

## Subfascial Endoscopic perforator surgery (SEPS) for Chronic Venous Insufficiency ? Our initial experience

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### Abstract

Chronic venous insufficiency presents with spectrum of clinical features ranging from pain/heaviness of affected limb to nonhealing ulcers. Venous hypertension due to valvular reflux or obstruction is pathophysiological event leading to development of Chronic venous insufficiency. Perforator incompetence plays a major role in this insufficiency. Hauer introduced minimally invasive technique of perforator ligation i.e Sub fascial Endoscopic perforator ligation(SEPS) in 1985. An observational study over a period of year involving 38 patients (48 limbs) of Chronic venous insufficiency with CEAP Class C4 to C6 undergoing SEPS was conducted with follow up ranging from 11months to 2 months. 48 limbs in 38 patients of Chronic venous insufficiency with following distribution of CEAP classification, C6-4, C5-6 and C4-8 underwent Subfascial Endoscopic perforator surgery (SEPS) using Harmonic scalpel along with or without ligation and stripping procedures. These patients were observed for ulcer healing and symptom relief. 8(33%) patients with ulcer showed complete healing in 8 weeks and 24 (92%) at 12 weeks and 26 (100%) at 16 weeks. Venous Clinical Severity Score (VCSS) showed significant decrease at 12 weeks. One patient had surgical site infection. One patient showed recurrence of ulcer after complete healing which was attributed to Saphenofemoral insufficiency which developed 7 months after SEPS. SEPS is an excellent minimally invasive procedure for perforator ablation in patients with severe (C5,C6) chronic venous insufficiency

**Keywords:** insufficiency, SEPS , venous ulcer

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### Introduction

Chronic Venous Insufficiency (CVI) is defined as a pathological state presenting with clinical spectrum varying from mild symptoms of pain and swelling of lower limb to severe cosmetic and disabling symptoms of lipodermatosclerosis and non healing ulcer <sup>[1,2]</sup>. The development of this venous pathology is well attributed to venous hypertension caused either by valvular reflux, obstruction or both involving deep, superficial or perforating veins <sup>[1,2,3,4]</sup>. Despite aggressive conservative therapy for patients of severe venous insufficiency including compression , life style modification and

venotonic medications , most of these patients require some form of surgical intervention due to high cost of conservative treatment and increasing symptoms. Understanding the role of perforator veins incompetence contributing to venous insufficiency, Linton in 1938 proposed and performed subfascial ligation of perforators through long longitudinal incision on the leg <sup>[5]</sup>, but this procedure was frequently complicated with wound infections, skin necrosis, delayed wound healing and nerve damage <sup>[4,6]</sup>. Various modifications were proposed with similar results , but Hauer in 1985 described endoscopic Subfascial perforator division , now called as Subfascial Endoscopic

Perforator Surgery (SEPS) [7]. We describe our experience of 15 patients (18 limbs) of CVI managed with SEPS.

**Material and Methods**

During March 2009 to March 2010, 48 lower extremities in 38 patients presenting with various degrees of chronic venous insufficiency were treated with SEPS in our institute. Patient details were recorded as per the standard Performa which included history, physical examination, age, sex, limb distribution CEAP class and Venous scores (Table I). All the patients underwent Duplex sonography to assess the site and type of venous abnormality. 22 patients were male and 16 were female with age in range of 22-46 yrs(mean 28). Duplex ultrasound showed saphenofemoral incompetence and perforator incompetence in 24 limbs and perforator incompetence alone in 24 limbs. Venous clinical severity scores (VCSS) were recorded preoperatively and then at 12 weeks in follow up. Patients with ulcers (C5,C6) were assessed for ulcer healing at 8,12 and 16 weeks after the procedure. Details regarding surgical procedure, duration of surgery, hospital stay and post operative complications were recorded.

