

# Original

## ARTICLE

### EXTENDED LONG LINE ECHOSCLEROTHERAPY (ELLE)

#### Review of technique

K PARSİ<sup>1</sup> AND AC LIM<sup>2</sup>

<sup>1</sup>Department of Dermatology, Liverpool Hospital, Liverpool, NSW, Australia

<sup>2</sup>Department of Dermatology, St. George Hospital, Kogarah, NSW, Australia

The technique of Ultrasound Guided Sclerotherapy [UGS] or Echosclerotherapy of lower limb varicosities was first presented in Strasbourg in 1989<sup>1</sup>. It involves introduction of a sclerosing agent into the lumen of a varicosity under duplex ultrasound guidance. UGS was initially developed to reduce the risks inherent in injection rather than to improve results.<sup>2,3,4,5</sup> This technique has been shown to be effective in treatment of primary truncal varicosities<sup>6</sup> as well as post-surgical recurrences involving isolated perforator incompetences, neovascularisation, and treatment of duplicated vessels or saphenous tributaries.<sup>7,8,9,10</sup>

Intravenous catheters or “long lines” have been used as central or peripheral lines for the introduction of intravenous agents. These lines are primarily used in interventional radiology or in intensive care units.

The Extended Long Line Echosclerotherapy was first described by one of the authors in 1997.<sup>11</sup> It involves the use of an intravenous catheter to deliver the sclerosant into the lumen of the varicosity under duplex ultrasound control. This article reviews the experience of the authors in using this technique in the past three years as well as further modifications and recommendations.

#### MATERIALS AND METHODS

##### Materials

Cavafix MT 134, Cavafix Certo 375 (B.Braun Medical Suppliers, Sydney, Australia), Fibrovein 3% (Sodium Tetradecyl Sulfate 3%) (Australian Medical and Scientific, Sydney, Australia).

##### Method

###### Mapping

The target vein, either the Long Saphenous Vein [LSV] or the Short Saphenous Vein [SSV], is visualised using a

#### ABSTRACT

**Background:** Ultrasound guided sclerotherapy (UGS) is an important technique in the treatment of vessels within the deeper subcutaneous tissue that are not readily and consistently visible. UGS has been used to treat truncal varicosities of lower limbs as well as vascular anomalies. The procedure requires multiple point-injections of the sclerosant along the length of the vein to achieve immediate sclerospasm and long-term sclerosis of the treated vein. In conventional UGS, the level of patient discomfort parallels the total number of injections required. Further, with each additional point-injection, there is an associated increased risk of injection-related complications such as extravascular or intra-arterial injections.

**Objective:** To review the Extended Long Line Echosclerotherapy [ELLE] technique where an intravenous catheter is used to safely introduce the sclerosant into lower limb varicosities under duplex guidance, thereby eliminating the injection-related pain and potential complications.

**Methods:** The varicosity is cannulated and catheterised under duplex guidance. The catheter is advanced proximally towards the main junction. Finally, the sclerosant is introduced as the catheter is slowly withdrawn.

**Conclusion:** ELLE may be a safe and useful adjunct to the technique of duplex ultrasound guided sclerotherapy and surgery.

duplex ultrasound. A 12 MHz or higher frequency probe is the preferred choice. The diameter of the vein at the junction is measured and documented. The vein is then followed distally to establish the incompetence pathway. All perforators and tributaries are noted and the tortuosity of the vein is assessed. The pathway of incompetence is assessed and mapped prior to treatment. The length, depth and lumen diameter of the selected vein is measured to assist in selection of the appropriate cannula, catheter and the entry point.

##### Cannulation

###### Selection of the Entry Point

The site chosen for cannulation is of paramount importance. The entry point should ideally be at the most distal

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Address Correspondence and reprint requests to: Dr Kurosh Parsi  
PO Box 419 Wentworth Building, University of Sydney, NSW 2006,  
Australia. Phone: + 61 2 9386 0211 Fax: + 61 2 9386 0258  
Email: persia10@magna.com.au

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catheter is inserted through the sheath with the protective cover in place, ensuring sterility.

