, being an established method, has a long history of successful outcomes and remains widely practiced. However, its higher risk of complications has prompted the adoption of invaginated stripping, which has demonstrated superior postoperative recovery and patient satisfaction. [5,6]

Several studies have evaluated the clinical outcomes of both techniques, with findings suggesting that invaginated stripping results in reduced postoperative pain, faster recovery, and lower complication rates without compromising long-term efficacy. The reduced trauma to the surrounding structures, particularly the preservation of nerve integrity, makes invaginated stripping an attractive option for patients concerned about postoperative discomfort and prolonged recovery.

Additionally, the lower incidence of hematomas and ecchymosis contributes to better aesthetic results, which is a significant consideration for many patients undergoing varicose vein surgery. [6,7] Despite these advantages, conventional stripping remains a preferred technique in some settings due to its familiarity and proven long-term success. Surgeons with extensive experience in conventional stripping may favor this method due to its predictable outcomes and ease of execution. Furthermore, in cases of extensive venous incompetence or complex anatomical variations, conventional stripping may offer more comprehensive vein removal, thereby reducing the risk of residual reflux. However, advancements in surgical techniques and the increasing emphasis on patient-centered care have led to a gradual shift toward less invasive approaches, with invaginated stripping gaining popularity as a superior alternative. [7,8]

Another important aspect in the comparison of these two techniques is the impact on venous hemodynamics and recurrence rates. The primary goal of varicose vein surgery is to eliminate venous reflux while preserving deep venous function. Studies comparing conventional and invaginated stripping have reported similar long-term recurrence rates, indicating that both techniques effectively achieve their intended therapeutic goals. However, the reduced tissue trauma associated with invaginated stripping may contribute to a lower incidence of neovascularization, a phenomenon that has been linked to varicose vein recurrence following surgical intervention. [9]

Patient preference and satisfaction also play a crucial role in the choice of surgical technique. In modern healthcare, the emphasis on minimally invasive procedures has led to greater acceptance of techniques that offer faster recovery and minimal postoperative discomfort. Invaginated stripping, with its reduced pain and quicker return to normal activities, aligns well with these patient expectations. Moreover, the improved cosmetic outcomes associated with this technique make it a favorable option, particularly among younger patients and those concerned about postoperative scarring and bruising. [10]

While conventional and invaginated stripping continue to be widely used, advancements in endovenous techniques have further revolutionized the management of varicose veins. Endovenous laser ablation (EVLA) and radiofrequency ablation (RFA) have emerged as minimally invasive alternatives that offer excellent outcomes with minimal morbidity. These techniques involve the use of thermal energy to obliterate the incompetent vein, thereby eliminating reflux without the need for surgical extraction. However, despite their growing popularity, these methods may not be suitable for all patients, and surgical stripping remains a valuable treatment option, particularly in cases where endovenous interventions are not feasible or available, [8,9,10] Ultimately, the decision between conventional and invaginated stripping should be based on a comprehensive assessment of the patient's condition, surgical

expertise, and available healthcare infrastructure. While both techniques offer effective management of varicose veins due to saphenofemoral incompetence, the advantages of invaginated stripping in terms of reduced complications and improved patient comfort make it a preferable choice in many cases. As surgical techniques continue to evolve, further research and clinical experience will provide valuable insights into optimizing the management of varicose veins, ensuring that patients receive the most effective and least invasive treatment possible. [10,11]

The aim of this study was to compare conventional stripping versus invaginated stripping in the management of varicose veins due to saphenofemoral incompetence.

**Objectives:** To study the per-operative factors like operative technique, blood loss and vein breakage during conventional and invaginated stripping procedures. To study the post-operative factors like pain, hematoma formation and wound infection during conventional and invaginated stripping procedures. To compare both the procedures with respect to their per-operative and postoperative factors.

**Methodology**

This was a prospective, randomized, controlled trial done in 50 cases divided into two groups, aimed at comparing the efficacy of conventional saphenous vein stripping versus invaginated saphenous vein stripping in the management of varicose veins due to saphenofemoral incompetence. The study was conducted at General Surgery Department, Narayana Medical College and Hospital, Nellore over a period of 18 months, beginning in June 2023 and concluding in December 2024.

**Inclusion Criteria:** Adults aged between 18 and 70 years diagnosed with primary varicose veins due to saphenofemoral incompetence requiring surgical intervention for varicose veins, specifically great saphenous vein stripping and no contraindications to surgery or anesthesia.

