SAPHENOUS SPARING TREATMENTS SHORT REVIEW

Selective sclerotherapy

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Abstract The concept of selectivity implies a targeted and segmental sclerosis, performed with sclerosing agents with very low concentrations and in limited quantities. This sclerosing agents can be in liquid or foam form depending on the case. The aim of this therapy, by definition cannot be ablative but it must aim at the conservation of both the saphenous veins and their tributaries. Traditional sclerotherapy has uncontrollable and unpredictable effects. The injection in one point causes the formation of a sclerus of variable extension, depending on several factors. For these reasons, selective sclerosis wouldn't make sense. However, it does when carried out for conservation purposes with an appropriate technique that makes it predictable, controllable and calculable. First of all, it is necessary to carry out a hemodynamic study with a III level Doppler ultrasound examination and then define a therapeutic strategy. Then, it is necessary to identify the vessels that can effectively carry out an adequate work of venous washing and then perform the injection within the phlebo-blocks (Bernardini technique). The injection must be inter-valvular in order not to involve the valves in the sclerotic process. In order not to allow the sclerus to progress beyond the washings incorporating the valves, the post sclerosis selective compression was designed: eccentric, segmental, inter-valvular and between washings. Selective sclerotherapy was performed using the ESEC method (conservative hemodynamic echo-sclerosis), representing one of its cornerstones. Through selective sclerotherapy, exploiting the evolutionary effects of sclerosis, post-recanalization, with a reduced calibre, it is possible obtain a functional recovery of the originally incontinent saphenous and tributaries, preserving the forward flow.

Keywords ESEC method, washing, selective sclerotherapy, selective compression, phlebo-blocks

1. Introduction

The traditional sclerotherapy of large incompetent venous trunks (great saphenous, short saphenous, anterior accessory saphenous, tributary veins), in primary varicose disease, has always been considered an alternative to ablative surgery which aims to suppress the treated vessel.

The main purpose of traditional sclerotherapy is the maximum possible ablation, in fact the sclerosis must reach the saphenous lumen in all its extension. To obtain this result it is necessary to use high dosages of the sclerosing agent, in concentration and quantity, using foam in a more aggressive way[1-6].

The elimination of great and/or short saphenous vein causes a reaction of the system aimed at maintaining adequate drainage, with consequent regional overload of the superficial venous circulation which causes an increase in transmural pressure (PTM), especially at the level of the tributary veins. The tributary veins of the saphenous veins compensate for the obstructed drainage initially with an increase in flow rate that causes a large dilatation, with a minimal increase in PTM. Subsequently, to obtain a further minimum dilatation, a considerable increase in PTM is required. These tributary veins being also affected by structural parietal damage. These damages occur due to altered collagen and elastin content where the balance between metalloproteases and endogenous tissue inhibitor pays a special role[7]. For these reasons veins decompensate becoming varicose and tortuous (relapses).

The purpose of the ESEC method (conservative hemodynamic echosclerosis)[8-11] is diametrically opposed to traditional sclerotherapy[1-3].

This method aims at venous functional recovery maintaining the primitive venous heritage preserving both the saphenous veins and the tributary veins. So ESEC method sclerotherapy uses very low concentrations and quantities of the sclerosing agent, using foam only when the liquid form is ineffective.

ESEC was born as a CHIVA method[12] with a sclerosing technique, therefore it aims to obtain the disappearance and symptomatology of varicose veins preserving the drainage of the saphenous and tributary veins.

One of the main principles of the ESEC method is the exploitation of the evolutionary effects of post-sclerosis recanalization. The sclerus achieved by sclerotherapy of a venous segment causes the following effects:

- reduction of the upstream and downstream diameter, determined by the splitting of the hydrostatic pressure column.
- perforating veins activation located on N2 and/or N3 with an increased diameter which were previously poorly draining and little or not visible by ultrasound.
- partial or total realignment of the valves due to transmural pressure reduction (PTM).

These evolutionary effects are the same obtained with CHIVA method.

The difference between ESEC and CHIVA are:

in CHIVA the fractionation of the pressure column is determined by the permanent surgical ligature. In ESEC, instead, it is determined by the sclerus which recanalizes in a few months. The post-sclerosis evolutionary effects after ESEC do not disappear but create two haemodynamic situations[8,9]:

1. antegrade outflow of the saphenous axis
2. low-flow reflux with re-entry into activated perforating veins which were previously undetectable

With ESEC 1 treatment these perforators can be centred on the saphenous axis. With ESEC 2 treatment they can be centred on the incontinent tributary vein and/or on the saphenous axis

The treated vessels are draining in both CHIVA and ESEC but there is a difference: in CHIVA method the sclerotherapy in residual tributary incompetence veins is considered a post-surgical completion therapy.