The catheter is introduced into the lumen of the vein under duplex ultrasound guidance and advanced towards the junction. Once the catheter is about 5 cm distal to the junction, the guide-wire is removed. The leg is then raised to about 45 degrees to empty the vein as much as possible. This will minimize collection of intra-vascular haematoma which may lead to post-sclerotherapy recanalisation. The proximal saphenofemoral/popliteal junction is then compressed (Cloutier Technique)<sup>12</sup> and the leg is brought back to about 30 degrees while maintaining the compression on the junction. The sclerosant is then introduced as the catheter is being withdrawn. An average of

4ml of Sodium Tetradecyl Sulfate 3% is injected along the whole length of the vein under ultrasound visualization. This can be divided into 5 injections of 0.8 ml of solution. In our experience this method of 'pulse injections' is superior to a continuous and gradual infusion of sclerosant through the catheter. The injections are delivered through a number of 1 ml syringes as the small diameter of the plunger allows a rapid introduction of sclerosant thereby producing turbulent flow in the lumen which maximises the contact of solution with the tunica intima. It also contributes to the so called 'summation effect' as described by Cloutier.<sup>13</sup> In measuring the total volume of injected sclerosant, the dead space of the catheter should be taken into account.

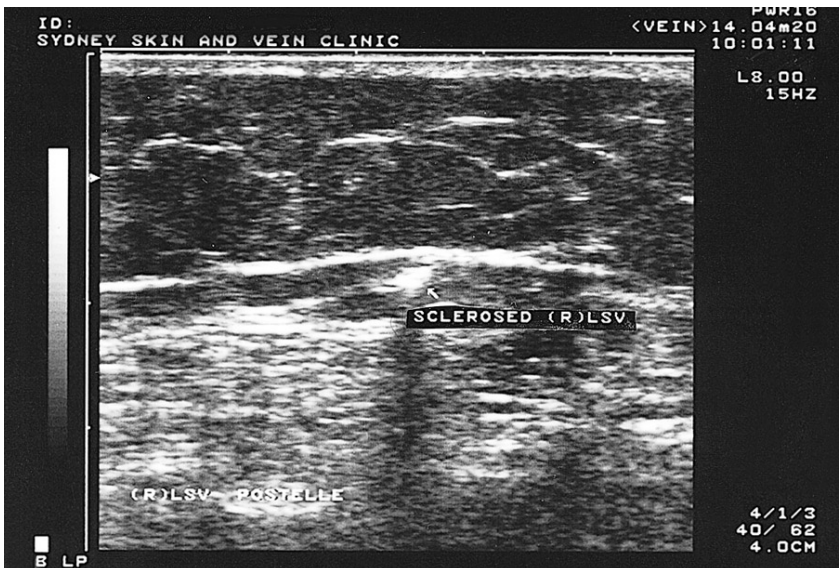
Special attention is given to T-junctions with tributaries and perforators as the catheter is gradually withdrawn. The bent tip of the catheter can be turned to point towards the entrance of tributaries or perforators. In our experience, extra volume of sclerosant is required at these escape points to ensure full sclerosis of these openings. Failure to fully sclerose the escape points may lead to partial recanalisation of the treated vein.<sup>6</sup>

The end points of the treatment include vasospasm, non-compressibility along the entire length of the treated vein and absence of any blood flow in the vein. This is confirmed by duplex re-examination at the end of the treatment session.

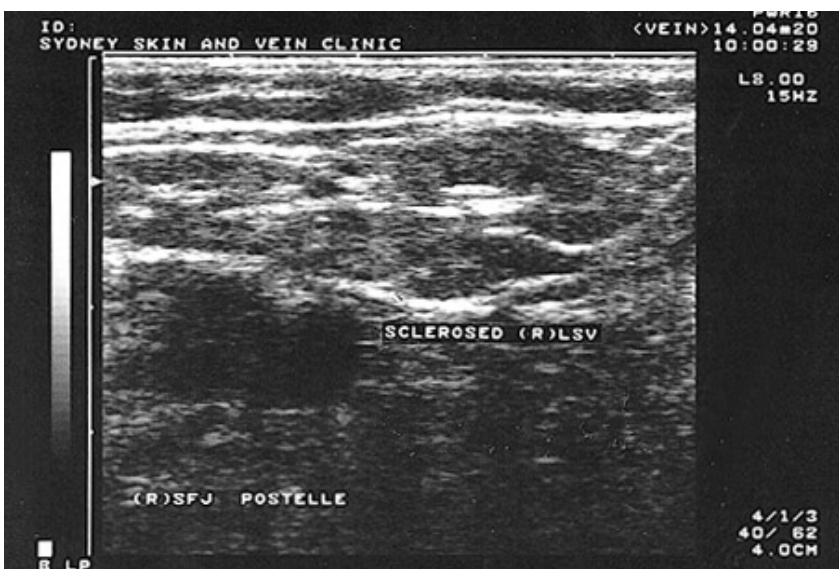
Finally, the catheter and the cannula are fully withdrawn and light pressure is applied to the site of insertion. Immediate compression in form of a Class 2 graduated compression stocking is then applied and the patient is advised to mobilise immediately and walk at a moderate pace for 30 minutes. The patients are also instructed to leave the stocking on continuously for the first seven days and to walk daily for 30 minutes.

