Eur J Vasc Endovasc Surg **34**, 605–612 (2007)
doi:10.1016/j.ejvs.2007.07.007, available online at http://www.sciencedirect.com on ScienceDirect

# True Long-term Healing and Recurrence of Venous Leg Ulcers Following SEPS Combined with Superficial Venous Surgery: A Prospective Study

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***Background***. *The role of perforator surgery remains unclear in the management of patients with leg ulcers. The aim of this study was to assess long-term healing and recurrence rates of leg ulcers following surgical intervention with combined Subfascial Endoscopic Perforator Surgery (SEPS) and superficial venous surgery.*
***Method***. *Case series with prospective long-term follow-up of 90 consecutive patients operated on with open (CEAP C6) or healed (CEAP C5) venous ulcers in 97 legs. Popliteal vein reflux was present in 21 legs. All 97 legs were treated with SEPS and 87% had additional superficial venous surgery. Patients were follow-up for a median of 77 months (range 60–112 months) with a minimum of 5 years.*
***Results***. *87% of all ulcerated legs healed. The three and five year recurrence rates were 8% and 18% respectively among survivors. In a multivariate Cox regression analysis previous vein surgery was the only factor significantly associated with recurrent ulceration* ($p = .004$).
***Conclusion***. *SEPS combined with superficial venous surgery leads to healing with a low recurrence rate in patients with open and healed venous ulcers. Previous venous surgery was found to be a significant risk factor for ulcer recurrence. This result emphasizes the importance of assiduous technique for varicose vein surgery and suggests a continuing role for perforator surgery in leg ulcer patients.*


*Keywords: Leg ulcer; SEPS; Superficial venous surgery; Perforator surgery; Venous ulcer; Minimal invasive surgery; Endoscopic surgery; Leg ulcer healing; Leg ulcer recurrence; Prospective study.*

## Introduction

The issue of whether perforator ligation should be performed has not been assessed in a randomised trial and some consider that subfascial endoscopic perforator surgery (SEPS) is out of fashion.[1] Published clinical series suggest that where SEPS has been performed in patients with venous ulcers, lower recurrence rates were observed[2,3] compared to another series where no perforator surgery was used.[4] These retrospective data included only a small proportion of patients followed for 5 years with extrapolation of available data to obtain ulcer recurrence rates. The actual long term estimates are therefore somewhat unreliable.[5–8] A few prospective series have reported only a short follow up.[9,10] There are no previous studies where all patients have been followed prospectively for five years, essential for obtaining an accurate estimate of recurrence rate for venous ulcers.

Since 1993 we have included all patients undergoing SEPS and superficial venous surgery in a prospective study, including all of those operated on for healed and open ulcers (CEAP C5 and C6). We have previously reported short term data on 149 SEPS procedures performed in patients with venous insufficiency C3 (varicose veins and oedema) to C6 (open leg ulcer).[11] We have since included more patients with leg ulcers to get more accurate data, and have followed these patients for a minimum of five years to assess the actual recurrence rate following these procedures. The aim of this investigation is to report the long term healing and recurrence data for patients with open or healed venous leg ulcers, and to try to assess possible risk factors for leg ulcer recurrence.

Interim data presented at the International Union of Phlebology World Congress Chapter Meeting, August 27–31, 2003 in San Diego, California.
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1078–5884/000605 + 08 $32.00/0 

## Methods

Between March 1993 and September 1998, 97 SEPS procedures were performed in the limbs of 90 patients with open (C6) or healed (C5) venous ulcers. There were 54 women (56 legs) and 36 men (41 legs). Their median age at the time of surgery was 66 (range 34–87) years. Patients were included prospectively.

### *Preoperative assessment*

The basic preoperative assessment included history, clinical examination and bidirectional Doppler ultrasonography. Prior to 1995 the diagnosis of perforator incompetence was established by phlebography. Since 1995 colour duplex ultrasonography (CDU) (Acuson 128XP; Acuson, Mountain View, California, USA) was used to map venous incompetence prior to surgery. Venous incompetence was considered present if there was reflux lasting >0.5 sec. Patients were examined in a semi-sitting position with legs dependent. Manual calf compression or compression technique by use of an inflatable cuff were used to provoke reflux. All major deep and superficial veins including perforators were scanned according to a standardized protocol used for venous assessments at our institution. Augmentation of flow in perforators was performed with manual compression of the foot and/or leg. Perforator incompetence was considered present if at least an outward flow lasting >0.5 sec. was detected in a perforator with a diameter exceeding 3 mm.

Based on preoperative examination and CDU result the venous insufficiency was initially classified according to recommendations from the Society for Vascular Surgery and The International Society for Cardiovascular Surgery.[12] The clinical classification was updated retrospectively when the CEAP (Clinical Etiological Anatomical Pathophysiological) classification appeared.[13]

Legs with venous incompetence involving the popliteal vein were considered to have clinically significant deep venous insufficiency (DVI).[14] Assessment for evidence of previous venous thrombosis was not included in the protocol from the start of the study and was only assessed retrospectively. All other limbs were considered to have predominantly superficial venous incompetence (SVI) and/or perforator incompetence (PVI), although some had additional segmental deep incompetence in other deep veins excluding the popliteal vein. Patients with ulcers caused by DVI were offered surgery only if their ulcers did not heal with compression treatment or if their ulcers recurred. A chronic venous ulcer was defined as any wound below the knee, with Doppler ultrasound confirmed venous reflux and an ankle brachial pressure index (ABPI) of 0.8 ore more, which had been present for more than 6 weeks. Patients with chronically occluded deep veins were excluded.

### *Surgical procedure*

Informed consent was received from all patients. Prophylactic antibiotics and thromboembolic prophylactics were only given selectively. A Storz 10 mm endoscope for perforating vein ligation (Karl Storz, Tüttlingen, Germany) and video-camera equipment were used. SEPS was performed in a bloodless field created by a Löfquist roll-on tourniquet (Boazul, Lidköping, Sweden). Insufflation of $CO_2$ has been used in recent years. The distal part of the deep compartment fascia was opened by sharp dissection to visualize the lower Cockett perforators. Lateral perforators were dealt with endoscopically by means of a further incision over the lateral compartment. Incompetent great and small saphenous veins were managed by junction ligation and stripping. Operations for groin recurrence were performed through a medial subfascial approach with repeat ligation at the sapheno-femoral junction using non-absorbable sutures. Avulsions were avoided in areas with lipodermatosclerosis.

Postoperatively patients with leg ulcers were treated with a zinc paste bandage (Zipzoc Salvstrumpa, Smith&Nephew, Mölndal, Sweden) with padding and a cohesive medium elastic bandage. Patients with healed ulcers received a full length class 1 support stocking (15–20 mm Hg).

### *Compression management*

In patients with residual deep vein incompetence class 2 compression stockings (21–30 mm Hg) were prescribed for lifelong use. All other patients were advised to use class 1 support stockings for the first month after surgery or after ulcer healing and thereafter at their own discretion.

### *Short-term follow-up*

Specially trained nurses saw the patients 7–10 days after operation at the outpatient clinic. Early complications were noted. Patients with healed ulcers received a below knee class 1 support stocking which they were encouraged to use during the day for one month. For patients ulcers, the zinc paste bandage was changed and the patients were referred to a district nurse for additional weekly changes. All C6