

MEETING REPORT

Recurrent varices after surgery (REVAS), a consensus document

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Report of the meeting† held in Paris on 17th & 18th July 1998 with participation of: Ugo Baccaglini, Italy; Pierre Barthelemy, France; Jean-Claude Couffinhal, France; Denis Creton, France; Simon Darke, United Kingdom; Ralph De Palma, United States of America; Bo Eklof, United States of America; Ermenegildo Enrici, Argentina; Gilbert Franco, France; Jean Pierre Gobin, France; Louis Grondin, Canada; Jean-Jerome Guex, France**; Georges Jantet, France; Claude Juhan, France; Jordi Maeso y Lebrun, Spain; Philippe Nicolini, France**; Andreas Oesch, Switzerland; Marcelo Paramo-Diaz, Mexico; Michel Perrin, France*; Paul Puppink, France; Eberhard Rabe, Germany; Rene Rettori, France; John Royle, Australia; Vaughan Ruckley, United Kingdom; Michel Schadeck, France; Jean Claude Schovaerds, Belgium; John Scurr, United Kingdom; Georgio Spreafico, Italy; Jan Struckman, Denmark; Frederic Vin, France

Recurrent varicose veins after surgery (REVAS) are a common, complex and costly problem. The frequency of REVAS is stated to be between 20 and 80% depending on the definition of the condition. A consensus meeting on the topic (Paris 1998, July) decided to adopt a clinical definition: the presence of varicose veins in a lower limb previously operated on for varices. The pathology of recurrent varicose veins has been poorly correlated with clinical examination and operative findings.

Clinical diagnosis remains essential but does not allow a precise assessment of REVAS. Consequently, the use of imaging investigations is essential. Duplex scan is considered as the method of choice. Both clinical diagnosis and imaging investigations allow the development of a classification for every day usage and future studies. This new classification of CEAP needs to be expanded to define the sites, nature and sources of recurrence, the magnitude of the reflux and other (possible) contributory factors. Methods for REVAS treatment include compression, drugs, sclerotherapy and redo surgery. There was no general consensus in favour of sclerotherapy, surgery or both to treat REVAS. Very few data were available to assess the results of treatment. Factors responsible for recurrence and recommendations for primary prevention were debated and are presented in this article.

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Introduction

Recurrent varices after surgery are a common, complex and costly problem both for the patients and

the physicians who treat venous diseases. Because of many different approaches, it was felt that a need existed for an international consensus meeting to discuss this topic. The panel reviewed the literature published in English and French on the subject, but other language publications were not reviewed. Some valuable papers may have been missed as a consequence but logistics made a complete series impossible. The group considered anatomical, clinical, pathophysiological, and instrumental (Duplex-

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Doppler) definitions. It also evaluated frequencies, prevalences, cost effectiveness of investigations and treatments and preventive methods. In many instances, the lack of data of various treatments on REVAS (Redo surgery, Sclerotherapy) as well as the lack of Type I evidence made the work of the panel and its conclusions very difficult. The meeting was held under the patronage of the Société Française de Phlébologie, the Union Internationale de Phlébologie and the Société de Chirurgie Vasculaire de Langue Française. This explains the unequal participation of French Physicians, especially in the selection of references, preparatory meetings and the final summary of the meeting. An attempt was made to collect a wide mix of medical and surgical skills on to the panel.

REVAS =

'REcurrent Varices After Surgery'

DEFINITION:

The presence of varicose veins in a lower limb previously operated on for varices. (With or without adjuvant therapies).

COMMENTS:

- This is a *clinical* definition, which includes: 'true recurrences', residual veins, and varicose veins as a consequence of progress of the disease.
- *Hemodynamic* abnormalities will also be discussed in the consensus paper.

Epidemiology & socio-economic consequences

There are no reliable epidemiological data specifically relating to recurrent varicose veins.

Frequency

Many retrospective studies are available and have been reviewed by Eklof and Juhan [1, 2]. These studies are not comparable because of differences in the definition of recurrence, the initial treatment, the classification, the method and duration of follow-up. The studies indicate a rate of clinical recurrence (leading to reoperation) ranging from 20 to 80% [3] between 5 and 20 yr. The rate of recurrence increases with time. Juhan [2] assumed a recurrence rate of around 50% to 5 yr. The average time between the first and second operations is usually long: ranging from 6 to 20 yr. (See *Table 1*) (table 1 in Puppink [4]). Few radiological or vascular laboratory studies have been carried out (instrumentally observed abnormalities do not imply severe recurrence or Chronic Venous Disease (CVD)). Incidentally Jones [5] showed a Duplex-detected recurrence

rate at 2 yr of 43% after surgical ligation and 25% after ligation and stripping although 89% of the patients remained satisfied with the results (average: 32% of clinical recurrences). In this study and those of Glass [6, 7] the surgical technique was always thought to be satisfactory; no additional sclerotherapy was carried out. Glass [6, 7] reported a recurrence rate of 25% after four or more years using a standard technique.*

Couffinhal [8] reported clinical and duplex evaluation of a 100 consecutively operated patients who were followed for two years. Hemodynamically 76% of these patients had a good result: 60% had no reflux and 16% had moderate reflux. These patients were also asked to assess their own satisfaction rate. They express total satisfaction in 75% of cases, whatever the objective hemodynamic finding.