## DISCUSSION

An 'open catheter' technique has been described by Grondin.<sup>5</sup> This technique recommends a 20G 44mm cannula for cannulation of the main trunks, 6 to 8cm distal to the junction following which the sclerosant is injected as a bolus. This method does not attempt to directly expose the incompetent perforators or the remaining trunk distal to the site of injection to adequate volumes and concentrations of the sclerosant.



**Figure 3:** Sclerosed ( R ) long saphenous vein



**Figure 4:** Sclerosed ( R ) long saphenous vein at the SFJ

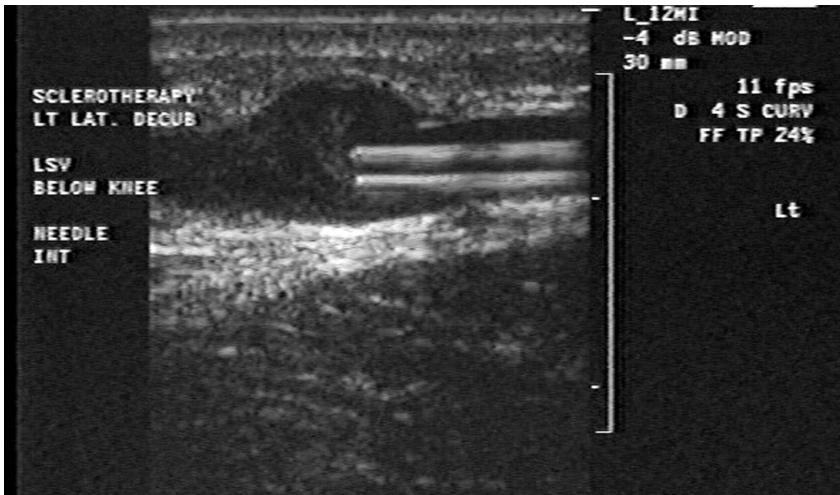


Figure 7: Cannula in situ (left LSV - below the knee)