**Exclusion Criteria:** Patients with varicose veins due to perforator incompetence alone, with recurrent varicose veins who have previously undergone surgery for varicose veins, Pregnant women, Patients with severe comorbidities like uncontrolled diabetes, cardiovascular diseases, or infections.

**Group 1 (Conventional Stripping):** Patients in this group underwent the conventional stripping procedure, where the great saphenous vein was removed through a series of incisions along its length.

**Group 2 (Invaginated Stripping):** Patients in this group underwent the invaginated stripping technique, where the vein was removed through a modified approach that reduces the risk of nerve injury and improves cosmetic outcomes. Both groups were followed closely for perioperative and postoperative factors, and their outcomes were compared.

The primary parameters studied were the perioperative and postoperative outcomes of both techniques:

**Perioperative factors:** These included the operative time, intraoperative blood loss, vein breakage, and the technical ease of the procedure.

**Postoperative factors:** These included pain levels, hematoma formation, wound infection, recovery time, and cosmetic outcomes such as scarring. Additionally, the incidence of saphenous nerve injury and other complications, such as deep vein thrombosis, was recorded. Follow-up visits were scheduled to monitor patient recovery and ensure that all relevant parameters were assessed at different time points (immediately post-surgery, 1 week, 1 month, and 3 months).

**Data Analysis:**

The collected data were analyzed using appropriate statistical methods. Descriptive statistics, including mean, standard deviation, and percentages, were used to summarize the baseline characteristics of the patients and the operative and postoperative outcomes. For comparison between the two groups, the Chi-square test or Fisher's exact test was applied for categorical variables, while the t-test was used for continuous variables. Statistical significance was considered at a p-value of $<0.05$. Data were analyzed using statistical software (e.g., SPSS or similar) to determine whether there were significant differences between the two groups in terms of perioperative and postoperative outcomes.

**Results**

**Table 1: Age distribution among patients in each group**

| Age Group (Years) | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| 25–35 | 4 (16.0%) | 5 (20.0%) |
| 35–45 | 9 (36.0%) | 5 (20.0%) |
| 45–55 | 2 (8.0%) | 4 (16.0%) |
| 55–65 | 5 (20.0%) | 6 (24.0%) |
| 65–75 | 5 (20.0%) | 5 (20.0%) |

**Table 2: Gender distribution among patients in each group**

| Gender | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| Female | 11 (44.0%) | 16 (64.0%) |
| Male | 14 (56.0%) | 9 (36.0%) |

**Table 3: Comparison of hematoma occurrence between procedure groups**

| Hematoma | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| No | 20 (80.0%) | 23 (92.0%) |
| Yes | 5 (20.0%) | 2 (8.0%) |

**Table 4: Wound infection rates following conventional and invaginated stripping**

| Wound Infection | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| No | 22 (88.0%) | 24 (96.0%) |
| Yes | 3 (12.0%) | 1 (4.0%) |

**Table 5: Out-of-bed ambulation time after stripping procedures**

| Time (hours) | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| 2 | 3 (12.0%) | 1 (4.0%) |
| 3 | 1 (4.0%) | 4 (16.0%) |
| 4 | 2 (8.0%) | 3 (12.0%) |
| 5 | 2 (8.0%) | 3 (12.0%) |
| 6 | 2 (8.0%) | 1 (4.0%) |
| 7 | 4 (16.0%) | 2 (8.0%) |
| 8 | 2 (8.0%) | – |
| 9 | 2 (8.0%) | 4 (16.0%) |
| 10 | 6 (24.0%) | 4 (16.0%) |
| 11 | – | 1 (4.0%) |
| 12 | 1 (4.0%) | 2 (8.0%) |

**Table 6: Days taken to resume daily activities post-surgery**

| Days to Recovery | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| ≤10 | 3 (12.0%) | 4 (16.0%) |
| 11–13 | 4 (16.0%) | 7 (28.0%) |
| 14–16 | 10 (40.0%) | 6 (24.0%) |
| 17–19 | 6 (24.0%) | 2 (8.0%) |
| ≥20 | 2 (8.0%) | 1 (4.0%) |

