# Perioperative sclerotherapy
## A survey of current practice by Italian phlebologically-active physicians

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**Perioperative sclerotherapy. A survey of current practice by Italian phlebologically active physicians**

AIM: *To find out how and when Italian phlebologically-active physicians apply perioperative sclerotherapy.*
MATERIAL AND METHODS: *A questionnaire was e-mailed to the members of three different Italian Societies of Phlebology. The answers were collected in a database (SPSS19 for Windows) and statistically evaluated.*
RESULTS: *Ninety surgeons (87.4%) and 13 (12.6%) phlebologists responded, 57 (56,3%) worked in hospital and 46 (44.7%) in an outpatient clinic. Perioperative sclerotherapy is administred by 63,1% of respondents merely postoperatively. 28,2% use also postoperative sclerotherapy, but sometimes in combination with preoperative (6.8%) or intraoperative sclerotherapy (21.4%). Only 8,7% perform the perioperative sclerotherapy pre-, intra- and/or postoperatively. Postoperative sclerotherapy is programmed in a significantly higher percentage and earlier in private practice. Vascular surgeons performed intraoperative sclerotherapy in a significantly higher percentage in comparison to non-vascular surgeons .*
DISCUSSION: *In contrast to the results of British and Irish surveys, Italian phlebologically-active physicians perform a remarkably higher percentage of perioperative sclerotherapy. Postoperative sclerotherapy is administered after 2,3±1,9 months. Private practitioners sclerose significantly earlier and more often compared to the in hospital operators. Postoperative sclerotherapy can be considered an adjuvant therapy in order to improve the surgical result and may be called "adjuvant sclerotherapy" in order to distinguish it from "sclerosurgery" or " sclerostripping", which are performed intraoperatively.*
CONCLUSIONS: *The answers of 103 partecipants give an acceptable overview on the current behavior of phlebologically-active physicians in private and public practice, in Italy. Perioperative sclerotherapy seems widely used, mainly as postoperative sclerotherapy, but also as sclerosurgery and more seldom as adjuvant sclerotherapy, and may lead varicose vein surgery to more miniinvasiveness. The rationale of "sclerosurgery" is manifold.*

KEY WORDS: Adjuvant sclerotherapy, Perioperative sclerotherapy, Sclerostripping, Sclerosurgery, Survey

## Introduction

Foam sclerotherapy is increasingly used for the treatment of varicose veins [1-6]. Sclerotherapy has been compared with surgery in randomized studies [7-10]. Despite former suggestions to combine surgery and sclerotherapy for the treatment of varicose veins [11-14] there were few reports on this technique [15-18]. Since the introduction of foam

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sclerotherapy this technique is more frequently reported as an intraoperative [7,19-23] or postoperative procedure [8,24]. The intraoperative application of sclerosants combines two different techniques to obtain a better, more durable occlusion of varicose veins, whereas the postoperative application of sclerosants may be seen either in the same context or as an adjuvant therapy, which is administered on demand or to complete the therapy.
Perioperative sclerotherapy is possibly adopted more often than referred to in the literature because of routine performance of postoperative sclerotherapy without scientific documentation and evaluation.
Therefore, we want to question how often perioperative sclerotherapy, as a preoperative, intraoperative or postoperative application, is adopted by the Italian phlebologically-active physicians. For this purpose we sent a questionnaire with specific questions to that target group.

## Material and Method

In 2013, a questionnaire was e-mailed to the members of three different Italian societies of Phlebology elected as Perioperative Sclerotherapy Study Group (PSSG). The questions were related to the activity in private or public practice, the type of techniques applied, the perioperative (preoperative, intraoperative, postoperative) moment of sclerotherapy and the relative percentage of procedures performed. Furthermore, the participants were asked if postoperative sclerotherapy was given on demand or already planned preoperatively, as part of their therapeutic schedule. Additionally, the time interval between the operation and the first postoperative session of sclerotherapy was asked.
Counted data is given as frequencies and/or percentages and groups have been compared by means of the Chi-Square or Fishers Exact-Test. Continuous data are expressed as mean and standard deviation and groups have been compared using Student's t-Test or the Mann-Whitney-U-Test as appropriate. The rationale for the preoperative planning of postoperative sclerotherapy was discussed over the telephone with the participants involved. All given p- values are two-sided and values less than 0.05 have been considered as statistically significant. SPSS 19 for Windows was used for data analysis. The questioning of an ethic committee was not considered necessary.