Instead, sclerosing treatment of the incompetence tributary veins represent the fundamental principle in ESEC method. With this method annual or biennial sclerotherapy maintaining treatments are required.

We remind you that varicose disease is genetic and can be controlled, cured but it is impossible to cure definitively. Therefore checks and possible therapeutic resumptions are necessary, whatever method and technique is adopted.

The ESEC method, compared to classic sclerotherapy, is much less invasive. The low invasiveness is determined by performing a particular technique, born in 1992 and perfected over time: selective sclerotherapy.

This type of sclerotherapy is selective because it is performed, with a particular technique, in a chosen venous segment after an accurate haemodynamic study. The purpose is to fractionate the hydrostatic pressure column. Chemical thrombosis, called sclerus, must be limited to a chosen segment.

The CHIVA method involves surgical ligation between the N3 and N2 junction and eventual subsequential ligation the saphenofemoral and sapheno-popliteal junction (crossotomy).

In ESEC method, sclerus in a small segment is comparable to surgical ligation but is initially performed at a certain distance from N3-N2 junction and saphenofemoral or sapheno-popliteal junction. The aim is always to fractionate the hydrostatic pressure column while preserving the saphenous drainage.

Instead, in classical sclerotherapy the principal target is the suppression of both the saphenous and tributary veins, with consequent elimination of their drainage. For this reason, the sclerus must extend all the way to the saphenofemoral or sapheno-popliteal junction and recanalization is considered a failure. If a recanalization occurs a sclerotherapy is performed again to obtain a vessel obstruction.

The scientific community has always judged impossible the selective sclerotherapy stating that sclerus certainly begins in the injection point and that his extension is uncontrollable.

The aim of this study is to demonstrate that with the ESEC method the selective sclerotherapy is able to control the sclerus extension.

2. ESEC principles

There are three ESEC variants:

- ESEC 2: the injection is performed in type III or II shunts (N1-N2-N3 or N2-N3) on the incontinent tributary vein. ESEC 2 is similar but not the same as CHIVA 2. The latter treats the N2-N3 reflux with a flush ligation at their confluence while ESEC 2 adopts several injections in the N3 segments.
- ESEC 1: the injection is performed in type I or II shunts on saphenous axis, in symptomatic cases. CHIVA 1 is a crossotomy (surgical ligation of the saphenous junctions) while ESEC 1 treats the

intermediate segments of N2 with injections without intervening on the junctions

- ESEC 2+1 is the combination of the previous two methods (before ESEC 2 and after ESEC 1), in case of insufficient result, especially when the diameter of the saphenous axis is high. ESEC 2+1 is similar to CHIVA 2 (first peripheral treatment and second treatment on the saphenous junction) but not the same as described previously.

The ESEC method is based on following fundamental principles:

- Formation of the sclerus
- fractionation of the hydrostatic column with consequent reduction of calibre both upstream in downstream
- reduction in transmural pressure (PTM)
- exploitation of post-sclerosis recanalization, with reduction of the treated vein calibre

The ESEC method exploits two hemodynamic evidences:

1. the predominantly ascending evolution of venous reflux[13-14]
2. the "washing" of the vessels[8,15-17] in correspondence with the bifurcations with other patent vessels (deep, saphenous, tributary or perforating) which effectively prevents the ascending progression of the sclero, as occurs in cases of primary venous thrombosis, not caused by sclerosis. Venous flow and increased velocity in these bifurcations prevent the progression of thrombosis. Inspired by what happens naturally, these washes have been used to block, the progression of sclerus after sclerotherapy.

In the ESEC protocol, after recanalization, it is necessary to carry out a new hemodynamic study[18] to analyse the characteristics of the flow, antegrade or retrograde, draining into the re-entry perforating veins with or without compartment jump.

3. Methods used in ESEC

Selective sclerotherapy has been used since 1992 when ESEC was born and more than 2000 saphenous veins have been treated.

In the last 9 years an Esaote Mylab Gold Echocolordoppler with 5-10 MHz and 10-18 MHz probe has been used for hemodynamic studies and for eco-guided and eco-controlled sclerotherapy. All data were recorded in a database.

Glass syringes were used for the production of foam, after being sterilized in a sterilizer, in accordance with the law. Glass syringes offer less resistance during the injection due to the lower friction of the piston. 27 G insulin syringes and 23G butterfly needles were used. The medical examination table has 4 motors, allowing the adjustment of the backrest slope and height and the position in Trendelemburg.

3.1 Data

851 lower limbs out of 673 patients (male 25%; female 75%) with average age of 65 years with saphenous incompetence were treated in the last 9 years with selective sclerotherapy with ESEC method (Table I).

The prevalence of the pathology was in 54.6% of cases in the left lower limb and in 45.4% of cases in the right lower limb.