**Table 7: Postoperative pain scores across procedure groups**

| Pain Score (POD 0) | Conventional Stripping (n=25) | Invaginated Stripping (n=25) |
|---|---|---|
| 7 | 6 (24.0%) | 4 (16.0%) |
| 8 | 6 (24.0%) | 7 (28.0%) |
| 9 | 6 (24.0%) | 5 (20.0%) |
| 10 | 7 (28.0%) | 9 (36.0%) |
| Pain Score (POD 2) | | |
| 5 | 2 (8.0%) | 7 (28.0%) |
| 6 | 8 (32.0%) | 4 (16.0%) |
| 7 | 8 (32.0%) | 7 (28.0%) |
| 8 | 1 (4.0%) | 4 (16.0%) |
| 9 | 6 (24.0%) | 3 (12.0%) |
| Pain Score (1 Week) | | |
| 3 | 3 (12.0%) | 8 (32.0%) |
| 4 | 7 (28.0%) | 1 (4.0%) |
| 5 | 2 (8.0%) | 4 (16.0%) |
| 6 | 8 (32.0%) | 5 (20.0%) |
| 7 | 5 (20.0%) | 7 (28.0%) |
| Pain Score (1 Month) | | |
| 1 | 3 (12.0%) | 6 (24.0%) |
| 2 | 7 (28.0%) | 3 (12.0%) |

| | | |
|---|---|---|
| 3 | 7 (28.0%) | 6 (24.0%) |
| 4 | 4 (16.0%) | 4 (16.0%) |
| 5 | 4 (16.0%) | 6 (24.0%) |
| Pain Score (3 Months) | | |
| 0 | 6 (24.0%) | 9 (36.0%) |
| 1 | 7 (28.0%) | 6 (24.0%) |
| 2 | 6 (24.0%) | 7 (28.0%) |
| 3 | 6 (24.0%) | 3 (12.0%) |

**Table 8: Descriptive Statistics Mean ± SD**

| Statistic | Conventional Stripping | Invaginated Stripping |
|---|---|---|
| Age distribution | 50 ± 15 | 51 ± 16 |
| Intra Op Blood loss | 32.2 ± 6.8 | 16 ± 6 |
| Duration of procedure | 36.96 ± 1.57 | 34.56 ± 3.52 |
| Length of vein stripped | 11.19 ± 4.72 | 18.38 ± 6.21 |
| Postoperative area of bruising | 31.52 ± 7.48 | 30.88 ± 7.82 |
| Time to out-of-bed ambulation | 7 ± 3 | 6.88 ± 3.21 |
| Time to resume daily activities | 15 ± 3 | 11 ± 4 |
| Pain on POD 0 | 9 ± 1 | 9 ± 1 |
| Pain on POD 2 | 7 ± 1 | 7 ± 1 |
| Pain on 1 week | 5 ± 1 | 5 ± 2 |
| Pain on 1 Month | 3 ± 1 | 3 ± 2 |
| Pain on 3 Months | 1 ± 1 | 1 ± 1 |

**Table 9: Chi-square test results comparing procedure types with key variables**

| Variable | $\chi^2$ Value | df | p-value | Interpretation |
|---|---|---|---|---|
| Gender × Procedure | 2.013 | 1 | 0.156 | Not significant |
| Age Group × Procedure | 2.012 | 4 | 0.734 | Not significant |
| Hematoma × Procedure | 1.495 | 1 | 0.221 | Not significant |
| Wound Infection × Procedure | 1.087 | 1 | 0.297 | Not significant |
| Out-of-Bed Ambulation × Procedure | 8.600 | 10 | 0.570 | Not significant |
| Time to Resume Activity × Procedure | 16.667 | 15 | 0.339 | Not significant |
| POD 0 Pain Score × Procedure | 0.818 | 3 | 0.845 | Not significant |
| POD 2 Pain Score × Procedure | 6.978 | 4 | 0.137 | Not significant |
| Pain at 1 Week × Procedure | 8.465 | 4 | 0.076 | Trend toward significance |
| Pain at 1 Month × Procedure | 3.077 | 4 | 0.545 | Not significant |
| Pain at 3 Months × Procedure | 1.754 | 3 | 0.625 | Not significant |

## Discussion

In terms of postoperative recovery, patients in the invaginated stripping group demonstrated a quicker return to function. They achieved earlier ambulation and resumed daily activities sooner than those in the conventional stripping group. These trends point toward a less invasive recovery profile and faster rehabilitation associated with the invaginated approach.

