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Neovascularisation and Recurrence 2 Years After Varicose Vein Treatment for Sapheno-Femoral and Great Saphenous Vein Reflux: A Comparison of Surgery and Endovenous Laser Ablation

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Abstract *Objective:* Neovascularisation is a major cause of recurrent varicosities following surgery. This prospective cohort study compares recurrence rates and the occurrence of neovascularisation following surgery or endovenous laser ablation (EVLA) for great saphenous vein reflux.
Method: 118 consecutive patients (72 female, 46 male, median age 48 [range 32–68 years]), 129 limbs were reviewed at a median of 24 months (range 18–30) after surgery ($n = 60$ limbs) or EVLA ($n = 69$ limbs) for primary sapheno-femoral and GSV reflux. Varicose vein recurrence, ultrasound detected groin neovascularisation and patient satisfaction (visual analogue scale) were recorded.
Results: Recurrence rates at 2 years were: surgery group 4/60 (6.6%; mid-thigh perforator $n = 2$, residual GSV with neovascularisation $n = 2$), EVLA group 5/69 (7%; GSV recanalisation $n = 3$ (all received <50 J/cm laser energy), mid-thigh perforator $n = 1$, new anterior saphenous vein reflux $n = 1$) $p = 0.631$. Neovascularisation was detected in 11/60 (18%) of the surgery group and 1/69 (1%) of the EVLA group, $p = 0.001$. Patient satisfaction rates were 90% and 88% respectively ($p = 0.37$).
Conclusions: Although the frequency of recurrent varicosities 2 years after surgery and EVLA was similar, neovascularisation, a predictor of future recurrence, was less common following EVLA. Further, current recommendations on delivering ≥ 70 J/cm laser energy should reduce recanalisation rates and recurrence after EVLA.

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Introduction

Varicose vein recurrence is common following conventional great saphenous vein (GSV) surgery, occurring in 13–29% of patients.[1–3] About twenty percent of interventions for varicose veins are for recurrent varicosities after surgery.[4,5] Although the causes of recurrence include perforator incompetence, accessory vein reflux and inadequate primary surgery, groin neovascularisation is the commonest of these.[2]

Currently, there is increasing interest in the use of minimally invasive treatments for varicose veins, including foam sclerotherapy, radiofrequency and endovenous laser ablation. Critics of these techniques suggest that recurrence rates may be higher than that those for conventional surgery. The aim of the current prospective cohort study was to compare both recurrence and neovascularisation rates 2 years following either conventional surgical treatment or endovenous laser ablation (EVLA) for varicose veins.

Methods

Patients

The study was approved by our institutional ethics committee and informed written consent was obtained from patients. Consecutive patients undergoing treatment for primary varicose veins due to sapheno-femoral (SFJ) and great saphenous vein (GSV) reflux between January 2004 and May 2005 were suitable for either surgery or EVLA were included in this study, 68 of whom were enrolled in a randomised controlled trial comparing surgery with EVLA. The remainder declined randomisation but were treated contemporaneously and agreed to follow-up. Patients with a previous deep vein thrombosis, recurrent varicose veins, and those who had reflux in other axial veins (anterior accessory great saphenous vein, small saphenous vein) or perforators were excluded from the study.

Of 127 patients undergoing treatment, 118 (129 limbs, 72 female patients, 46 male, median age 48 [32–68]) have completed 2-year follow-up: conventional surgery (60 limbs) and EVLA (69 limbs).

Surgery

Surgical treatment was performed by a consultant vascular surgeon under general anaesthesia. A flush sapheno-femoral (SFJ) ligation was performed with ligation and division of all tributaries together with GSV stripping to the knee and multiple avulsions. No additional surgical strategies such as a groin patch or over-sewing of the saphenous trunk were used.

EVLA

EVLA was performed as described previously[6] (810 nm diode pulsed laser at 12 W power) by a consultant vascular surgeon or a research registrar. The GSV was ablated from the knee to the SFJ. Total laser energy (J) and energy density (J/cm) were recorded prospectively. At 6- and 12-weeks follow-up, residual superficial varicosities that were either visible or palpable and >3 mm in size were treated with foam sclerotherapy. Ultrasound guided foam sclerotherapy for persisting or recurrent GSV reflux was not performed during this study. The ''package'' of EVLA together with delayed sclerotherapy (when required) within 12 weeks of treatment achieves the same outcome as conventional surgery.

Data collection and follow-up

Pre-treatment clinical severity (CEAP) scores and treatment details were recorded prospectively. All patients underwent both clinical examination and a duplex ultrasound scan (DUS) using a TITAN® ultrasound system (Sonosite Inc., Bothell, USA) before treatment and at 6, 12, 52 and 104 weeks after the treatment. The maximum diameter of the GSV was measured using ultrasound (avoiding focal dilatations due to varicosities) while standing prior to the treatment. The reflux status of the SFJ, the treated GSV, the deep veins and all axial veins were documented in each visit. If visible, compressibility and detectable blood flow during calf squeeze and release of the treated GSV were also recorded at all follow-ups. Finally at 2 years patients were examined for evidence of recurrent varicose veins. This was defined as the presence of any visible or palpable varicosities measuring >3 mm on the treated leg that had been noticed by the patient or the examining clinician.

Neovascularisation (serpentine venous channels) in the groin was also identified by careful DUS assessment, with the probe held longitudinally, horizontally and at different angles. The largest diameter and the duration of reflux in these channels were documented. When present, neovascularisation was classified[7] as those of small size (<4 mm) with reflux of <1 s duration (Grade 1) and those with larger (≥ 4 mm) veins and prolonged reflux (>1 s; Grade 2). All recurrent varicosities were traced with DUS to identify the source of reflux including thigh or calf perforators. Patients' satisfaction scores at 2 years were obtained using a visual analogue scale.

Statistical analysis

Recurrence and neovascularisation rates were compared between groups using Fisher's exact test. Patients' satisfaction was compared using a Mann–Whitney *U* test. A p value of <0.05 was considered significant. All analysis were performed using the statistical package SPSS® for Windows (SPSS, Chicago, Illinois, USA).

Results

Patients' demographic details and pre-treatment disease severity are shown in Table 1. Recurrence and neovascularisation rates are compared in Table 2. At one year clinical recurrence was found in 2 surgical and 5 EVLA patients with groin neovascularisation present in 7 and 1 patients respectively.

At 2 years neovascularisation was detected in 11/60 (18%) patients following surgery and 1/69 (1%) after EVLA ($p = 0.001$). Of the patients with neovascularisation 6/11