## Results

One hundred and thirteen responses were given (Tab I). Private and public practice were almost equally presented. Activities in private hospitals were counted with the hospital group for statistical analysis.
82.3% of the respondents were surgeons, 15.9% phlebologists and two partecipants declared themselves as an angiologist (Tab. I). Their answers were added to those of the phlebologists for calculations.

TABLE I - *Distribution of respondents according to practice, profession, performance of sclerotherapy and surgery.*

| | n | % percentage |
|---|---|---|
| Respondents | 113 | Unknown, see text |
| practice | | |
| private | 55 | 48,7 % |
| hospital | 51 | 45,1 % |
| private hospital | 7 | 6,2 % |
| Profession | | |
| surgeon | 93 | 82,3 % |
| phlebologist | 18 | 15,9 % |
| angiologist | 2 | 1,8 % |
| Sclerotherapy | | |
| Yes | 110 | 97,3 % |
| No | 3 | 2,7 % |
| Surgery | | |
| Yes | 106 | 93,8 % |
| No | 7 | 6,2 % |

TABLE II - *Crosstab of techniques applied versus profession.*

| Applied Techniques | Profession | | N | % |
|---|---|---|---|---|
| | Surgeon | Phlebologist | | |
| Surgery and sclerotherapy | 37 | 7 | 44 | 42,7 |
| Hemodynamic Surg. and Sclerotherapy | 2 | 4 | 6 | 5,8 |
| Surg. or Laser and Sclerotherapy | 17 | 2 | 19 | 18,4 |
| Surg. or Thermal ablation and Sclerotherapy | 4 | 0 | 4 | 3,9 |
| Surg. or Laser or Th. ablation and Sclerotherapy | 30 | 0 | 30 | 29,1 |
| Total | 90 | 13 | 103 | 100 |

Sclerotherapy was performed by 97.3% and surgery by 93,8% of the participants. Seven surgeons declared that they do not perform sclerotherapy as a routine therapy but only postoperatively; three surgeons do not perform sclerotherapy at all. Six phlebologists and one angiologist (all seven in private practice (Chi-Square-test, $p < 0.0001$) who do not operate varicose veins were therefore not included in statistical computations, as well as the three surgeons mentioned above. Consequently, this report includes 103 surgeons and phlebologists who perform perioperative sclerotherapy. Ninety of them are surgeons (87,4%) and 13 (12,6%) phlebologists, 57 (56.3%)of them work in hospital and 46 (44,7%) in an outpatient clinic.
The techniques applied are listed in table II. The majority of respondents combine traditional surgery and sclerotherapy; six surgeons specifically indicated the hemodynamic technique. 30 surgeons use three different abla-

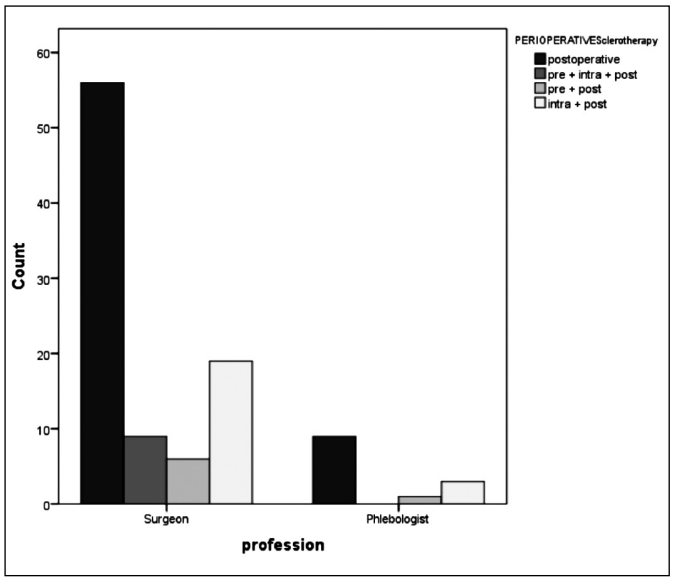


Fig. 1: Relationship between perioperative sclerotherapy and profession.