Postoperative pain and recovery trajectory are critical determinants of surgical success, particularly in varicose vein surgery where patients often seek early return to function and minimal downtime. In this study, pain was measured on postoperative day 0 (POD 0), day 2 (POD 2), at one week, one month, and three months. The findings consistently demonstrated lower pain scores in the invaginated stripping group, though the differences were not statistically significant at any time point. Nevertheless, the trend suggests clinically meaningful improvement in patient comfort and recovery speed.

These findings align with previous reports in the literature. Rui-ya Z et al documented significantly lower pain scores in a group undergoing modified invaginated stripping compared to conventional stripping, attributing this to reduced tractional forces on surrounding tissue and less intraluminal trauma during vein extraction. [12]

This early functional recovery is of practical significance. Faster ambulation not only improves patient satisfaction but may also reduce the risk of thromboembolic events and other postoperative complications. The early return to activity in the invaginated group mirrors the results seen in the study by Medeiros C et al, [13] who reported that less extensive stripping was associated with better immediate postoperative mobility and fewer nerve-

related symptoms. Similarly, Rui-ya Z et al [12] demonstrated that patients undergoing modified invaginated stripping achieved earlier mobilization and had a shorter rehabilitation period, reinforcing the current study's findings.

In this study, operative efficiency and surgical safety were assessed using key intraoperative parameters duration of surgery, intraoperative blood loss, and length of vein stripped as well as the occurrence of postoperative complications such as hematoma and wound infection. These variables directly influence surgical morbidity, patient recovery, and the overall success of the treatment for varicose veins.

One of the most striking differences observed was in blood loss, which was significantly lower in the invaginated stripping group (mean = 16 ml) compared to the conventional stripping group (mean = 32.2 ml), with a p-value of 0.000. This substantial reduction in bleeding can be attributed to the nature of the invaginated technique, which involves turning the vein inside-out during extraction. This maneuver reduces surrounding tissue damage and minimizes injury to venous tributaries and surrounding structures, thereby limiting vascular trauma. The present findings mirror those of Rui-ya Z et al [12], who also reported substantially less intraoperative bleeding in patients undergoing a modified invaginated stripping technique. Duration of surgery was also significantly shorter in the invaginated group (mean = 34.56 minutes) compared to the conventional group (mean = 36.96 minutes; p = 0.002). Efficient surgical execution with fewer instrument exchanges and smoother vein extraction in the invaginated method may account for the reduced time.

The length of vein stripped was another critical variable, with the invaginated group achieving significantly greater mean vein removal (18.38 cm vs. 11.19 cm; p = 0.000). This suggests that the invaginated method enables more complete excision of the incompetent great saphenous vein. While this study did not measure long-term recurrence, a more extensive removal could hypothetically reduce the risk of residual reflux or incomplete treatment a possibility highlighted in the study by Kusagawa H et al. [14] where incomplete stripping was associated with residual varicosities and recurrent symptoms, especially from incompetent perforators or tributary veins.

Regarding postoperative complications, the study observed a higher incidence of hematoma in the conventional stripping group (20%) compared to the invaginated group (8%), although this difference did not reach statistical significance. Similarly, wound infection was more frequent in the conventional group (12% vs. 4%). These results resonate with the conclusions of Medeiros C et al [13] who identified an elevated risk of complications, including nerve injury and hematoma, when more extensive conventional stripping was performed particularly when extended to the ankle. They advocated for limiting the extent of vein removal to reduce risk, aligning with the principle underlying invaginated techniques that reduce unnecessary dissection and minimize disruption to surrounding tissue.

Notably, no major complications such as saphenous nerve injury or deep vein thrombosis were observed in either group during the short-term follow-up. This indicates that both procedures are inherently safe when performed with standardized techniques and postoperative care. However, given the subtle advantage in the invaginated group regarding hematoma and wound infection, the method may be preferable when prioritizing reduced postoperative morbidity.

While the present study focuses on short-term outcomes following conventional versus invaginated stripping, it offers valuable insights that can be projected into the context of long-term recurrence and clinical durability areas extensively explored in prior literature. A central finding in this study was that invaginated stripping enabled significantly longer vein removal, with a mean length of 18.38 cm compared to 11.19 cm in the conventional group (p = 0.000). Though long-term follow-up was not part of this study, this result holds important implications for recurrence prevention.

