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Duplex Ultrasound Outcomes following Ultrasound-guided Foam Sclerotherapy of Symptomatic Recurrent Great Saphenous Varicose Veins

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Abstract *Objectives:* To describe duplex ultrasound (DUS) outcomes 12 months following ultrasound-guided foam sclerotherapy (UGFS) of recurrent great saphenous varicose veins (GSVV).
Methods: A consecutive series of UK National Health Service patients underwent serial DUS examinations following UGFS with 3% sodium tetradecyl sulphate for symptomatic recurrent GSVV.
Results: 91 treated legs (CEAP $C_{2/3}$ 58, C_4 21, C_5 8, C_6 4) belonging to 73 patients (24 male) of median age 58 (range 32–86) years were enrolled between November 2004 and May 2007. The median volume of foam used was 8 (range 4–14) ml. Above-knee (AK) and below-knee (BK) GSV reflux was present in 88 (97%) and 80 (88%) legs respectively prior to treatment. AK and BK-GSV reflux was completely eradicated by a single session of UGFS in 86 (98%) and 74 (93%) legs respectively; and by two sessions of UGFS in 88 (100%) and 77 (97%) legs respectively. In those legs where GSV reflux had been eradicated, recanalisation occurred in 7/78 (9%) AK and 8/68 (12%) BK-GSV segments after 12 months follow-up. Retreatment, where undertaken, with a single UGFS session effectively eradicated all GSV reflux in all cases of recanalisation.
Discussion: A single session of UGFS can eradicate reflux in the AK and BK-GSV in over 93% of patients with symptomatic recurrent GSVV. Re-recurrence at 12 months is superior to that reported after redo GSV surgery, similar to that observed following other minimally-invasive techniques and, when it occurs, is effectively and simply treated by a single further session of UGFS.

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Introduction

Residual and/or recurrent great saphenous vein (GSV) reflux is disappointingly common after superficial venous surgery (SVS). For many years, authors have reported that around 20% of patients undergoing SVS for great saphenous varicose veins (GSVV) have been operated previously for GSVV in the same leg.[1,2] In our current ultrasound-guided foam sclerotherapy (UGFS) practice we find that figure to be 21% suggesting that there has been little improvement in surgical outcomes in recent times.

Recurrence after GSVV surgery may be due to

1. Residual varicose veins (VV) often because of failure to adequately strip a refluxing above-knee (AK) and below-knee (BK) GSV at the first operation,[3]
2. True recurrence, often referred to as neovascularisation. This can occur at the previously dissected saphenofemoral junction (SFJ) or stripping track, or
3. Progression of disease, for example the development of new reflux in the anterior accessory saphenous vein in the thigh.

All three pathologies often co-exist in the same patient and can be difficult to distinguish.

Redo GSVV surgery typically comprises re-exploration of the SFJ, stripping of the AK-GSV and multiple phlebectomies. Such surgery can be technically demanding and associated with a higher incidence of significant complications and re-recurrence than first time GSVV surgery.[4,5] Furthermore, reflux in the BK-GSV, a well-recognised cause of recurrence resulting from a reluctance to strip the BK-GSV for fear of causing saphenous nerve injury at the first operation,[6] is similarly difficult to treat with further surgery.

Although the role of endovenous laser ablation (EVLA), radiofrequency ablation (RFA) and UGFS in treating primary GSVV is well established, their effectiveness in recurrent GSVV is less well defined.[7–15]

The aim of the present study, therefore, is to describe duplex ultrasound (DUS) outcomes 12 months following UGFS of recurrent GSVV.

Methods

Patients

Local ethics committee approval and written informed consent were obtained. Consecutive UK National Health Service (NHS) patients referred to AWB and DJA by their general practitioners between November 2004 and May 2007 because of symptomatic recurrent GSVV were studied.

Recurrence was defined as previous surgery to the GSV in the same leg on at least one previous occasion. Specifically, all patients had undergone attempted SFJ ligation and multiple phlebectomies, with or without attempted stripping of the GSV; in most cases this was to the level of the knee only.

To be considered suitable for UGFS patients had to have symptomatic (CEAP C_{2-6})[16] venous disease (i.e. treatment was not offered for cosmetic indications) and significant ($>$0.5 s) reflux in a segment of residual AK and/or BK-GSV on DUS. Vein size was not a consideration in patient selection. Patients with absent pedal pulses or an ankle brachial pressure index $<$0.9 were excluded as were those with post-thrombotic deep venous disease.

Pre-treatment assessment

DUS was performed, as previously described,[7] at the initial clinic attendance in order to identify sites of superficial, deep and communicating venous reflux.

UGFS treatment

Our method of UGFS treatment has been described in detail previously and is thus summarised here.[7] All treatments took less than 30 min and were performed as office procedures in a treatment room. The superficial varices and incompetent truncal veins were marked on the skin using duplex imaging with the patient standing, and then, with the patient supine, cannulae were inserted into the truncal veins under direct ultrasonographic guidance. Sclerosant foam, prepared by a modified Tessari's method using two 2 ml syringes connected by a three-way tap and a 5 micron filter (B Braun Medical, Sheffield, UK), and comprising 0.5 ml of 3% sodium tetradecyl sulphate (STS) (Fibrovein®; STD Pharmaceuticals, Hereford, UK) and 2 ml of air, was then injected with the leg held in an elevated position. Aliquots of foam were injected until all target veins were observed to be in spasm and full of foam on DUS.

With the leg still elevated, compression bandaging was applied and a thigh-length class II compression stocking (Credelast®; Credenhill, Ilkeston, UK) providing 23–32 mmHg at the ankle applied over the bandage. This was left intact for five to ten days, depending on the size of the veins, after which it was removed and the class II stocking worn alone for the remainder of the first month. All patients were provided with a 24 h "help-line" number to call at any time following treatment in case of any concerns.

Outcome measures and follow-up

The aim of treatment was to relieve the symptoms of venous hypertension.

The chosen primary end-point was, therefore, complete eradication of superficial venous reflux in the trunk and major tributaries of the GSV.

All patients were seen at 1, 6 and 12 months after treatment in a dedicated nurse-led (GRB) research clinic.

Patients were also asked at their first post-treatment visit whether they had had any problems following treatment. Specifically they were asked about visual disturbance, headache, and possible nerve problems in the treated leg. Phlebitis and skin pigmentation were not recorded.

Repeat DUS was performed at each follow-up visit as per the pre-treatment duplex. In addition, occlusion of the treated saphenous trunk was determined by a lack of compressibility and the absence of any flow. Complete occlusion was defined as occlusion over the entire length of the GSV. Recanalisation was defined as the presence of flow in either an antegrade or retrograde direction in a previously