



## Sclerotherapy Techniques and Procedure

### Objectives of this Chapter:

- Familiarizing yourself with the most-commonly used sclerotherapy techniques.
- Learning the 25 injection techniques for a successful sclerotherapy.
- Becoming familiar with the mechanism of action of the different sclerosing medications.
- Explaining the before and after treatment instructions.
- Acquiring the basic knowledge needed to adequately respond to the patients' most frequently asked questions.
- Controlling the most common side effects of sclerotherapy.
- Determining the steps of the first sclerotherapy.
- Knowing what to do in the second sclerotherapy and thereafter.

The objective of this chapter is to make you familiar with the basics of the sclerotherapy procedure. The chapter offers a step-by-step guide to facilitate the daily practice of that technique, and it also provides answers to the most common questions that arise in this process.

### What is sclerotherapy?

Sclerotherapy is the chemical obliteration of varicose veins through a benign artificial thrombophlebitis localized on a varicose segment with the resulting obliteration of the vein.

The purpose of sclerotherapy is to eliminate a varicose vein by turning it into a fibrous cord.

The sclerosing treatment causes a chemical reaction in the internal wall of the vein, with the resulting inflammatory alteration specific to the endothelium. This causes in turn a limited reaction of the tunica intima (inner layer), or also of the tunica media (middle layer), capable of forming clots that adhere to the wall and that eventually organize themselves into fibrous tissue.

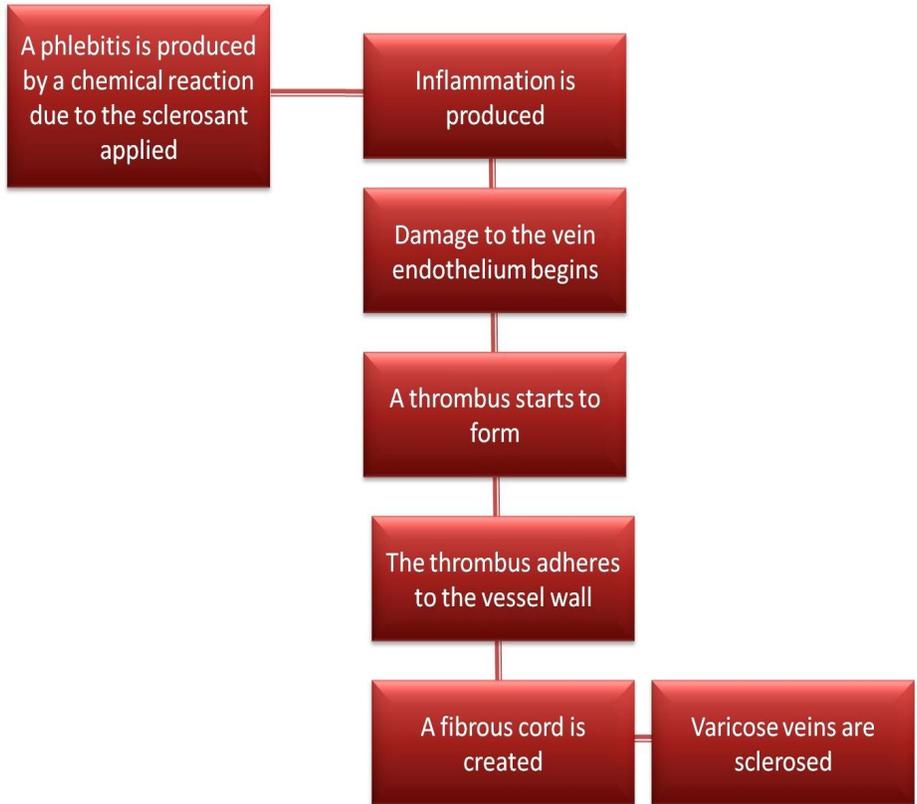
### How does sclerosis take place?

The inflammatory reaction takes place approximately within 15 minutes of the injection. This causes a mixed fibrino-hematic exudate that adheres to the blood vessel walls and contributes to platelet aggregation and the beginning of a vein stasis-induced clot. Within a few hours, this clot sticks to the vein wall. Adhesion becomes more visible within 24 hours of the injection.

Fibrous tissue organizes itself more easily when the hematic component of the thrombus is lower and the fibroblastic infiltration is greater. This fibrous tissue becomes evident two weeks into the treatment.



## Physiopathology of Sclerotherapy



## Histology of Sclerosis

How does the thrombus work in its different stages?

Stages	Evolution of the thrombus
3 hours after the injection	Edema and partial detachment of the endothelium. Formation of a red thrombus that retracts partially.
15 hours after the injection	The thrombus fully occupies the lumen and becomes firmly adhered to the venous wall.
24 hours after	The organization process begins.
18 days after	Formation of capillaries and fibroblasts.

We cannot talk about the beginning of the sclerosing reaction without talking about the vascular endothelium. Today, the endothelium is no longer considered to be an inert coating of blood vessels. It has specific functions.