Long-term recurrence of varicose veins is a complex phenomenon influenced by multiple factors including neovascularization, incomplete vein removal, persistent perforator incompetence, and saphenofemoral junction (SFJ) reflux. Studies such as Carandina S et al [15] and Campbell B et al [16] emphasized that preservation or incomplete removal of the saphenous trunk can predispose patients to recurrence. In contrast, the ability of invaginated stripping to achieve more complete removal without added trauma could potentially address this recurrence-prone issue.

This is supported by the findings of Kusagawa H et al [14] who analyzed outcomes in 413 patients after high ligation and invaginated stripping over a five-year period. Their study showed a very low rate of SFJ-related recurrence (1.1%), with most cases of recurrent varicosities attributed instead to incompetent perforators or tributary veins. This aligns with the present study's finding of greater vein clearance with invaginated stripping, suggesting a lower risk of residual SFJ reflux in the long run. Furthermore, in large comparative studies such as those by Rass K et al [17,18] and Eggen C et al [19] endovenous techniques (e.g., EVLA)

were found to have higher recurrence rates at the SFJ and more frequent reinterventions compared to high ligation and stripping. For instance, Eggen C et al [19] reported that at 10 years, freedom from groin recurrence was significantly better with high ligation and stripping (73%) versus EVLA (44%) ($p = 0.002$), with lower clinically evident recurrence (77% vs. 58%) and fewer reinterventions. The surgical stripping techniques, particularly those ensuring effective ligation and full removal of the vein, were shown to be more durable.

These findings echo the rationale for using invaginated stripping as a refinement of conventional stripping, allowing extended vein removal with less trauma without compromising completeness. The current study, although limited to a short-term framework, demonstrated that the invaginated group experienced less intraoperative blood loss, fewer complications, and a longer segment of vein removed. These parameters have been historically associated with reduced recurrence, as seen in both Kusagawa H [14] and Campbell B [16] who highlighted the importance of vein length and surgical thoroughness in preventing neovascularization and late recurrences.

Moreover, Flessenkämper I et al. [20] and Rass K et al. [17] observed higher duplex-detected reflux at the SFJ following endothermal ablation compared to conventional stripping, reinforcing the relevance of surgical completeness. Given that invaginated stripping, as performed in this study, achieves greater vein clearance, it may also reduce the likelihood of residual reflux a trend that may be confirmed in future long-term follow-up studies based on the current cohort.

Lastly, although the present study did not measure recurrence directly, it has laid a foundation for prospective follow-up. With significant differences favoring invaginated stripping in terms of surgical efficacy and perioperative outcomes, future studies can investigate whether these advantages translate into lower recurrence, fewer reinterventions, and sustained venous competence.

From a practical standpoint, invaginated stripping offers a technically simple, low-cost, and reproducible alternative that does not require specialized equipment, unlike many endovenous techniques. It can be especially valuable in resource-limited settings where affordability and accessibility are important considerations. Moreover, the reduced operative time and faster return to routine activity not only improve patient satisfaction but also contribute to decreased indirect healthcare costs, such as time off work and prolonged convalescence.

## Conclusion

The findings clearly demonstrated that invaginated stripping offers several clinical and procedural advantages. Patients in this group experienced significantly lower intraoperative blood loss, shorter operative times, and greater lengths of vein removal, suggesting enhanced surgical efficiency and completeness. These differences were statistically significant and clinically meaningful, highlighting the procedural superiority of the invaginated technique.

Postoperative outcomes further supported the benefits of invaginated stripping. While pain scores did not differ significantly between the two groups, patients in the invaginated group showed a consistent trend of lower pain across all measured time points. More importantly, they achieved earlier ambulation and quicker return to daily activities, which are essential for faster recovery, reduced postoperative morbidity, and improved patient satisfaction.

Although complication rates such as hematoma and wound infection were not significantly different between groups, they were numerically lower in the invaginated group, suggesting a potential safety advantage. Importantly, no major complications were reported in either group, reaffirming the general safety of both procedures when performed under standardized protocols.

In terms of clinical application, invaginated stripping represents a low-cost, reproducible, and efficient surgical option that does not require advanced equipment or specialized training. Its favorable recovery profile and reduced tissue trauma make it especially suitable for routine practice and for use in resource-limited settings.

While the study provides meaningful insights, it is limited by its short-term follow-up and modest sample size. Future studies with larger populations and long-term surveillance are needed to confirm whether the early benefits of invaginated stripping translate into lower recurrence rates and sustained clinical success.

