

SCLEROTHERAPY TECHNIQUE FOR TELANGIECTASIA AND RETICULAR VEINS

TELANJEKTAZİ VE RETİKÜLER VENLER İÇİN SKLEROTERAPİ TEKNİĞİ

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ABSTRACT

Over the last decade, there has been an increase in demand to treat small, unwanted veins and symptomatic varicosities. Sclerotherapy is systematic and effective treatment for reticular and telangiectatic leg veins by the injection of a locally irritating chemical substance. Appropriate management of lower extremity telangiectasias and spider veins will lead to better results, better patient satisfaction with fewer complications. The purpose of this article is to review technique and discuss how to minimize potential complications.

Keywords: *Sclerotherapy; reticular vein; spider vein; unwanted veins.*

ÖZET

Geçtiğimiz on yıl süresince küçük, istenmeyen ve semptomatik variköz damarların tedavisinde hızlı bir artış olmuştur. Skleroterapi, sistematik olarak retiküler ve telanjektazik bacak venlerinin tedavisinde lokal irritant kimyasal bir maddenin enjeksiyonu işlemidir. Uygun tedavi ile alt ekstremitte bacak venlerinin tedavisinde iyi sonuçlar alınacaktır. Bu makalenin amacı, skleroterapi tekniğini ve olası komplikasyonları en aza indirmeye konusunu gözden geçirmektir.

Keywords: *Skleroterapi; retiküler ven; örümcek ven; istenmeyen venler.*

INTRODUCTION

Sclerotherapy, most common venous procedure performed in the office, is an effective treatment for reticular and telangiectatic leg veins. It has been estimated that between 10% and 20% of the adult in modern populations have varicose veins and that up to 50% of women will have telangiectatic leg veins by the age of 50. The difference between varicose, reticular and telangiectatic leg veins is one of size. Tortuous veins larger than 4 to 5 mm in diameter are referred to as varicose, veins between 1 and 4 mm in diameter are referred to as reticular,

and veins less than 1 mm in diameter are referred to as telangiectasia.

Sclerosants, sclerotherapy solution, are injectable chemical cauterants intended to scarify and obliterate vascular tissue. To be effective, sclerosants must denature biologic molecules, which provide structural integrity to the vein wall. Despite human experimentation encompassing an enormous range of more or less toxic agents, the perfect sclerosant, complication free and 100% effective, has not been discovered. Most phlebologists agree that the optimal sclerosing agent should demonstrate few adverse reactions, including pigmentation, ulceration, telangiectatic matting (neovascularization), and allergic hypersensitivity potential. Characteristics of the optimal sclerosant are listed in

Table 1.

Minimal adverse reaction profile
Hyperpigmentation
Ulceration
Telangiectatic matting (neovascularization)
Low allergy profile

Table 1. Characteristics of the optimal sclerosant.

Sclerotherapy has known contraindications, which summarized in **Table 2.** (1,2).

Absolute Contraindications	Relative Contraindications
Known allergy to the sclerosant	Longstanding history of leg edema
Allergy to disulfuram	Hypercoagulable state
Acute superficial or deep vein thrombosis	Late stage diabetic complications
Local infection in the are of sclerotherapy or severe generalized infection	Allergic diathesis
Immobility, bedridden state	Thrombophilia with history of deep vein thrombosis
Advanced peripheral arterial occlusive disease	Asthma
Pregnancy (first trimester and after the 36 th week of gestation)	Extreme needle phobic patients

Table 2. Absolute and relative contraindications for performing sclerotherapy.

TECHNIQUE

Sclerotherapy is recommended for all veins smaller than 4 mm in diameter. For veins smaller than 1 mm in diameter that are persistent after sclerotherapy, or needle-phobic patients laser or intense pulsed light treatment may also be used.

After successful sclerotherapy, the vein is converted into a thread of connective tissue. Crucial for success are concentration of the sclerosant agent used and its contact time with the adjacent venous wall. Detergent sclerosing agents, such as sodium tetradecyl sulfate and polidocanol, can be mixed with air to produce foam. In comparative studies, sclerotherapy with foam was more effective than with liquid. (3,4). Although several techniques have been used to produce foam, the most commonly used technique is that described by Tessari. Using two 5 ml syringes and 3-way stopcock, a mixture of 1 part detergent agent is placed in one syringe and 4 parts room air in the other. Pushing the two syringes in back and forth manner performs vigorous mixing. Foam sclerotherapy has the advantage of better efficacy and safety especially for larger tributary veins.

We recommend the use of a foamed sclerosing agent for all veins larger than 1 mm in diameter. Foaming should be done only with a detergent sclerosing solution. I use ¼ mix ratio (1 ml of solution with 4 ml of air) for foaming. It doubles its effective sclerosing power while decreasing adverse effect profile.