ESEC treatment can be applied to any degree of superficial venous pathology from CEAP classification C2 to C6. It is not applied in the case of C1, when the pathology is minimal and concerns exclusively primitive telangiectasiae.

The mean diameter of great saphenous veins is 6.65 mm, 6.12 mm in the short saphenous veins and 5.48 mm in the anterior accessory saphenous veins.

Patients with the following problems were excluded from this study:

- Walking problems
- Hepatic, cardiac, renal insufficiency
- Drug allergies

ESEC 2+1 is applied during the maintenance therapy, who starts after one year of the treatment, when the result, after 2-3 sessions distanced about six months, is not sufficient with the appearance of recurrence and significant symptoms

3.2 Technique of selective sclerotherapy

ESEC protocol provides for two different types of sclerosing agents in low concentration (0.25-1%, sometimes 2% and rarely 3%) and in limited quantities (0.5-2 ml, rarely 3 ml) such as Lauromacrogol 400 and Sodium Tetradecyl Sulphate (STS)[8-11] which, being surfactants, can be used both in liquid form and in foam. STS is more efficient in liquid form.

The two sclerosing agents are equivalent in foam form. Lumen is partially or totally occluded due to sclerus which appear progressively increasing the concentration and the quantity of the chosen sclerosing agent. It is not necessary occlude completely the lumen when, after hemodynamic study, is present a satisfying reduction of the lumen calibre upstream and downstream of the sclerus. In the major part of the cases the result is obtained with 0.25-5% concentration of the sclerosing agent in 1-3 sessions.

Table I
Number and type of treated veins, according to shunt typology and ESEC

	Great saphenous veins	Short saphenous veins	Anterior accessory saphenous veins	Giacomini veins	Thiery veins
Total number	641	92	98	10	10
Shunt I (ESEC 1)	29	6	0	0	0
Shunt II (ESEC 2)	405	59	63	3	7
Shunt III (ESEC 2)	194	25	34	3	3
Pelvic shunt (ESEC 2)	13	2	1	4	0

The concentration of the sclerosing agent will be increased if the sclerus is not formed after 3 sessions. The foam is produced by bubbling in a glass syringe[13] filled with 0.2 ml of sclerosing agent. The butterfly needle is inserted and by clipping the plastic tube a slow and constant suction traction is applied to the piston. A correct suction force must be applied to make the liquid bubble, transforming it into micro-bubbles, more or less large. The size of the bubbles is proportional to the suction force imparted to the piston.

A dry foam is produced, with a liquid/air ratio of 1/15-20. This dilution is not reported in any scientific publications because it is an unprecedented technique that we have used for over 30 years to treat thousands of varicose and N2-N3 veins, however never providing a scientific report of the details. We plan to fill this gap as soon as possible. The purpose of this dilution is to obtain the sclerus. Obviously this very diluted foam produces sclerus if injected between two phlebo-blocks and two washes. This means that the higher density of the humid foam is not as important as the selective contact on the vein wall of the dry foam, even if of shorter duration.

The drier foam, with ratio liquid/air 1:20 compared with microbubbles with ratio liquid/air 1:4, has a shorter duration and it is indicated for a less aggressive sclerotherapy. This means that the higher density of the wet foam (poor of air) is not as important as the selective contact on the vein wall of the dry foam (rich of air) , even if of shorter duration. The drier foam, with a liquid/air ratio of 1:20, is composed of larger bubbles compared with the microbubbles with a liquid/air ratio of 1:4, has a shorter duration and is indicated for less aggressive sclerotherapy, such as the ESEC.

The choice between liquid and foam is based on the type of strategy and on the diameter of the vessel to be treated. In the presence of a small diameter vein, N2 or N3, the treatment starts with liquid form (the sclerosing agent, in a small diameter vein works on the venous wall without suffer an excessive dilution with the blood). The sclerosing liquid agent, in a small calibre vein, works on the venous wall without being too diluted by the blood.

In most cases ESEC 2 is performed, starting with incontinent tributary vein injecting 0.5%, 0.5-1 ml in liquid form, in a supine position, in Trendelemburg, to reduce the vein diameter enhancing the contact between sclerosing agent and venous wall. Then, in case of insufficient result, a re-injection 0.5-1-2 ml, rarely 3 ml, with 0.25-0.5-1% foam, rarely 2-3 % is applied after 2-3 weeks.

The amount of sclerosing agent, in liquid or foam form, must be proportional to the length of the treated venous segment. For example, a short segment needs 0.5-1 ml while a longer one may need 1-2 ml, rarely 3 ml. How patients react to selective sclerotherapy is subjective. In fact, sometimes a large diameter vessel has a better response than a smaller one so it is recommended starting with a low dosage.

The injection of sclerosing agent is not random but it is mandatory performed:

- between two valves
- between two washes
- between two or three phlebo-blocks

These requirements must be simultaneously satisfied in order to not negatively condition the result. They are essential to maintain the valve integrity that supports the physiological fractionation of hydrostatic pressure. If the valve was engulfed by the sclerus, it would be damaged and could no longer perform its function.

