Liquid and Foam Sclerotherapy for Spider and Varicose Veins

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KEYWORDS

• Sclerotherapy • Telangiectasia • Spider veins • Varicose veins
• Foam sclerotherapy

KEY POINTS

- Sclerotherapy has diverse application in the treatment of cutaneous telangiectasia, superficial venous insufficiency, pelvic venous reflux, and venous malformations.
- It has an important role in the treatment of venous disease in all stages.
- It is an important tool for physicians treating venous disease, and familiarity with sclerotherapy indications, contraindications, and techniques is an important part of any vein practice.
- Management of patient expectations regarding symptom relief, improvement in appearance, and expectation of recurrent disease is of critical importance.

INTRODUCTION

Patients with venous insufficiency may present with symptomatic varicosities or advanced disease (skin changes, ulceration) or may just have cosmetically bothersome varicose or spider veins.[1,2] Techniques for treating superficial venous insufficiency include surgical stripping, microphlebectomy, and endothermal (laser and radiofrequency) and nonendothermal ablation. These techniques all have important places in the treatment of venous disease; however, sclerotherapy has the broadest role because it can be used in the treatment of venous disease at every stage of severity. Sclerotherapy is an effective and widely used modality to diminish the appearance of cosmetically bothersome lower-extremity telangiectasias.[3] Truncal saphenous incompetence can be treated with sclerotherapy, which offers an advantage over other saphenous ablation techniques in that incompetent tributary veins can be treated simultaneously with the same modality.[4] With advanced venous disease, nests of

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abnormal veins are often present in the dermal and subdermal beds of active and healed ulcers. Because of the thickening associated with the diseased overlying skin, microphlebectomy of these veins may not be possible, and foam sclerotherapy offers a straightforward treatment approach.[5] Foam sclerotherapy has also been used in the treatment of pathologic perforator veins.[6] Sclerotherapy has an important role in the treatment of vascular malformations throughout the body,[7] and in the treatment of pelvic venous reflux.[8] Given the diverse applications of liquid and foam sclerotherapy in the treatment of venous disease, it is important for physicians caring for venous patients to have familiarity with its potential benefits, limitations, contraindications, and side effects.

THE DEVELOPMENT OF SCLEROTHERAPY

Sclerotherapy induces injury to the venous intima, which is followed by eventual fibrosis of the vessel. A variety of sclerosants have been used in the past, but in the United States, the most commonly sclerosing agents used today are hypertonic saline, sodium tetradecyl sulfate (STS), and polidocanol (POL). Both liquid and foam sclerotherapy are widely used throughout the world.[9]

POL and STS are detergent sclerosants and can be turned into a foam by mixing them with a gas, usually room air, CO_2, O_2, or a CO_2/O_2 mixture. In 1944, Orbach described mixing room air with a sclerosant[10]; however, this technique did not gain popularity until its "rediscovery" some 50 years later. Both Cabrera Garrido and colleagues[11] of Spain and Monfreux[12] of France published papers in 1997 describing their techniques in the use of foam sclerosants.[11,12] Today, the most widely used technique is the "double-syringe" method described by Lorenzo Tessari of Italy in 2000.[13]

The techniques described by Cabrera Garrido, Monfreux, and Tessari were applied by clinicians to compound foam in their own clinical settings (physician compounded foam, PCF). A standardized proprietary foam sclerosant (Varithena; BTG, West Conshohocken, PA, USA) was approved by the US Food and Drug Administration (FDA) for the treatment of great and accessory saphenous vein and tributary vein incompetence in 2013.[14] Potential advantages of this commercially available proprietary foam is more consistent foam characteristics (bubble size, sclerosant strength) and assured sterility.[15]

SCLEROTHERAPY BASICS

Agents

The most frequently used sclerosants are outlined in **Table 1**. In the United States, the most commonly used agents are STS, POL, and hypertonic saline. Both STS and POL are FDA-approved sclerosants, whereas the use of hypertonic saline is considered to be an off-label use. The mechanism of action of endothelial injury varies depending on the sclerosing agent used. Hyperosmolar agents, such as hypertonic saline, cause diffusion of water from the intracellular space to the extracellular space, causing nonspecific cell destruction as well as hemolysis. The 2 commonly used detergent sclerosants, STS and POL, cause protein theft denaturation, which lyses of the cell wall, without hemolysis. Corrosive sclerosants are less commonly used and have a direct cytotoxic effect on the endothelium. Platelet aggregation is stimulated by all sclerosants, which then produces a dense network of platelets and fibrin, then eventually, vessel fibrosis.[16] If the process of fibrosis fails to occur, the sclerotherapy will not be successful. Selection of the appropriate concentration of sclerosant for the size of the treated vessel increases the chance for successful treatment.

Each sclerosant has different dosing, different advantages and disadvantages, as shown in **Table 2**. STS is a synthetic surfactant (soap); POL is a nonester local