MECHANISM OF ACTION

Sclerotherapy is defined as the introduction of a foreign substance into the lumen of a vessel, causing thrombosis and subsequent fibrosis. Detergent sclerosants such as sodium tetradecyl sulfate (STS), ethanolamine oleate, and polidocanol (POL) produce endothelial damage through interference with the cell surface lipids. Hypertonic saline and hypertonic glucose solutions produce dehydration of endothelial cells through

osmosis, resulting in endothelial destruction. Chemical irritants or caustic agents such as glycerin and polyiodinated iodine produce direct destruction of endothelial cells. The advantages and disadvantages of each solution are listed in **Table 3**.

Solution	Pigment	Allergy	Necrosis
Glycerin	-	-	+
Sodium tetradecyl sulfate	+	+	-
Polidocanol	+	+	+
Hypertonic saline	+	-	++

Table 3. Advantages and disadvantages of sclerosing solutions.

There are several types of sclerosant available in the market. The recommended concentration of sclerosants for various types and diameters of vein size is listed in **Table 4**.

Vein Size, mm	Solution
<1	72% glycerin, sodium tetradecyl sulfate 0.25%, polidocanol 0.5%, hypertonic saline 11.7%
1-4	Sodium tetradecyl sulfate foam 0.25 - 0.5%; polidocanol foam 0.5 - 1%
4-10	Sodium tetradecyl sulfate foam 1 - 3 %; polidocanol foam 2-5%

Table 4. Recommended solutions and concentrations for different size of veins.

INJECTION TECHNIQUE AND TREATMENT STRATEGIES

The goal of successful sclerotherapy treatment of reticular and telangiectatic legs veins is efficient elimination of unwanted veins while causing the minimal amount of adverse effect in the shortest time. In other word, sclerotherapy is a controlled thrombophlebitic reaction. Therefore, the main principle is to produce the least amount of inflammation. Minimizing inflammation by injecting the vessel with the minimal effective sclerosing concentration will avoid the risk of initiating the formation of new telangiectasias around the edge of the treated area. In addition, the use of compression immediately after

sclerotherapy will minimize the resulting inflammation by decreasing thrombus formation.

Treatment strategies are listed in **Table 5**.

Examine the extremity under treatment consideration
Identify the reflux points with physical examination and duplex ultrasonography
Choose sclerosant and concentrate for clearance for each treatment based on vessel size
Vessels that are larger than 8 mm in diameter or elevated above the skin surface may alternatively be treated using ambulatory phlebectomy. Greater or lesser vein incompetence may be managed using endovenous technique (laser or radiofrequency ablation)
Prepare and label sclerosants (type and concentration)
Proceed with a treatment plan beginning with largest diameter vessels and zones of feeding arborization first. A proximal to distal limb approach gives the best therapeutic consistency
Smaller diameter vessels using lower concentration sclerosants are treated subsequently
Postsclerotherapy compression is important to improve results and minimize complications
Immediate ambulation following sclerotherapy is essential

Table 5. Treatment strategies for sclerotherapy.

Sclerotherapy should start from the largest to smallest vessels, which allow easy cannulation and infusion of the sclerosing solution. Injection of larger caliber veins first, solution is seen entering that telangiectasia that they feed into, obviating the need to cannulate the distal smaller telangiectasia. The quantity of solution to be injected should be enough to fill the vessel and displace intravascular blood. The injection should stop when the solution stop flowing. This will minimize the risk of damage to the deep venous system. The entire superficial venous system of each leg is treated at one time to avoid leaving areas of refluxing blood flow or extravasation of red blood cells from the damaged vessel, which leads to hyperpigmentation.

Postsclerotherapy thrombophlebitis is a common problem seen after sclerotherapy, especially when larger varicosities are treated. Trapped thrombus within the treated vein segment leads to pain, inflammation, and pigmentation of the skin overlying the vein. Patients should be instructed and examined 2 weeks following sclerotherapy injection. Aggressive compression can prevent this problem but is often difficult to apply over

the upper thigh and knee areas where there is a lot of motion. It is also challenging in patients with obesity. If thrombosis developed, it can be evacuated early with microthrombectomy technique through a 22-gauge needle. Patients with significant inflammation often benefit from this technique, especially if the treated vein is very close to the skin surface. Microthrombectomy leads to more rapid relief of pain and inflammation with improved clinical results. (5). Re-treatment if necessary is important issue. The treated area should not be re-treated sooner than 6 to 8 weeks after first sclerotherapy. This will allow for resolution of inflammation between treatments. The patient should be instructed to walk immediately after the sclerotherapy treatment to help prevent deep vein thrombosis. Calf muscle movement produces a rapid blood flow in the deep venous system that dilutes any sclerosant that may have migrated to this area. Patients with a patent foramen ovale are at increased risk for neurological complications. (6). Since, patent foramen ovale is a common asymptomatic condition, precautions including the use of Trendelenburg position, limb elevation, manual or ultrasound probe compression, injecting slowly, and limiting the volume of foam sclerosant used each treatment to prevent foam from traveling centrally should be used in all patients. (7, 8). Complications resulting from sclerotherapy can be divided into 3 categories.