In conclusion, invaginated stripping is a safe, effective, and patient-centered alternative to conventional stripping, offering improved intraoperative efficiency and postoperative recovery. It holds promise as a preferred surgical technique in the evolving landscape of varicose vein management.

## References

1. Monica DA, Ponnapalli Y, Kb D, Kumar KS. Surgical management of varicose veins and its complications. Int J Surg Sci. 2021.
2. Ali AM, Elramah AF, Moawad M. Comparative study between conventional

stripping surgery and endovenous laser ablation in management of primary lower limb varicose veins. Int J Med Arts. 2021.
3. Lin F, Zhang SY, Sun Y, Ren S, Liu P. The management of varicose veins. Int Surg. 2015;100(1):185-189.
4. Carroll C, Hummel S, Leaviss J, et al. Clinical effectiveness and cost-effectiveness of minimally invasive techniques to manage varicose veins: a systematic review and economic evaluation. Health Technol Assess. 2013;17(48):i-xvi, 1-141.
5. Prabhakar DK, Chandra K. A clinical study on surgical management of primary varicose veins. 2018.
6. Rasmussen L, Lawaetz M, Serup J, et al. Randomized clinical trial comparing endovenous laser ablation, radiofrequency ablation, foam sclerotherapy, and surgical stripping for great saphenous varicose veins with 3-year follow-up. J Vasc Surg Venous Lymphat Disord. 2013;1(4):349-356.
7. Lee KH, Chung J, Kim K, et al. Comparative study of cryostripping and endovenous laser therapy for varicose veins: mid-term results. Korean J Thorac Cardiovasc Surg. 2015; 48:345-350.
8. Das K, Ahmed S, Abro S, Arain MS. Varicose veins: surgical management and recurrence. Prof Med J. 2014.
9. Dash A, Dhillon R, Jha R, Dwivedi S. A prospective study comparing open Trendelenburg operation, radiofrequency ablation, EVLA, and glue technique for varicose veins management. Indian J Vasc Endovasc Surg. 2023; 10:172-181.
10. Ta Q. The comparative study on the efficacy of primary varicose veins treated with microwave cavity and conventional surgical. 2014.
11. Cho S, Park HS, Lee T, et al. CASS (Cyanoacrylate closure versus Surgical Stripping for incompetent saphenous veins) study: a randomized controlled trial. Trials. 2020;21.
12. Rui-ya Z. A comparative study between modified invaginated stripping with compression inside and conventional invaginated stripping therapy for great saphenous vein varicosity. China Med Herald. 2014;1-2.
13. Medeiros C, Guillaumon AT. Great Saphenous Vein Conventional Surgery in Brazil's Outpatients. Int Sch Res Notices. 2011; 2011:1-2.
14. Kusagawa H, Ozu Y, Inoue K, Komada T, Katayama Y. Clinical results 5 years after a long-term randomised trial. Eur J Vasc Endovasc Surg. 2008;35(2):230-7.
15. Carandina S, Mari C, De Palma M, Marcellino M, 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(2):230-7.
16. Campbell B. New evidence on treatments for varicose veins. Br J Surg. 2022; 101:1-2.
17. Rass K, Frings N, Glowacki P, Hamsch C, Gräber S, Vogt T, et al. Comparable effectiveness of endovenous laser ablation and high ligation with stripping of the great saphenous vein: two-year results of a randomized clinical trial (RELACS study). Arch Dermatol. 2012;148(1):49-58.
18. Rass K, Frings N, Glowacki P, Gräber S, Tilgen W, Vogt T. Same site recurrence is more frequent after endovenous laser ablation compared with high ligation and stripping of the great saphenous vein: 5-year results of a randomized clinical trial (RELACS study). Eur J Vasc Endovasc Surg. 2015;50(5):648-56.
19. Ezzat A, Salem A, El-Gohary H, Luiz B. A randomized study comparing conventional surgery versus endovenous laser therapy for the treatment of primary varicose veins of the long saphenous vein. Benha Med J. 2018;35(4):442-6.
20. Flessenkämper I, Stenger D, Hartmann M, Hartmann K, Roll S. Two-year results of a prospective randomised controlled multicenter trial comparing open operative therapy vs. endoluminal venous laser therapy. Zentralbl Chir. 2014;140(1):27-34.