tive techniques together with sclerotherapy. In total, half of the phlebologically- active physicians exclusively perform surgery (or hemodynamic surgery) and sclerotherapy, and the other half offer the alternatives, surgery or thermoablation or laser combined with sclerotherapy.
There was no difference between private and public practice (Chi-Square-test, p= 0,891) in the techniques applied. However, in hospital surgeons perform significantly more endovascular procedures (Chi-Square-test, p < 0,0001) compared to private practice.
The frequency and type of perioperative application of sclerotherapy related to profession are listed in Fig I. There was no statistical difference between surgeons and phlebologists (Chi-Square, p= 0,699). We did not find any difference regarding the workplace either (Chi-Square, p=0,298).
Perioperative sclerotherapy is merely administred postoperatively by 63.1% of respondents (Table III). 28,2% use also postoperative sclerotherapy, occasionally in combination with preoperative (6,8%) or intraoperative sclerotherapy (21.4%). 8.7% perform the perioperative sclerotherapy pre-, intra- and/or postoperatively.
15,5 percent of interviewees practice sclerotherapy preoperatively, 28,7% intraoperatively and 100% postoperatively (Table IV). 47,6 % of these programme the sclerotherapy preoperatively as a therapeutic plan. 73,8% administer sclerosants on demand, that means when varicose veins are still present at the check up, i.e. without a preoperative therapeutic plan.
The application of intraoperative sclerotherapy was independent of profession, workplace or available techniques. The physicians administer preoperative sclerotherapy to about 15±9%, intraoperative sclerotherapy to 36±33% and postoperative sclerotherapy to 41±28% of their patients. For programmed postoperative sclerotherapy this value amounted to 44±28%, in comparison with sclerotherapy on demand (28±21%) (Table IV).
Postoperative sclerotherapy is administered after 2,3±1,9 months (median 2 mo; minimum 0,10- maximum 12 mo) and is performed significantly earlier in private practice than in hospital (1,8±1,1 v. 2,7±0,3 months; U-Test, p= 0.047). It is also significantly (U-Test, p = 0.002) more often programmed (51% vs. 33%) than in hospital. Sclerotherapy on demand is administered with a higher frequency in private practice (37% vs. 23%) (U-Test, p = 0.008).
Operators who also perform laser-ablations do sclerotherapy more often (39±20%) on demand than those



TABLE III - *Types of perioperative sclerotherapies and their combinations.*

| | | Perioperative Sclerotherapy | | | |
|---|---|---|---|---|---|
| | | **Frequency** | **Percent** | **Valid percent** | **Cumulative Perc.** |
| Valid | postoperative | 65 | 63,1 | 63,1 | 63,1 |
| | pre + intra + post | 9 | 8,7 | 8,7 | 71,8 |
| | pre + post | 7 | 6,8 | 6,8 | 78,6 |
| | intra + post | 22 | 21,4 | 21,4 | 100,0 |
| | total | 103 | 100,0 | 100,0 | |

TABLE IV - *Frequency of perioperative sclerotherapy in percentages given by the respondents and percentages overall all patients within responder.*

| **Periop. Sclerotherapy** | **N** | **%** | **Mean %** | **Median %** | **Min-max %** | **CI** |
|---|---|---|---|---|---|---|
| preoperative | 16 | 15,5 | 15±9 | 15 | 5 – 30 | 95% |
| intraoperative | 29 | 28,7 | 36±33 | 20 | 10 – 100 | 95% |
| postoperative | 103 | 100 | 41±28 | 30 | 2 – 100 | 95% |
| post. programmed | 49 | 47,6 | 44±28 | 30 | 2 - 100 | 95% |
| post. on demand | 76 | 73,8 | 28±21 | 20 | 2 - 100 | 95% |