1. Frequent but transient

- a. Telangiectatic matting (10-30%)
- b. Postsclerotherapy pigmentation (10-30%)
- c. Pain with injection
- d. Urticaria after injection

2. Rare but self-limited

- a. Cutaneous necrosis
- b. Superficial thrombophlebitis

- c. Nerve damage (saphenous or sural)
- d. Transient visual disturbances, especially in migraine patients, hematuria (using foam sclerotherapy)

3. Rare but major

- a. Anaphylaxia
- b. Deep vein thrombosis, pulmonary embolism

Postsclerotherapy hyperpigmentation is usually noticed within 3 to 4 weeks after sclerotherapy and can last from 6 to 12 months. However, spontaneous resolution occurs in 70% at 6 months, it may persist longer than 1 year in 10% of patients. The incidence of hyperpigmentation depends primarily on the size of the treated vessel, the type of sclerosant with concentration. The incidence is higher when treating larger veins (greater than 1 mm) as opposed to smaller veins. The risk of hyperpigmentation depends on many factors including general health, skin type, the size and depth of vessels to be treated, the location of vessels on the body, other medications being taken. Patient related factors play an important role such as total body iron stores, vessel fragility, and increased sensitivity to histamines. It is also more pronounced in patients with dark hair and dark toned skin. More superficial veins are more likely to exhibit hyperpigmentation than deeper ones for several reasons such as reabsorption of extravasated heme is more efficient in the deeper dermis; hemosiderin pigment is also less visible when it is deposited in lower dermis. Treatment technique also can play an important role in the development of hyperpigmentation. Especially, excessive intravascular pressure from rapid injection may cause vessel rupture. Therefore, it is

essential to control the rate of injection particularly with tiniest vessels.

There is no highly effective method for treating postsclerotherapy hyperpigmentation. Treatments include exfoliation with mild peeling agents, laser therapy. However, most patients will have spontaneous resolution of hyperpigmentation within 1 year. Periodic photographic documentation is satisfactory in most cases. Due to similarity to tattooing with hemosiderin, lasers (532 and 1064 nm) may offer a reasonably effective therapy with causing physical fragmentation of pigment.

Another frequent but transient complication is telangiectatic matting, appearance of tiny new red telangiectasias. It is mostly, located in and around the site of treatment. It often is seen on the medial and lateral thighs, medial ankle, and medial and lateral calves. The most common site is the inner thigh just above the knee. Probably, this may be due to the movement at the knee, causing rapid fluctuations in venous pressure. The incidence is between 15% and 24%. Predominantly it is seen in women. The precise etiology is unknown, however angiogenic and inflammatory processes may cause preexisting subclinical blood vessels to dilate. The risk factors are higher infusion pressures; using larger volumes and higher concentration of sclerosant.

Other less frequent and less severe side effects of sclerotherapy include transient visual disturbances, pain with injection and urtication. Transient visual disturbances have been rarely reported after the use of foam sclerosants. The etiology was felt to be due to the presence of persistent air bubbles from the foam passing from venous system to the arterial side through a large patent foramen ovale.

Postsclerotherapy pain is usually experienced with usage of the osmotically active sclerosant, hypertonic saline. The

pain is typically described as burning or stinging. Urticaria is common after sclerotherapy and most likely represents a localized histamine response to vascular injury. Patients should be informed that itching and redness would fade in 4 to 24 hours. A non-sedating antihistamine medication is recommended.

Cutaneous necrosis is a rare complication. There are several reasons for this unwanted complication. However, extravasation of the sclerosant into the perivascular tissue is the most common cause. It is rare in experienced hands. A meticulous technique is the key to prevent. Injection into certain locations on the lower extremities can increase the probability of cutaneous necrosis. The perimalleolar area is particularly prone to ulceration.

Anaphylactic reactions to sclerosing agents have been reported with the incidence of 0.3%. The incidence of deep vein thrombosis, which is often mentioned as a concern by patients, is exceedingly low.

COMPRESSION TREATMENT AFTER SCLEROTHERAPY

Graduated compression is universally recommended for both surgical and non-surgical treatment of varicose veins. After injection of all varicose and telangiectatic veins, the treated veins are compressed to minimize significant thrombosis. Sigg and Orbach in 1950 and Fegan in the 1960s initially describe postsclerotherapy compression. This approach is perhaps most important advance in sclerotherapy for varicose veins. The compression eliminates a thrombophlebitic reaction and substitutes a sclerophlebitis with the production of a firm fibrous cord.

Functions of compression are listed in **Table 6.** (9)