Although the combination of surgery and post-op sclerotherapy is thought to be better than surgery alone [9], no prospective data yet exist to confirm that this strategy has a lower recurrence rate. The sources of reflux (described further in 'classification'), in relation to the primary surgery, are listed in *Table 2* (table 3 in [2]). The rate of repeat surgery varies from 7.5 to 25% and is summarised in *Table 3*. The differences between rates of redo surgery probably relate to the widespread use of sclerotherapy by French teams who have reported lower percentages of redo surgery [4, 8, 10, 11].

Socio-economic consequences

At present there are no published socio-economic data on recurrent varicose veins. In order to demonstrate the range of costs, data from 20 selected patients having long saphenous surgery were gathered by Nicolini and Fasquelle in a private hospital. Hospital/op costs including the price of operation, the length of hospital stay and the immediate post operative treatment. Post-op costs include the nurses' fees, sclerotherapy, cost of time off work, and were calculated over a two-month period (*Table 4*). The cost difference was related to the length of hospital stay which itself was related to the higher complication rate. Creton has reported that, the price in France of an initial day-case surgical procedure on the long saphenous vein is 760€ (additional 230€ for one night hospitalisation).

Prospective studies are needed to evaluate:

- The frequency and socio-economic consequences of REVAS

*Standard surgical technique = juxta-femoral (or popliteal) ligation and division with removal of greater (or short) saphenous vein with multiple phlebectomies.

Table 1 Time to redo surgery

Author	Year	Mean time (yr)
Rivlin	1966	6
Lofgren	1972	10
Olivier	1975	6
Gedeon et al. [10]	1982	11
Greaney and Makin [58]	1985	9
Corbett et al. [43]	1988	16
Darke [51]	1992	20
Perrin et al. [11]	1993	12

Table 2 Sites of reflux according to initial operation

Operation (number of legs)	Sapheno-femoral junction reflux (%)	Mid-thigh perforator reflux (%)	Leg perforator reflux (%)	Sapheno-popliteal junction reflux (%)	Gastrocnemius vein reflux (%)
LVS (110)	67	38	62	34	20
SSV (6)	67	0	83	33	0
LVS + SSV (19)	42	26	47	26	74

Table 3 % Reoperations of varices in venous surgery

Author	Year	Mean time (yr)
Rivlin	1966	25
Lofgren	1972	24
Gedeon et al. [10]	1982	10.8
Perrin et al. [11]	1982	7.5
Darke [51]	1992	21
Puppincq et al. [4]	1995	17
Couffinhal [8]	1996	18

Table 4 Examples of values of costs in initial and re-operations

Procedure	Hospital/operation cost (€)	Post-op cost (€)	Time of hospitalization (days)
Initial operation	1070	1140	1.5
Reoperations:			
Uneventful	1295	2060	2.3
With complications	2870	5860	10

- Risk factors which predispose to recurrent varicosities
- How a treatment affects the natural history of primary and recurrent varicose veins

Pathology: documentation of clinical and operative findings

Few studies have been carried out which attempt to correlate the pathology with radiological or ultrason-

ographic findings. There are no studies which have attempted to correlate the operative findings with clinical examination. When the operative findings are recorded in patients with REVAS, it is suggested that the following should be documented.

1. Sapheno-femoral and sapheno-popliteal junction areas [12–14]

The site of the previous scar: which should be related to the groin or popliteal creases. The presence of scar tissue and its relation to the deep fascia.

The characteristics of the tissues: fibrosis (chronic inflammatory reaction), lymphatic proliferation (lymph channels and/or nodes), varicose venous channels (cavernoma) embedded in the scar, collateral venous channels bypassing the junction.

The sapheno-femoral (or popliteal) junctions: is there evidence of previous interruption? If yes, specify ligation, clip or other; an absolutely intact junction; a stump still connected to recurrent varices via tributaries or neovascularisation; neovascularisation between varices and the deep trunk, without any residual stump. Neovascularisation is described by Glass [15] and Nyameke [16] as 'serpentine neovascular veins between a thigh varicosity and the common femoral vein'.

No connection in the area between REVAS and deep system [17], that is: complete sapheno-femoral (or sapheno-popliteal) disconnection, varices in thigh or calf may still be connected to tributaries or to remaining trunks.

2. Perforating veins

Has there been previous surgery to the perforators? If so, was the previous surgery extra or sub-fascial, and is there evidence of previous perforator interruption? (e.g. clip, ligation)

3. Long and short saphenous trunks & networks

These vessels may be better assessed by imaging than by operative findings.

4. Microscopy

Studies by Glass [15, 18] and Nyamekye [16], have shown that areas of neovascularisation consisted of tortuous, thin-walled veins, whose media was of variable thickness. There was a complete absence of mural nerves in the neovascular veins. While these features appear to be characteristic of neovascularisation, we do not know if these are the cause or consequence of REVAS.