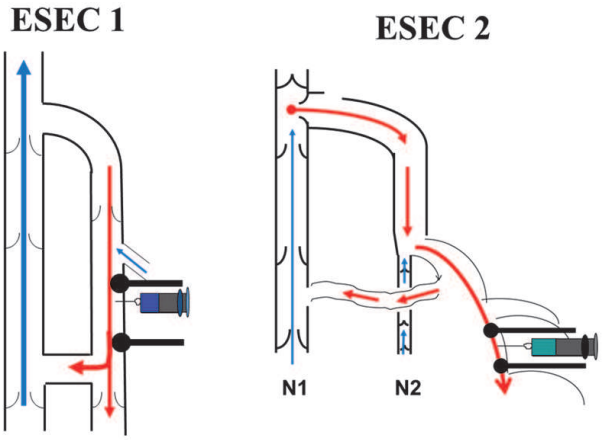

Figure 1 - Left picture: selective sclerosis is performed in saphenous vein between two valves washings and phlebo-blocks (ESEC 1); N1-N2-N3 or N2-N3 reflux, Right picture: the injection between two phlebo-blocks and two tributary veins of N3 that perform the washing (ESEC 2).

Figure 2 - Two phlebo-blocks prevent the spread of the sclerosing agent beyond the selected segment

Everyone believes that the sclerus is uncontrollable with an unpredictable progression involving the valves. This occurs because in traditional sclerotherapy high quantity and concentrations doses of sclerosing agent are injected causing an endothelial lesion extended to the entire axis or in a large part of it. Last but not least, in a selective sclerotherapy an extensive and strong compression is applied excluding all washings from the tributary veins.

In order to limit the effect of the sclerosing agent and the progression of the sclerus, the phlebo-block technique was invented. It must be carried out between two washes and between two valves limiting the injected sclerosing agent (Figure 1, Figure 2). Only in this case, in an expected way, sclerus is formed without causing valvular damage. When the valves are not visible, especially in large diameter veins, the technique is performed with the same procedure in order not to damage the functioning valves located at a greater distance.

In a clinical daily practice two or three phlebo-blocks are applied (in most cases two phlebo-blocks are used. The third phlebo-block is applied to the washing in case of risk of invasion of the sclerosing agent inside the washing), for about 5 minutes, spaced 2-20 cm each one, between two washings and two valves, above and below. When the phlebo-blocks are removed a minimal amount of air is dispersed, now devoid of sclerosing agent due to the rupture of the dry foam macro-bubbles (liquid/air ratio 1:20) of short duration.

The quality of the humid foam, with ratio, liquid/air 1:4, is not important as well as the selective contact with wall vessel. The distance between the phlebo-blocks depends on the distance between the chosen washings through a doppler ultrasound hemodynamic study. Thus, the sclerus extends to the more or less spaced chosen washes without going beyond as shown in Figure 3.

4 Post-sclerosis compression

4.1 Selective compression

Traditional sclerotherapy of the saphenous and/or extra saphenous trunks, with liquid or foam sclerosing agent, requires extensive and strong post-sclerosis compression, to reduce pain and inflammation. On the other hand, selective sclerotherapy needs to carry out an eccentric compression which is also selective, targeted to the selected segment, between two washings and two valves (Figure 4). Selective compression reduces inflammation and limits both the extension and the diameter of the sclerus in the treated vein segment.

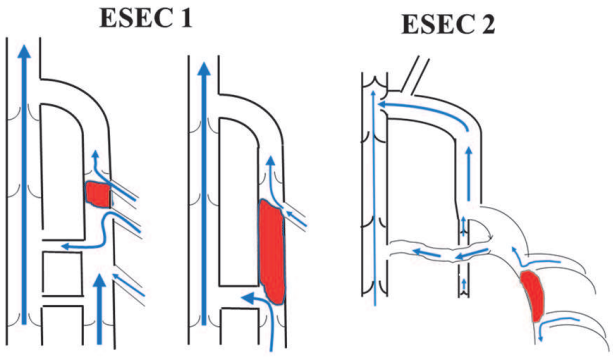

Figure 3 - When the distance between two washings is short, sclerus extends for a smaller length and is positioned between 2 washings and two valves (ESEC 1 in left side); on the contrary, when the distance is longer, a more extended sclerus is situated between 2 washings and two valves (ESEC 1 in the middle); finally, sclerus ends at the junction between two tributary vein washings (ESEC 2 in the right side)