who prefer termal ablations (13±6%) (U-Test, p = 0,05). Preoperative and intraoperative sclerotherapy are almost equally distributed (U-Test, p = 0.548 and 0.798 respectively) between private and public practice.
Non of the following factors: profession, different techniques or the moment of sclerotherapy had an effect on the interval between surgery and subsequent therapy.
The interval between surgery and postoperative sclerotherapy does not differ between preoperatively programmed or non programmed sclerotherapy, whereas it is significantly longer for sclerotherapy administered on demand (2,5±1,9 v. 1,7±1,4 months ; U-Test, p = 0,028).
There were neither differences found between vascular and general surgeons or non surgeons regarding the percentage of pre- intra- or postoperative sclerotherapy, nor for the planning of postoperative sclerotherapy.
Sclerotherapy on demand only was significantly more often administered by vascular surgeons (80% vs 57%) in comparison to non vascular surgeons (Chi-Square, p = 0.02). Vascular surgeons performed a significantly higher percentage of intraoperative sclerotherapy than non vascular surgeons (51±39% vs 17±6%)(t-Test, p=0,0021)
The sixteen partecipants, who administer preoperative sclerotherapy (16±9% of patients treated) gave the following rationale or indications for this procedure. Eight gave a practical explanation, five a functional one and three use sclerotherapy as a first step in perioperative sclerotherapy for recurrent varicose veins. No differences were found between the three groups regarding workplace (0,597), profession (0,309) or specialization (0,647).

## Discussion

Perioperative sclerotherapy was performed at first by Tavel in 1904 and Schiassi in 1909 [25] and reproposed in the seventies and called "sclerostripping" by P. Conrad [11]. The technique consisted of a high safeno-femoral ligation, stripping of the great safenopus vein and compression sclerotherapy of its tributaries and was suggested for varicose veins associated with moderate to severe great saphenous vein incompetence. This technique found few followers, as did compression sclerotherapy as an alternative to surgery. The introduction of foam sclerotherapy gave a new impulse, not only for sclerotherapy of varicose veins but also for the perioperative sclerotherapy [7,8,19-23]. In fact, there are an unknown number of phlebologists who combine surgery and sclerotherapy as a routine procedure. The real incidence is not known, probably due to a lack of publications. Two articles [26,27], dealing with the behaviour of British and Irish vascular surgeons show a low engagement in sclerotherapy. Only 1% of these surgeons performed sclerotherapy as an alternative to surgery [26]. In these questionaires the participants were not asked about their behavior in perioperative sclerotherapy, perhaps because "sclerostripping" was not considered relevant by the authors. " Sclerostripping" is also not mentioned as a surgical technique in two important overviews [28,29] published at an interval of twenty years.
In contrast, it is interesting that 91% of Italian phlebologically-active physicians perform perioperative sclerotherapy. The present data is hardly comparable to the older data of the former cited surveys and overviews [26-29], when foam sclerotherapy was still unknown. The profession of the interviewees is also different; the English respondents being members of a vascular society and the Italians respondents being a mixture of general practitioners, internal medical specialists, purely flebologists, general surgeons and vascular surgeons.
It is impossible to quantify the ratio of respondents because there were three Italian societies of phlebology questioned and the address lists had a high percentage of incorrect e-mail accounts. Furthermore, there are a lot of phlebologists who do not perform surgery and therefore probably did not answer the questionnaire. This assumption seems supported by the relatively small number of participating flebologists (17,7%) compared to surgeons (82,3%). It is also possible that vascular surgeons, as in Great Britain and Ireland, reject the perioperative sclerotherapy and therefore did not fill out the questionnaire.
Surgeons and phlebologists are equally distributed between private and public services, which reflects the current applications of phlebologically-active physicians in Italy.
Reasons for more venous endovascular interventions in hospital may be at one hand a higher availability in the hospital and on the other hand the relatively high costs of endolaser devices, also as the safety regulations for laser-applications wich may impediment the introduction of laser in private ambulatories. Oddly the percentage of respondents who offer laser ablations (47,6%) in Italy is relatively low compared to the wide use of laser in the United States.
In contrast, the large number of those performers of "sclerosurgery" is striking, especially considering previous, unfavorable studies on sclerotherapy [26,30,31] and the poor success of "sclerostripping" in the eighties. The present revival of perioperative sclerotherapy may explained by the success of foam sclerotherapy.
The term "sclerostripping" however, is not very appropriate because sclerotherapy can be administered preoperatively, intraoperatively and postoperatively. If administered intraoperatively, we can define it properly as sclerostripping, this means combining stripping and sclerotherapy in the same session as suggested by Conrad [11]. If other surgical procedures are applied, it would be more appropriate to define it as "sclerosurgery". Sclerosurgery is quite frequently (27,8%) performed by the respondents.
In contrast, administering sclerosants in addition to a surgical procedure ( pre- or postoperatively) is not scle-

