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A Study Of Clinical Outcomes Of Subfascial Endoscopic Perforator Ligation Surgery In Perforator Incompetence In A Tertiary Care Hospital

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Abstract

Background: *Chronic venous insufficiency (CVI), primarily due to venous hypertension caused by valvular incompetence, often leads to symptoms ranging from limb discomfort to non-healing venous ulcers. Subfascial endoscopic perforator surgery (SEPS) offers a minimally invasive solution targeting incompetent perforators.*

Objective: *To assess the clinical outcomes of SEPS in patients with perforator incompetence, specifically evaluating symptom reduction using the Venous Clinical Severity Score (VCSS) and venous ulcer healing.*

Methods: *A prospective longitudinal study involving 30 patients with duplex-confirmed perforator incompetence (CEAP class 4–6) was conducted from October 2019 to October 2021. VCSS and ulcer size were recorded pre-operatively and post-operatively at weeks 1, 2, and 3. Statistical analysis used paired t-tests.*

Results: *There was a significant reduction in mean VCSS from 6.66 pre-operatively to 4.2 at week 3 post-operatively ($p < 0.00001$). Mean ulcer size decreased from 3.3 cm² to 1.54 cm² over 3 weeks ($p = 0.04$). SEPS was associated with minimal complications and a favorable hospital stay duration (4–6 days in 83% of cases).*

Conclusion: *SEPS is a safe and effective surgical modality for managing advanced CVI due to perforator incompetence. It significantly reduces symptom severity and accelerates ulcer healing, with minimal morbidity.*

Keywords: *Chronic venous insufficiency, perforator incompetence, SEPS, VCSS, venous ulcers, endoscopic perforator surgery*

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I. Introduction

Chronic venous insufficiency (CVI) encompasses a spectrum of clinical symptoms including pain, limb heaviness, edema, pigmentation, lipodermatosclerosis, and venous ulceration. Its primary cause is venous hypertension, which may be due to valvular incompetence or obstruction within the superficial, deep, or perforator venous systems [1,2].

Incompetent perforator veins are a key contributor to CVI, allowing retrograde blood flow that increases venous pressure in the superficial system. This results in “blow-out syndrome” and trophic skin changes, particularly in the gaiter area [3,4]. While superficial vein surgeries such as stripping and phlebectomy

address axial reflux, they may not adequately correct perforator dysfunction, particularly in CEAP class 4–6 patients [5].

Subfascial endoscopic perforator surgery (SEPS) offers a minimally invasive alternative that allows for direct visualization and division of incompetent perforators. This technique preserves skin integrity and reduces morbidity associated with open procedures [6,7].

This study aims to evaluate the effectiveness of SEPS in managing perforator incompetence in CVI patients using objective measures like the Venous Clinical Severity Score (VCSS) and ulcer size.

II. Materials And Methods

Study Design and Setting

This was a prospective longitudinal clinical study conducted from October 2019 to October 2021.

Sample Size and Sampling

A total of 30 patients were selected using a systematic sampling method.

Inclusion Criteria

- Patients aged 18–60 years
- CEAP class 4–6 CVI
- Duplex-confirmed perforator incompetence
- Informed consent obtained

Exclusion Criteria

- Deep venous reflux or thrombosis
- Recurrent varicose veins
- Saphenopopliteal reflux
- Arterial occlusive disease
- Previous lower limb surgery
- Pregnancy

Data Collection

- History and clinical examination
- CEAP classification and VCSS scoring
- Duplex ultrasound for perforator mapping
- Venous ulcer measurement (cm^2)
- Postoperative VCSS and ulcer assessment at weeks 1, 2, and 3

Surgical Technique

SEPS was performed using standard laparoscopic instruments under spinal anesthesia. Incompetent perforators were ligated subfascially through small port incisions. Patients ambulated on the same day post-surgery and were discharged within 3–6 days.

III. Results

Demographics

- **Gender:** 66% male (n=20), 34% female (n=10)
- **Age:** Majority between 30–50 years; mean age 40.7 years
- **CEAP Class:** 77% (n=23) in class 4–5; 23% (n=7) in class 6

Symptom Reduction

- Pre-op mean VCSS: 6.66
- Post-op VCSS:
  - Week 1: 6.0 (↓10%)
  - Week 2: 5.33 (↓19.9%)
  - Week 3: 4.2 (↓36.9%)
- Statistical significance: $p < 0.00001$

Ulcer Healing

- Mean pre-op ulcer size: 3.3 cm^2
- Week 1: 2.544 cm^2 (↓22.9%)