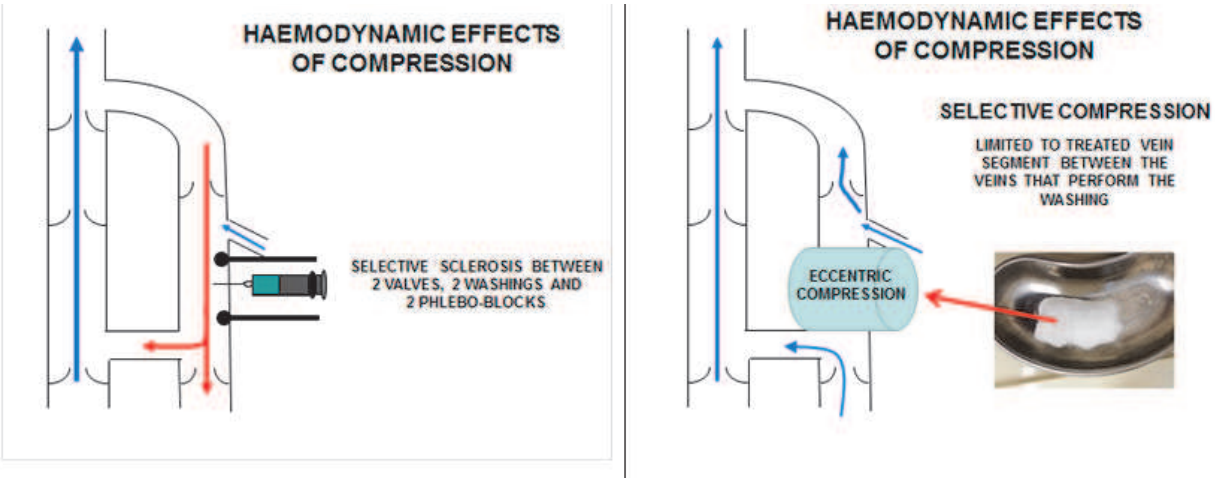

Figure 4 - The left picture represents the selective sclerosis in a refluxing great saphenous while the right picture shows an eccentric compression that does not occludes the two washings