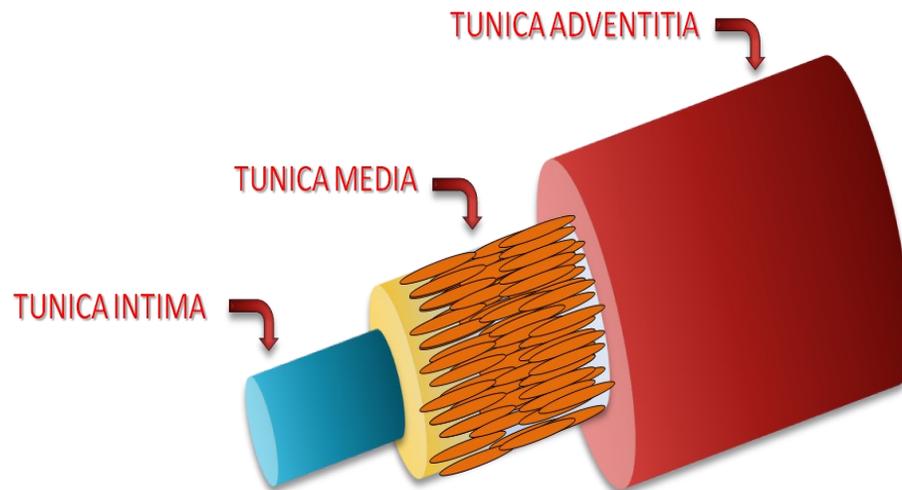
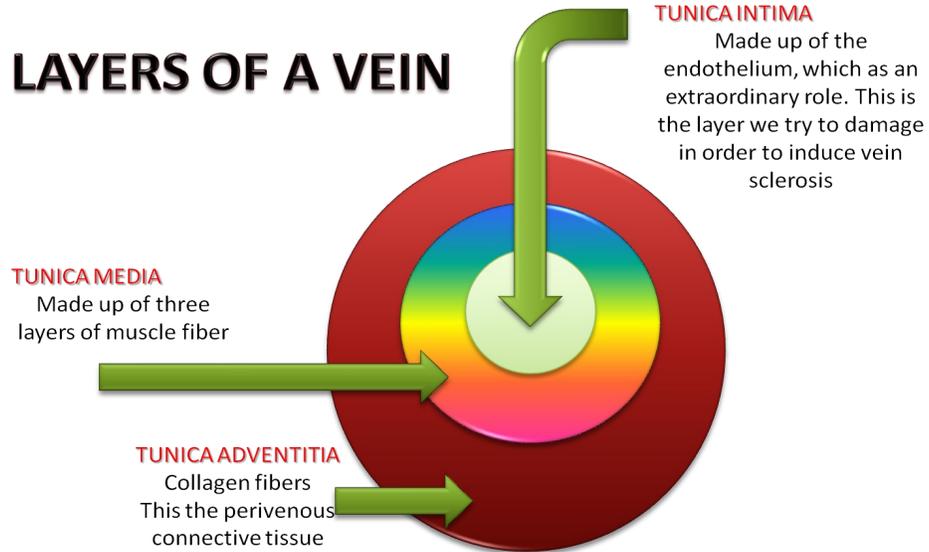
### What are some of the functions of the endothelium?

- It has the power of synthesis, storage and release of special molecules.
- It is involved in vasodilatation and vasoconstriction
- It regulates adherence of white blood cells and interaction between platelets and the blood vessel wall.
- It intervenes in vascular remodeling.

### How does the endothelium intervene in regulating the blood vessel wall?

- A. Antithrombotic property. Its luminal face does not activate platelets or the clotting cascade.
- B. Keeps vascular tone by producing vasodilating substances such as nitric oxide, prostacyclin, acetylcholine, serotonin and histamine, as well as vasoconstrictors such as endothelin, thromboxane A<sub>2</sub>, angiotensin II and prostaglandin A<sub>2</sub>.
- C. It controls the growth of vascular smooth muscle. Endothelial cells negatively influence growth-promoting factors. The endothelium produces heparin and heparan sulfate to counter this effect.
- D. It has a role in the development and remodeling of blood vessels. Changes may range from excessive growth to lumen stenosis.

## LAYERS OF A VEIN



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**What are the three principles used, according to the medical literature, in order to determine the volume and concentration of the sclerosant?**