Table 1. Demographic of patient, Operative and post operative details

Age (yrs)	28.5(22-46)
Male	22
Female	16
CEAP; C - 4	22 (45.8%)
C -5	15 (31.3%)
C -6	11 (22.9%)
Pathology, Reflux	58
Obstruction	0
DVT	0
Limbs	
Right:left	26:22
Surgery performed	
GSV ligation + SEPS	24(50%)
SEPS alone	24(50%)
Mean Operating time ( mins) including anaesthesia time	48 (30-75)
Mean Hospital stay (days)	1
No. Of Perforators divided(mean)	3.33 (2-5)
Complications	
Surgical site infection	1
Haemorrhage	0
Neuralgia	0
Recurrence	1

Total number of patients -38 Total number of limbs – 48  
GSV- Great Saphenous vein

**Surgical technique**

All the patients underwent SEPS with /without Great Saphenous vein ligation and stripping as indicated. The incompetent perforators were marked a day before surgery. All the procedures were performed

under spinal anaesthesia. Inj Amoxycillin + clavulanic acid 1.2 gms were given at the time of induction. After dissecting SF junction etc, SEPS was performed with 2 Port technique using two 5 mm ports (Fig I) . 1<sup>st</sup> port was placed approx 10 cm below and 5 cm medial to tibial tuberosity in the Subfascial plane .CO<sub>2</sub> insufflation was done to keep pressure around 25-30 mm of Hg . Dissection of this space was done using a 0° degree telescope. Under endoscopic vision, another port was placed approx 5 cm below and medial to 1<sup>st</sup> port. The space was dissected using coagulating instrument upto the ankle. All the perforators encountered were ablated using Ultrasonic Harmonic Scalpel (Ethicon).After the procedure, the skin incisions were closed using skin staplers with a vacuum suction drain left in subfascial space.

Figure 1



**Results**

Out of 48 limbs, 24 (50%) underwent SEPS + Saphenous surgery and rest 24 (50%) underwent SEPS alone. Average duration of surgery was 48 mins (30 - 75).All the patients were discharged next day after removal of drain. Only 1 post operative complication developed as surgical site infection which was controlled with antibiotics. The Venous Clinical Severity Score showed significant decrease (p <.005) when assessed at interval of 12 weeks (Table II). Ulcer healing rates were assessed at intervals of 8, 12 and 16 weeks. 33.3 % ulcers healed at 8 weeks, 90 % at 12 weeks and 100 % at 16 weeks (Diagram I).

Table 2. VCSS and Ulcer healing

	Preop	8 weeks	12 weeks	16 weeks	p-value
VCSS	11.8± 2.02		3.78± 0.642		<.0001
Ulcer healing		33.3%	90%	100%	

Diagram I. Distribution of Ulcer healing with time

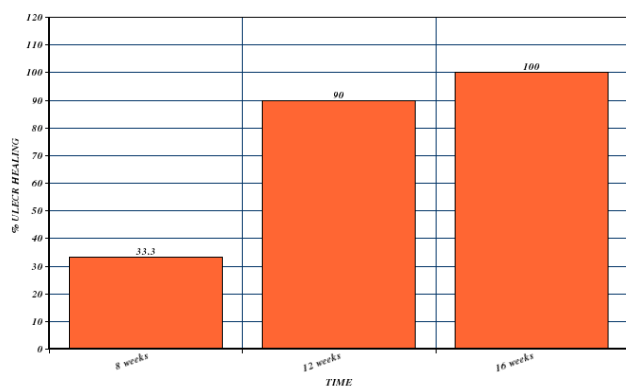


Fig II shows complete ulcer healing in one the patients after 12 weeks. One patient developed recurrence of ulcer after 5 months of SEPS. Duplex scan showed incompetent Saphenofemoral junction which was not present at the time of first surgery. 34 out of 38 (90%) patients were satisfied with the surgery after 6 months of follow up.