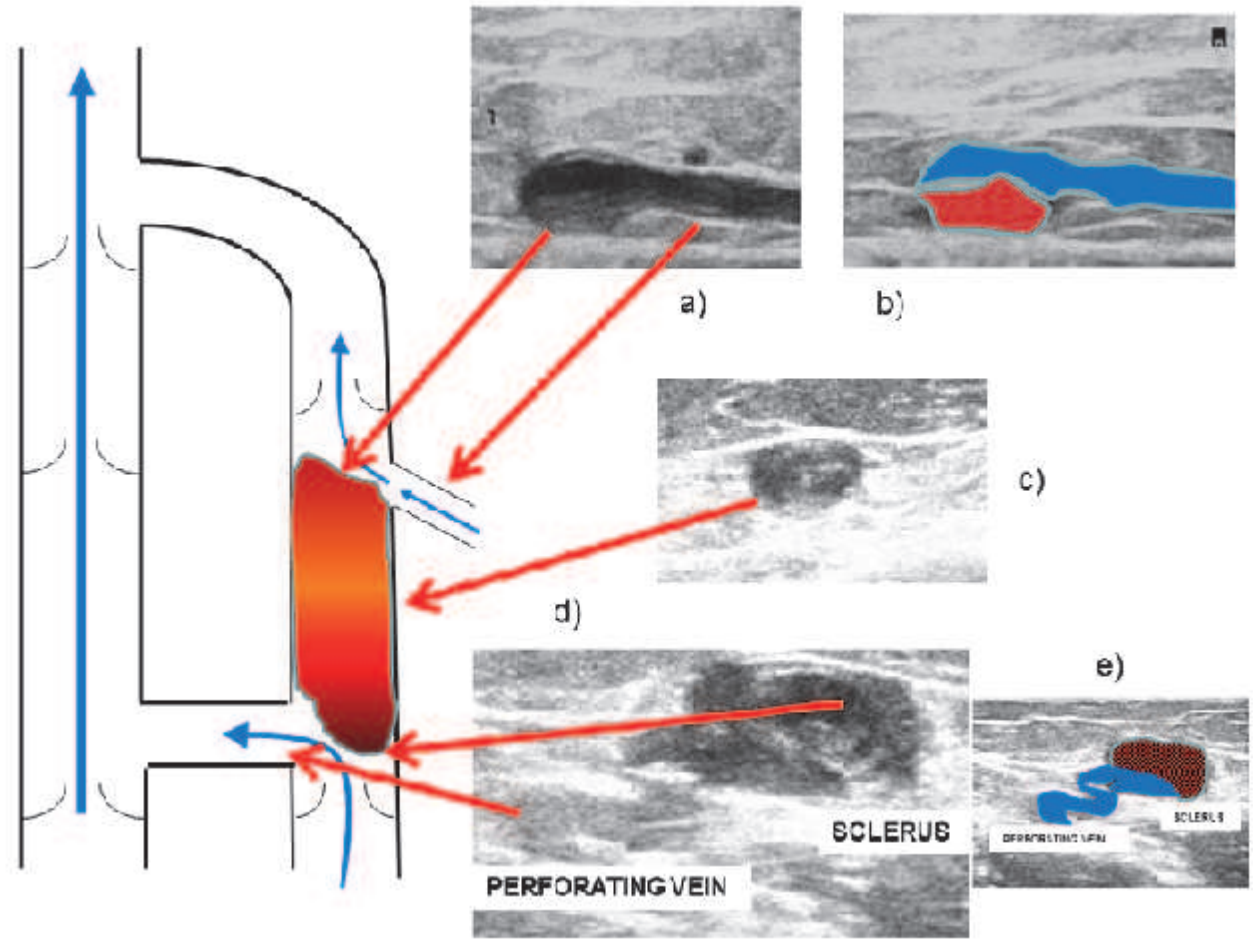

Figure 5 - a) tributary washing on the great saphenous vein at the superior part of the sclerus; b) graphic representation of a) (in red the sclerus and in blue the great saphenous washed by the tributary vein); c) shows the sclerus in transversal section; d) shows the inferior part of the sclerus washed by the perforating vein; e) graphic representation of d) (in red the sclerus and in blue the perforating vein and great saphenous vein

4.2 Non selective compression

A more extensive compression would lead to a closure or a reduction of the washings causing a progression of the sclerus until the subsequent washings (Figure 6).

The progression of the sclerus rarely reaches the saphenous-femoral crosse. When this happens, the sclerus stops at the junction with the superficial epigastric vein, without reaching the femoral vein (Figure 7).

The extension of the selective eccentric compression must necessarily be less or equal, but not greater compared to the segment length between two washings and phlebo-blocks. In most of the cases the eccentric compression is concentrated in a small segment in the injection site. After the removal of cotton phlebo-rolls, the sclerus occurs and extends even beyond the compressed segment, ending at the washings levels (Figure 5).

For the eccentric compression is used a roll pressed cotton wool, 2.5 cm length and with 2-3 cm diameter for veins of limited calibre and with 5-6 cm diameter for a greater veins calibre. These rolls must be removed in the evening before sleeping in supine posture. During the night, with this posture, the hydrostatic pressure is minimized and the diameter of the veins is reduced. Consequently, the sclerus has a reduced diameter.

5. ESEC method

In the ESEC 2 treatment the injection is performed on the refluxing N3 (tributary vein). The lavage is exerted by N2 (saphenous vein) or by tributary veins.

In ESEC 1 method, the injection is performed on the saphenous axis (N2), in a segment located between two valves and between two tributary veins which make the lavage.

A more or less extensive (2-20 cm, sometimes more) intervalvular sclerus is formed with the same distance of the chosen washings, identified by an accurate hemodynamic study. The segment is chosen between two closer washes. Thus, sclerus extension can be planned. In case of fractionation of the hydrostatic pressure column and unsatisfactory valvular realignment this technique can be repeated subsequently in other saphenous segments. Finally, an almost complete remodelling of the saphenous axis is obtained. This occurs above all in great saphenous incontinence with a large diameter and long reflux.

The most cases of shunts are type II or III (N2-N3 or N1-N2-N3). So, ESEC 2 treatment is required in most cases. In these cases the injection is performed on the incompetent tributary saphenous vein (N3), initially in a segment between two intermediate bifurcations, not on N2.

Sometimes after ESEC 2 the calibre reduction of the incontinent saphenous does not realign sufficiently the valves and an important saphenous reflux remains. In such cases we perform the ESEC 2+1 method, therefore first we treat the incontinent tributary vein and when it has re-analysed we treat the saphenous axis, with the same technique.

6. Results: our experience in selective sclerotherapy using ESEC method

In selective sclerotherapy the target is the formation of the limited dimension of the sclerus functionally comparable to surgical ligation. But the purpose of the sclerus formation is to determine a series of evolutionary effects aimed at the elimination or reduction of venous stasis and the disappearance or reduction of varicose veins.

Although we have treated thousands of cases with selective sclerotherapy in 30 years[8]. In particular, we examined 851 lower limbs out of 673 patients, obtaining the following results:

- in 846 out of 851 lower limbs (99.4%) sclerus extension is appeared after selective sclerotherapy and post-sclerosis selective compression between two chosen lavages as expected.
- in 5 out of 851 lower limbs (0.6%) has been verified a sclerus ascending evolution until the junction with an overlying tributary able to perform an adequate lavage
    - 2 out of these last 5 lower limbs treated with ESEC 2 and with ascending sclerus evolution, the great saphenous, below the N2-N3 junction appeared atrophic ecocolordoppler exam and so this vein was unable to carry out an adequate lavage (Figure 8).
    - instead, in 3 out of 5 lower limbs treated with ESEC 1 and with ascending sclerus evolution, a long incompetence was found, about 5-6 sixths, with a large diameter of the saphenous vein (over 15 mm)

The post-treatment and post-remodeling diameter reduction is 48.20% in the great saphenous, 51.30% in the small saphenous and 55.40% in the anterior accessory saphenous[9].