- Week 2: 1.95 cm² (↓40.54%)
- Week 3: 1.54 cm² (↓53.33%)
- Statistical significance: $p = 0.04$

Complications
- Minor complications (10%): wound infection, hematoma, neuralgia
- All managed conservatively
- Mean hospital stay: 4–6 days in 83% of patients

Parameter	Value
Gender (Male)	66% (n=20)
Gender (Female)	34% (n=10)
Age Group (30–50 years)	Majority
Mean Age	40.7 years
CEAP Class 4–5	77% (n=23)
CEAP Class 6	23% (n=7)
Mean Pre-op VCSS	6.66
Mean Week 3 VCSS	4.2
Mean Pre-op Ulcer Size (cm²)	3.3
Mean Week 3 Ulcer Size (cm²)	1.54
Minor Complications	10% (wound infection, hematoma, neuralgia)
Mean Hospital Stay (4–6 days)	83%

IV. Discussion

Subfascial Endoscopic Perforator Surgery (SEPS) has gained prominence as a minimally invasive modality in the management of chronic venous insufficiency (CVI), particularly for patients with advanced disease (CEAP class 4–6). The current study reinforces the utility of SEPS by demonstrating statistically and clinically significant improvements in venous clinical severity scores (VCSS) and ulcer healing rates within the first three postoperative weeks.

The mean pre-operative VCSS of 6.66 showed a progressive reduction over three weeks postoperatively, with a 36.9% decline by week 3 (mean VCSS 4.2). This trend reflects early symptomatic relief, which is consistent with the intended physiological correction of ambulatory venous hypertension following perforator interruption. The statistical significance of the VCSS improvement ($p < 0.00001$) further supports the efficacy of SEPS in mitigating venous symptoms such as pain, edema, and skin changes.

Ulcer healing also followed a promising trajectory. The mean ulcer area decreased from 3.3 cm² preoperatively to 1.54 cm² by week 3—a 53.3% reduction. This underscores the role of perforator incompetence in ulcer persistence and highlights the benefit of SEPS in promoting rapid healing. The improvement was statistically significant ($p = 0.04$), affirming the relevance of timely surgical intervention in patients with venous ulcers. These findings align with previous studies that report improved ulcer healing rates and prevention of recurrence after perforator ablation [6–9].

The demographic analysis revealed a predominance of male patients (66%), which may reflect both the higher prevalence of physically demanding labor among men—a known risk factor for venous disease—and gender-based differences in healthcare-seeking behavior. This trend has been similarly observed in other regional studies and warrants further exploration into sociocultural and occupational influences on disease presentation.

The CEAP classification distribution, with 77% of patients in class 4–5 and 23% in class 6, highlights the selection of patients with significant clinical burden, for whom conservative measures may have failed. SEPS is particularly beneficial in this subgroup, offering a minimally invasive option to address deep-seated perforator incompetence, often not adequately tackled by surface treatments alone.

Intraoperative findings showed that an average of 4.2 perforators were successfully identified and divided per patient, indicating that SEPS allows for comprehensive subfascial visualization and ligation. This is crucial because incomplete perforator interruption is associated with treatment failure and recurrence. The endoscopic approach provides a magnified field with precise targeting, reducing collateral tissue injury.

Postoperative complications were minimal (10%) and included minor wound infections, hematoma, and transient neuralgia. All were managed conservatively without any reoperations or conversions to open procedures, underscoring the safety profile of SEPS. These findings corroborate earlier literature that emphasizes the low morbidity and high safety of SEPS in experienced hands [10,11].

Most patients (83%) had a hospital stay of 4–6 days, which is acceptable and comparable with other studies involving SEPS. Although some centers perform SEPS as a day-care procedure, factors such as institutional protocols, patient comorbidities, and concurrent ulcer management may influence hospitalization duration.

Overall, the findings affirm SEPS as an effective, safe, and reproducible surgical technique for patients with advanced CVI and perforator incompetence. It not only accelerates symptomatic relief and ulcer healing but also minimizes complications and enhances patient recovery. Future studies with larger sample sizes and long-term follow-up would be beneficial to assess recurrence rates and quality-of-life outcomes post-SEPS

V. Conclusion

SEPS is a minimally invasive, safe, and effective technique for the treatment of perforator incompetence in chronic venous insufficiency. It results in significant reduction of symptoms and ulcer healing within three weeks, with minimal complications.

Given its efficacy and safety profile, SEPS should be considered a complementary procedure alongside conventional superficial venous surgeries, especially in advanced stages of chronic venous disease.

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