rosurgery or sclerostripping, but must be considered a primary (preoperatively) or a secondary (postoperatively) step in a treatment plan in the case of programmed, perioperative sclerotherapy.

Postoperative sclerotherapy can be considered an adjuvant therapy in order to improve the surgical results and may be called "adjuvant sclerotherapy" to distinguish it from "sclerosurgery" or " sclerostripping". Adjuvant sclerotherapy can be performed on demand, if residual varicose veins are found after surgery, or programmed, i.e. the surgeon interrupts the points of insufficiency and plans to sclerose the residual veins later.

In this context, it is interesting to note the behavior of hospital surgeons and surgeons in general; they perform postoperative sclerotherapy significantly later and programme fewer postoperative procedures. Hospital surgeons prefer to eliminate the varicose veins in one step and therefore do not generally plan an additional sclerotherapeutic session; postoperative sclerotherapy is only performed on demand, when necessary in the surgical follow-up. So sclerotherapy on demand is performed later than programmed sclerotherapy, because it is not part of a treatment plan. In private practice, the programmed adjuvant sclerotherapy is planned quite regularly and significantly more often.

A few participants (n 16) performed preoperative sclerotherapy (15,5%, Table IV). The rationale given was a functional one or a practical one or for recurrent varicose veins. The functional one provides a treatment plan with sclerotherapy of the insufficient saphenofemoral junction or of insufficient perforators first, followed by surgery (stripping and/or ablation of varicose veins). If the functional result leads to a calibre reduction and normalization of the varicose veins (functional result) no further intervention is carried out.

Practical reasons for preoperative sclerotherapy were shortening of the operating time, an improvement of patients' comfort and a reduction of postoperative pain and scars. A reduction of multiple incisions on the limb also lowers the risk of saphenous-nerve-lesions [14]. It may diminish postoperative complications of more invasive procedures [22].

Miniinvasiveness and the reduction of costs are becoming more and more relevant in surgery and also in flebology. These can be achieved by technical alternatives or moving the treatment from hospital in the private practice [32]. Combining surgery with sclerotherapy in different treatment plans, like pre-, intra- or postoperative sclerotherapy undoubtedly helps to attain this goal. Up to now, sclerotherapy after surgery was considered a correction of surgical faults or incompleteness. Nowadays, in the light to the data from this survey, it seems it has lost this negative connotation and instead it is performed as a therapeutical tool for the treatment of varicose veins. The results in the literature seem promising too, but there is certainly a need for more studies and scientific evidence.

## Conclusions

The results of this questionnaire give a rather incomplete survey of the application of perioperative sclerotherapy of Italian phlebologically-active physicians, due to the small percentage of respondents. The reasons for the low response may be because three societies were included with a number of incorrect e-mail adresses and the lacking feedback of interviewees who do not perform perioperative sclerotherapy or surgery at all.

Nevertheless, the answers of 103 participants give an acceptable overview on the current behavior of phlebologically-active physicians in private and public practice in Italy. In particular, it is important to note that perioperative sclerotherapy seems widely used as sclerostripping and as adjuvant sclerotherapy in Italy. It would be interesting to see what the current practice in other European countries is.

In our opinion, there is a tendency towards a more frequent application of perioperative sclerotherapy, which is already adopted for recurrent varicose veins, due to the success of foam sclerotherapy. Perioperative sclerotherapy may help to lead varicose vein surgery to more miniinvasiveness.

The main anatomopathologic indication is the incompetence of the superficial saphenous vein with dependent varicosities with or without perforator insufficiency.

Perioperative sclerotherapy should be differentiated in preoperative sclerotherapy, sclerosurgery and adjuvant sclerotherapy. Preoperative sclerotherapy may be applied for functional or practical reasons.