Figure II A &amp; B



## Discussion

Chronic Venous insufficiency has a complex pathogenesis in which all the three venous systems of lower limb i.e deep , superficial and perforator play a role [4,8]. Venous insufficiency develops when venous pressure is increased and return of blood is impaired either from valvular incompetence/ reflux of deep or superficial veins, perforator valve incompetence , venous obstruction or a combination of these [1,2,9]. The deep vein valve failure is most commonly a consequence of damage from previous deep vein thrombosis [10]. Dysfunction or incompetence of valves in the superficial system may be primary ( pre-existing weakness) or secondary (due to thrombosis, direct injury, higher pressure or under hormonal influence)[10]. Failure of valves is most commonly seen at

the junctions of deep and superficial system, particularly saphenofemoral and saphenopopliteal leading to superficial system dilatation and appearance of varicosities [2]. High pressure within the deep vein also contributes in the patients of perforator incompetence [11]. These haemodynamic changes in the large veins of the lower limb are transmitted into the microcirculation resulting into microangiopathy ( elongation and tortousity of capillary beds, basement membrane thickening ,endothelial damage and increased permeability) leading to the appearance of clinically recognizable features (spider angioma, reticular veins and edema, skin pigmentation and eczematous dermatitis). Progression of diseases leads to lipodermatosclerosis, increased risk of developing cellulitis and eventual venous ulceration [2,9].

The role of perforator incompetence in CVI has been well documented in the Literature. Although Rhodes in his report found that perforator incompetence was present in 77 % patients with Venous insufficiency [12], Linton as far as 1938 advocated subfascial ligation of perforators in patients with venous insufficiency [5]. Linton's procedure and its modifications which required long incisions on the leg through the area of ulcer went into disrepute due a high rate of wound complications [4,6].

In 1985, Hauer described the minimally invasive method of ligating incompetent perforators endoscopically in subfascial plane [7]. This method showed clear advantage over Linton's operation in terms of wound complications [6]. Since then this procedure has been performed all over the world. TenBrook etal systematically reviewed 20 series of this procedure including 1140 patients, found 56%-100% ulcer healing rates [13]. They observed that on average 40 % ulcers healed in 30 days , 64 % in 60 days and 86 % after 60days. In our series, we had comparable ulcer healing rate , 33 % healed in 8 weeks , 90 % in 12 weeks and 100 % healed in 16 weeks. O'Donnell in his review of 22 series of SEPS, observed 90% ulcer healing rates over a period of 21 months [14]. We had ulcer recurrence in one patient due saphenofemoral junction incompetence developing later, 5 months after having undergone SEPS. Ulcer recurrence associated with SEPS in literature ranges between 9-13% [13,14].

Uncu in his series of 28 patients undergoing SEPS observed statistically significant improvement in symptoms observed by Chronic Venous Insufficiency Index after 3 months of surgery (8.14 vs 2.54) [4]. In our series we also observed significant decrease in VCSS in patients undergoing SEPS with / without Saphenous surgery ( Table 3).

Several modifications have developed in this procedure since its inception in 1985. Many surgeon use Single port technique [15]. Several methods of perforator ligation have been described using Clips, electrocautery and harmonic scalpel [3,4,15,16,17]. We used Harmonic scalpel for

perforator division as it is associated with less chances of nerve damage, absence of foreign body sensation as with clips and good haemostasis<sup>[17]</sup>.

The complication rate with this procedure is very low. In one of the review, the complications observed were wound infection (6%), haematoma(9%),neuralgia (7%) and DVT (1%)<sup>[13]</sup>.In our series only one patient developed wound infection which was controlled with antibiotics only.

Newer techniques are now being used for management of varicose veins and incompetent perforators including ultrasound guided Sclerotherapy and endovenous thermal ablation, but they are still in the early phases. These procedures certainly score over SEPS as they are less invasive and can be performed under local anaesthesia as day care procedures. But However SEPS should be preferred in patients with multiple perforators with high reversal flow, diameter >3.5mm and paratibial in location<sup>[14]</sup>.Endovenous ablation should be reserved for poor surgical patients and sclerotherapy for failure of other techniques.

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