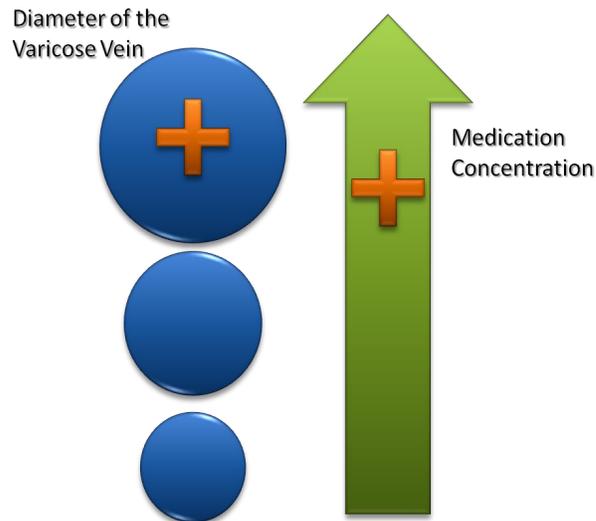
- **The strongest concentration must be injected into the highest reflux point.** This means that the concentration for treating saphenofemoral reflux is stronger than the one you would use in the lower part of the thigh and the ankle.
- **What is important is the “concentration of the sclerosing agent inside the vein, not in the syringe.”** Tournay, 1949. There are different formulas that take into account the diameter and length of the vein, as well as the viscosity of the sclerosant. They all coincide in that, the greater the diameter, the stronger the concentration to be used. This principle varies from one patient to another. Finding the “ideal” concentration for each of them is what we strive for with the dichotomous procedure.
- **The amount of sclerosant to inject into the same site must not exceed 1.0 ml.** The usual amount is 0.5 ml. Venographic studies have shown that, whenever more than 1.5 ml of solution is injected into one site, the liquid spills into the deep circulation. In our experience, we prefer to not exceed 1 ml in blood vessels wider than 5 mm and, in the remaining vessels, using 0.5 ml per injection site.

**What are the most widely-used dilutions of the most common sclerosing medications?**

Vein Diameter	Most common used sclerosing agent		
	Sotradecol	Polidocanol	Saline
< 0.5	0.1 %	0.25 %	2.9 %
0.5-1.0 mm	0.2 %	0.5 %	5.8 %
1-2 mm	0.3 %	0.75 %	8.7 %
2-3 mm	0.5 %	1 %	11.7 %
3-5 mm	0.75 %	2 %	14.6 %
+ 5 mm	1-3 %	3-5 %	23.4 %

**Based on the above table, what can we conclude?**

**That “the greater the diameter, the greater the concentration.”**



The ratio between the diameter of the vein and the concentration of the medication is linear. But this ratio can sometimes be changes in favor of a lower concentration of the medication.

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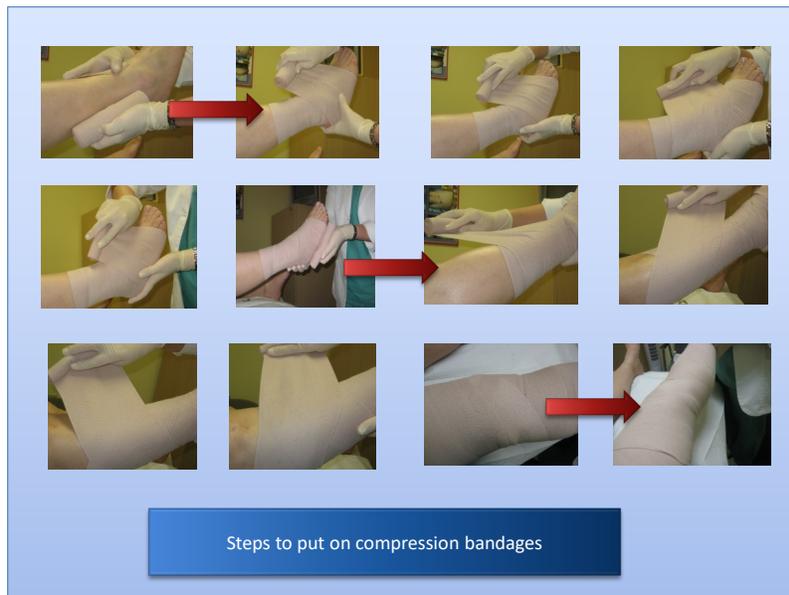
### The Fourth Step

**The fourth step** Developing the new therapy according to established guidelines and protocols, keeping in mind any changes to the plan.



### The Fifth Step

**The fifth step.** Placing the compression bandages. As indicated repeatedly above, compression bandages are applied according to the appropriate technique and the patient's condition and tolerance.



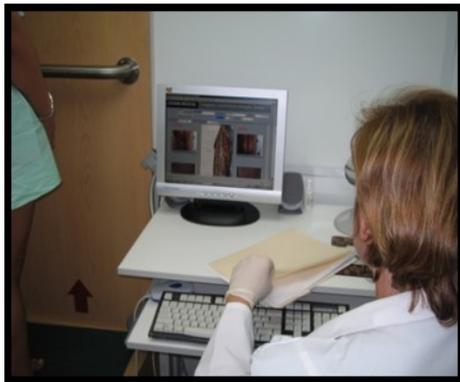
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### The Sixth Step

**The sixth step.** Giving the patient new instructions as appropriate. The physician should insist on what is to be expected and what behavior to follow at each time.

In this step we must be sure that the patient understood his or her instructions by asking him or her some control questions.

### The Seventh Step



**The seventh step.** Documenting all details related to our work. All technical aspects and changes in strategy should be documented so that evidence is maintained for the corresponding therapist in the following session.

Aside from the technical aspect, documenting every step is important for legal and administrative protection purposes, and to facilitate invoicing for our services if needed.



Remember to get the patient's signature on the control sheet on the day of service.