The reasons for "sclerosurgery" are manifold, some of them complementary and also depending on the moment of application. Sclerosurgery may be performed in order to minimize the recurrence of varicose veins, to shorten operating time, to reduce postoperative pain and discomfort, to resolve the problem in one step, to simplify the intervention, to save time and money, to facilitate ambulatory treatment, to shorten the period of disability.

Adjuvant sclerotherapy is to be distinguished in programmed or on demand, that means as part of a precise treatment plan (programmed) or for corrections of residual varicose veins found unexpectedly on the follow up (on demand).



## Riassunto

Obiettivo: Conoscere il comportamento dei Flebologi Italiani riguardo alla scleroterapia perioperatoria

Materiali e Metodi: Fu chiesto di rispondere ad un questionario, inviato per e-mail, agli iscritti di tre società flebologiche Italiane. Le domande vertevano sul tipo di specializzazione raggiunta, sul tipo di posto di lavoro,

privato od ospedaliero, se l'intervistato eseguiva la sclero-terapia, la flebochirugia e la scleroterapia perioperatoria, ed in particolare se la eseguiva solo pre- o intra- o postoperatoriamente od in combinazione. Venne chiesto inoltre di indicare le relative percentuali, il tempo tra l'intervento e la scleroterapia postoperatoria e se la scleroterapia postoperatoria era programmata già prima dell'intervento o se veniva eseguita a demand in caso di varici residue dopo l'intervento. Gli esecutori di una scleroterapia preoperatoria vennero interrogati telefonicamente sul razionale per questa procedura. Le risposte furono inserite in un database SPSS 19 per Windows. Per variabili numeriche è stato applicato il t- Student test o il Mann-Whitney rank sum test. Dati categoriali vennero analizzati con il test Chi quadrato o Fisher exact test rispettivamente per numerosità inferiori a 100. La significatività statistica venne presunta per valori di p inferiore a 0,05.

RISULTATI: 113 colleghi risposero al questionario. 10 partecipanti furono esclusi dall'analisi statistica perchè non eseguivano scleroterapia o chirurgia. Dei 103 partecipanti rimanenti 90 (87,4%) sono chirurghi e 13 (12,6%) flebologi; di questi, il 56,3% esercita in struttura pubblica, il 44,7% in struttura od ambulatorio privato. La scleroterapia perioperatoria viene praticata dal 63,1% solo come procedura postoperatoria. L'8,7% la esegue sia pre, intra- e postoperatoriamente. Il resto combina due di queste tre procedure (28,2%). La scleroterapia preoperatoria viene eseguita sul 15±9%, quella intraoperatoria sul 36±33% e quella postoperatoria sul 41±28% dei pazienti. Essa viene programmata significativamente più frequentemente (p=0,014) e prima nel tempo (1,8+/-1,1 verso 2,7+/-0,3 mesi; p=0,016) in ambulatorio privato. I chirurghi vascolari eseguono una percentuale significativamente (p= 0,02) più alta di scleroterapie intraoperatorie.

In ospedale vengono eseguiti significativamente più interventi endovascolari che nel privato.

La scleroterapia preoperatoria (n. 16) viene scelta o per ragioni funzionali (n. 8) o per ragioni pratiche (n. 5) o in varici recidive (n. 3).

CONCLUSIONI: La scleroterapia perioperatoria può essere impiegata come terapia aggiuntiva al gesto chirurgico per migliorare il risultato chirurgico e dovrebbe essere chiamata "scleroterapia adjuvante" per distinguerla dalla scleroterapia di per se e dalla "sclerochirurgia" o dallo "sclerostripping", che vengono eseguiti insieme al gesto chirurgico, intraoperatoriamente.

Le risposte di 113 partecipanti danno un'impressione attendibile dei comportamenti attuali in tema di scleroterapia perioperatoria degli operatori Italiani in campo flebologico.

La scleroterapia perioperatoria sembra ampiamente usata come sclerochirurgia e come scleroterapia adjuvante con il raggiungimento di una maggiore miniinvasività del gesto chirurgico. Il razionale della sclerochirurgia è multifattoriale.

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