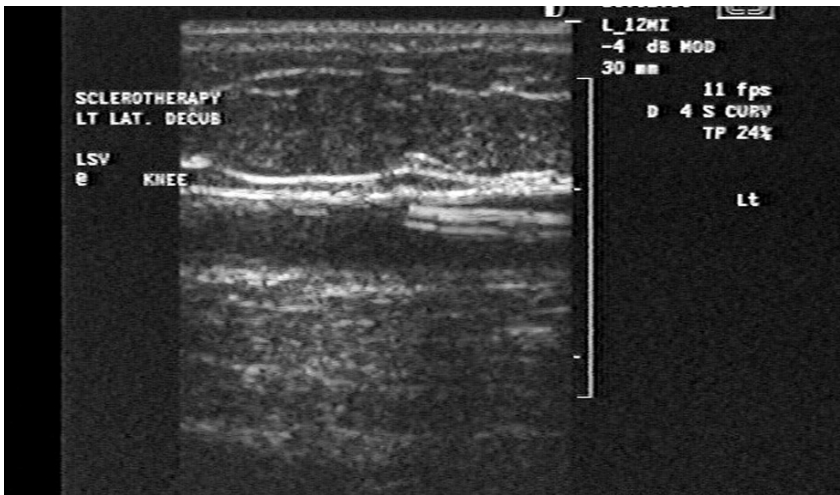


Figure 8: Catheter advancing in LSV

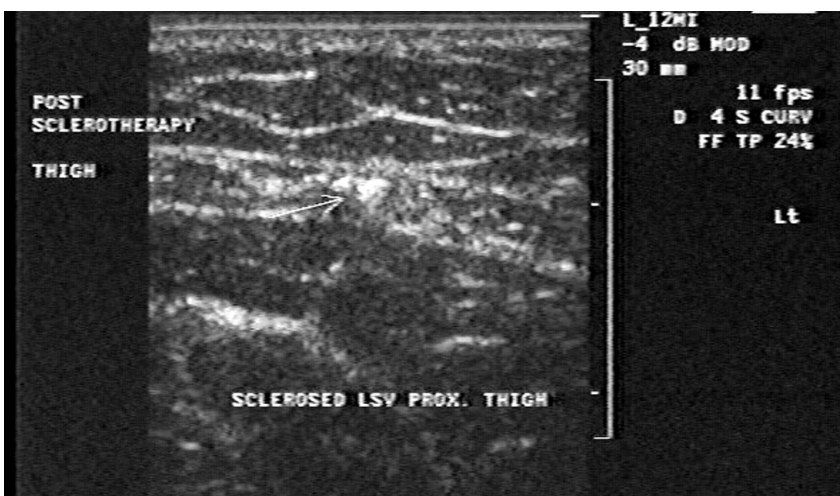


Figure 9: Sclerosed LSV post-ELLE

cannula diameter also makes entry into smaller diameter vessels more difficult. Finally, there is a definite learning curve associated with this technique making it a significant time and skill challenge for the novice.

The long term effectiveness of ELLE is currently being assessed by the authors. This data when complete, will enable efficacy evaluation of the ELLE technique compared with other procedures such as UGS and surgery.

## REFERENCES

1. Knight RM, Zygmunt JA. Echosclerotherapy. *Proceedings of the Phlebology Society of America*. 1989.
2. Schadeck M. *Duplex and Phlebology*. Napoli: Gnocchi, 1994:115-117.
3. Knight RM. *Treatment of Superficial Venous Disease with Accurate Sclerotherapy*. Proc. Can. Soc. Phlebol., Whistler 1991.
4. Vin F. Principle and method for rapid treatment of incompetence of the greater saphenous vein using sclerotherapy. *Phlebologie* 92, Eds Raymond-Martimbeau P, Prescott R, Zummo M. John Libbey Eurotext, Paris, 1992; 787-792.
5. Grondin L, Soriano J. Duplex-Echosclerotherapy, the quest for the safe technique. *Phlebologie* 92, John Libbey 1992; 828-23.
6. Kanter A, Thibault PK. Saphenofemoral Incompetence Treated by Ultrasound-guided Sclerotherapy. *Dermatologic Surgery* 1996;22:648-652.
7. Neglen P, Einarsson E, Eklof B. The functional long-term value of different forms of treatment for varicose veins. *Br J Surg* 1979;66:182-184.
8. Jacobson BH. The value of different forms of treatment for varicose veins. *Br J Surg* 1979;66:182-184.
9. Thibault PK, Lewis WA. Recurrent varicose veins part 1: evaluation using duplex venous imaging. *J Dermatologic Surg Oncol* 1992;18:618-624.
10. Thibault PK, Lewis WA. Recurrent varicose veins part 2: injection of incompetent perforating veins using ultrasound guidance. *J Dermatologic Surg Oncol* 1992;18:895-900.
11. Parsi K. Extended Long Line Echosclerotherapy. *Sclerotherapy Society of Australia Newsbulletin* 1997; 1(3): 10-12.
12. Cloutier G. Sclerose des crosses des saphenes internes et externes: Nouvelle approche. *Phlebologie* 1976; 3:227-32.
13. Cloutier G, Sansoucy H. La sclerose des crosses saphenes internes et externes avec compression: Resultats. *Phlebologie* 1980; 4:731-35.
14. Biegeleisen K, Nielson RD, O'Shaughnessy A. Inadvertent intra-arterial injection complicating ordinary and ultrasound guided sclerotherapy. *J Dermatol Surg Oncol* 1993; 19:953-958.
15. Schadeck M, Allaert FA. Echotomographie de la sclerose. *Phlebologie*, 1991; 44(1):111-130.
16. Ouvry PA, Ouvry P, et al. La place de la sclerotherapie dans le traitement des petites saphenes variqueuses. *Phlebologie* 1988; 41:751-65.
17. Grondin L. Sclerotherapy of the lesser saphenous vein. *Proceedings of the Sclerotherapy Society of Australia*, 1995. ■