Even in the rare cases of the sclerus ascending evolution, the symptomatic benefit was optimal.

The great advantage of selective sclerotherapy is the reproducibility over years, with maintenance therapy, where it is possible to further remodel those previously untreated venous segments that are incompetent in the (annual) hemodynamic control session.

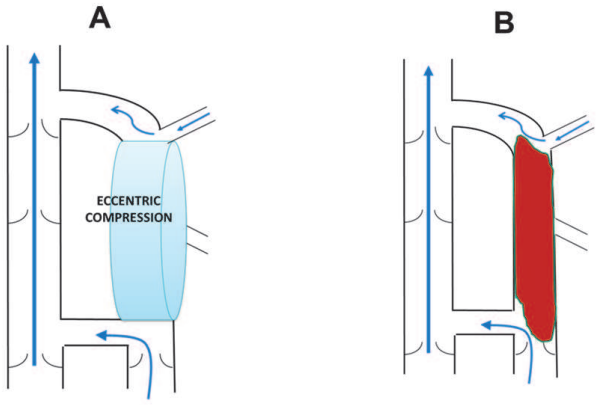

Figure 6 - A longer roll of pressed cotton wool overpasses the washing of the first tributary vein obstructing the washing deflux (A); washing performed by the deflux of the first tributary vein not obstructed by eccentric compression resulting in an increased length of the sclerus (red) (B)

The sclerus formation often occurs with blood accumulations, semi-liquid, often painful. The pain disappears after 3-5 days and after about 2 weeks is performed the evacuation of this blood accumulation puncturing the skin with a 19 G needle. Sometimes these procedures must be repeated again after 2 weeks. If the skin becomes red, this also disappears after 3- days.

After recanalization of treated N3 vessels, especially in the predisposed patients, in about 15% of cases, a pigmentation may remain along the course of the treated vein which reduces or disappears in about 6 months. Reactive phlebitis along venous segments next to the treated vein were not detected above all because the phlebo-blocks prevent the diffusion of the sclerosing agent.

Even the cutaneous necrosis from extravenous injection was not detected because the dosage of the sclerosing agent in the ESEC provides for the use of very low concentrations and quantities above all in the form of foam.

Reactive telangiectasiae were retrieved and occurred in about 10% of cases, mostly in the lower and medial III of the thigh, in the presence of cellulites as in spring as well in summer. Post- recanalization of the treated veins, were treated subsequently, with traditional sclerotherapy.

Complications of selective sclerotherapy that could lead to therapy interruption are:

- scotomas, which rarely appear due to the lower dosage of sclerosing liquid used in this method
- rare allergic reactions

These patients were not included in the statistics of this study and are actually complications that could occur as well with traditional sclerotherapy

7. Discussion

It is still impossible to prevent and cure the cause of primary venous insufficiency (a chronic, progressive, familiar, and recurrent disease) and no current available technique demonstrated any undoubtable superiority. Nowadays, treatments of varicose veins are essentially based on pathophysiologic reasoning.

The primary objectives of most treatments are:

1. to suppress sources of reflux and
2. to cure the patient's main concerns, which can be symptoms, appearance (cosmetics), or prevention of complication.

With the purpose to suppress venous stasis, the ESEC technique has gained most of the goals of venous treatment differentiating from other venous techniques. Similarly, to the CHIVA, from which it derives, ESEC technique has a conservative and functional approach that preserves the venous drainage vessel (saphenous vein integrity) and ensures drainage through an anterograde flow at saphenous junctions or a retrograde flow using re-entry perforating veins.

Although the strategy used for the ESEC technique is similar to that employed in the CHIVA technique, there are significant differences between the two techniques, mainly due to the less invasiveness, the preservation of the saphenous junctions and the use of sclerotherapy (one of the cardinal principles of ESEC, complement for CHIVA).

Faced with the crossotomy required for the CHIVA 2 technique, the ESEC technique uses the

saphenous junction as a relevant point to ensure drainage into the deep circulation. The integrity of the saphenous junctions is always preserved with the ESEC technique.

In ESEC, recanalization is not a failure if the hemodynamic target is preserved. Preservation of drainage vessels even if they were varicose but now hemodynamically corrected and reduced decreases the spontaneous risk of ascending progression of related varicose disease. Therefore, even with recanalization, it is possible to obtain the suppression of venous stasis and the consequent relief of the patient's varicosities and disorders

The ESEC sclerosing technique has always been criticized for the unpredictability of the extension of the sclerus: it certainly starts at the injection point but it is not possible to predict where it stops, at the intersection with which washing tributaries. This problem, typical of traditional sclerotherapy, was solved with the application of phlebo-blocks and the use of washings. The formation of a small sclerus could be compared to the surgical ligation performed with the CHIVA.

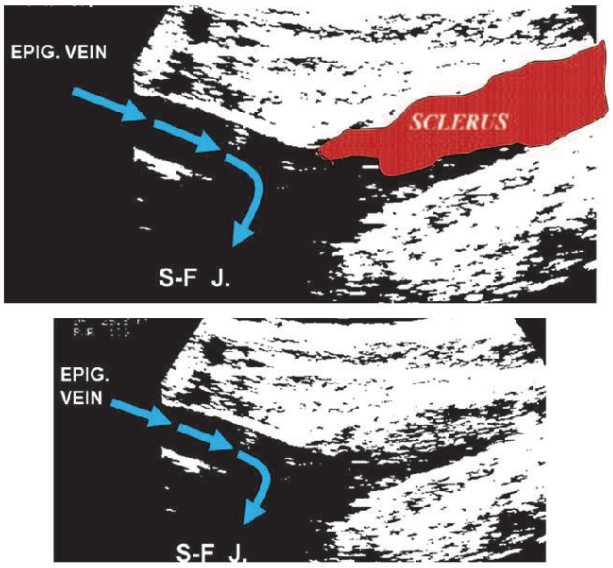

Figure 7 - Sclerus (red) stops at the saphenous arch with superficial epigastric vein that performs washing (light blue arrows)

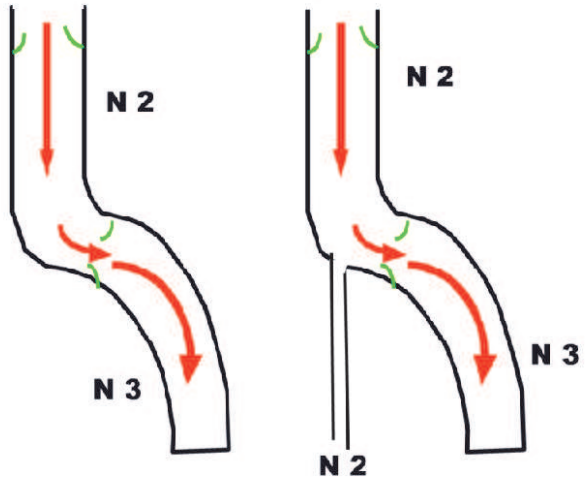

Figure 8 - N2-N3 reflux and an atrophic saphenous vein below

This study demonstrates how selective sclerotherapy, becoming super-selective over the years with the evolution of the exploitation of some hemodynamic principles and techniques, has improved the ESEC method. It is not possible to predict the number of sessions, each patient reacts differently. The patient should always be informed of the long duration of the therapy, often many months, sometimes a year.

Due to the absence of surgical requirements, the ESEC technique can be easily managed ambulatory with the practice.

The operator must have a good knowledge of hemodynamic and must personally carry out both the diagnostics and the therapy, therefore the method is difficult to manage in a hospital setting.

8. Conclusion

Selective sclerosis, or rather, super-selective, is justified only with the use of ESEC method. It is a conservative technique because it is aimed at the formation of a very limited sclerus, delimited by the first two effective washings. The main purpose of the sclerus is to fractionate the hydrostatic pressure to trigger a whole series of post-sclerosis evolutionary effects such as the reduction of the calibre upstream and downstream, even after recanalization, the consequent valve realignment, total or partial, with functional recovery of initially incontinent vessels. Instead, the purpose of sclerotherapy with ablative method is to eliminate all the incompetence of the saphenous trunks through the ablation of the saphenous axes and their tributaries. In this case, the formation of the sclerus must be as extensive as possible, destroying the valve system and occluding the drainage veins. Recanalization in traditional sclerotherapy is considered a failure while in ESEC is one of the cardinal principles of the method.

In conclusion, selective sclerotherapy aimed at a selected venous segment, chosen after an accurate hemodynamic study, obtains, in the vast majority of cases, a progression of the sclerus limited to this segment. Thus, the progression of sclerus is not uncontrollable as in traditional ablative sclerotherapy, but can be planned and at the end of the treatment the vein is remodeled in many segments.

Aiming at the suppression of venous stasis using a conservative, functional, and echo-sclerosant approach, the ESEC technique has gained most of the goals of venous treatment, making the difference with the traditional sclerotherapy. The technique must be now evaluated in larger studies. Evaluation of long-term results, in comparison with other techniques, should take into account all advantages and drawbacks including cost efficacy and quality of life from a lifelong point of view.

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