It is difficult to access all these changes during reoperations and it is therefore vital to carry out pre-operative imaging investigations, on patients with REVAS.

Clinical diagnosis of recurrent varicose veins

Modes of presentation

Patients who have had previous surgical treatment of varicose veins may consult their physician for various reasons: Unsightly recurrent varicose veins especially

common in female patients; symptomatic recurrent varicose veins; or recurrence found at routine follow up.

Diagnostic level 1 consists of medical history, physical examination, and continuous wave Doppler examination. Other non invasive investigations are defined as Level 2. Invasive investigations are defined as Level 3.

The following details should be documented:

Medical history

Previous treatment: The date of previous treatment for varicose veins, the age of the patient at the time of surgery; the name of the surgeon and the place of operation in order to retrieve the operative record; date of the onset of recurrence, symptoms of chronic venous disease after surgery, surgical complication including lymphedema. Other treatment after initial surgery: e.g. sclerotherapy, use of compression stockings and leg elevation.

Recurrent varicose veins: Family history of varicose veins and a general history including pregnancies [19], and hormone therapy [19], deep vein thrombosis, obesity and a change of occupation should be recorded, related to varicose veins [20]. Aching legs, pain, heaviness fatigue, itching, burning, leg swelling (disappearing after leg rest), cramps, restless and throbbing legs [21] should be sought. Some authors [4, 22] have reported that recurrent varicose veins are associated with more severe symptoms and signs. Complications, including superficial thrombophlebitis, lymphedema, infection, hemorrhage, skin changes (including lipodermatosclerosis and ulceration) must also be recorded.

Physical examination

This should include inspection for telangiectasias, varicose veins in previously treated areas and in new areas. Leg swelling may be apparent and oedema must be documented. Circumference of both legs should be measured for comparison. Skin changes including eczema, pigmentation, lipodermatosclerosis, and active or healed ulceration and superficial thrombophlebitis. The presence of scars must be noted (especially the groin or popliteal fossa). The relationship between scars and recurrent varicose veins or neurological lesions (numbness, etc) must also be documented. Arterial pulses should be examined and a doppler ankle brachial index is desirable. A general examination including abdominal palpation should be performed.

Continuous wave doppler examination

An audible reflux in the groin, popliteal fossa or at any other site indicates a need for Duplex examination.

Remarks

Medical history, physical examination and CW Doppler examination (diagnostic level 1) do not provide all the necessary information for using the CEAP classification [23] of recurrent venous disease. In the great majority of patients with REVAS further investigations are necessary (diagnostic level 2) with duplex scan or plethysmography); level 3: Invasive testing with ascending and descending venography, and venous pressure measurements may be necessary in order to complete the classification and to aid a decision regarding treatment, and to assess its results. Clinical manifestations ('C') can be derived using level 1 diagnostic tests, but the Etiologic classification ('E'), the newly proposed anatomic classification (Extended and Epitomised 'A', CF infra) and pathophysiologic findings ('P') all require further more detailed tests.

Severity scoring: The Consensus Group [24], added to the CEAP classification, [23], and their modification can be used for clinical evaluation of REVAS. It was suggested that, pain, oedema, venous claudication, pigmentation, lipodermatosclerosis, ulcer size, ulcer duration, ulcer recurrence and the number of ulcers should all be scored 0–2 to give a maximum score of 18. Rutherford [25] has also proposed a new scoring system. The consensus group has also suggested a *Disability score* which could be graded: 0: asymptomatic; 1: symptomatic (the patient can work without leg compression); 2: symptomatic (can work only with leg compression); 3: total disability. The anatomical score is based as the number of segments involved (deep, superficial, perforators) and requires more complex investigations. Clinical severity can also be tested by assessing 'quality of life' with Launois' questionnaire [26], or other quality of life questionnaires.

Specific clinical features that may suggest the etiology and prognosis in recurrent varicose veins

Many factors, including whether the venous disease is diffuse or localised, the patient's gender, hormonal states and relationship of the recurrence with pregnancy may be important. Large varicose veins in a previously operated area appearing a short time after surgery are worth noting. A poorly placed incision, the development of reflux in other territories and the status of deep venous system may also be important factors in the development of recurrence. Level 1 tests can be used to assess the clinical manifestations of recurrent varicose veins ('C') but cannot determine E, A, nor P in the CEAP classification. In most patients this information is necessary to decide the best form of treatment. Further investigations (level 2 or 3) are therefore strongly recommended.

Instrumental investigations (vascular laboratory and radiology)

Analysis of the literature on the instrumental investigation of REVAS is difficult because different authors have used different classification systems, definitions and methods of investigation. The role the REVAS consensus meeting was to define the most appropriate investigations and to provide guidelines for use of non-invasive tests.

Available investigations include:

1. Continuous wave Doppler examination [27].
2. Duplex scanning [28–41], preferably with colour coded imaging. It was felt that Duplex scanning should be performed in the upright or semi-recumbent position. Examination of the patient solely in the supine position provides inadequate information.
3. Various methods of plethysmography.
4. Venography. This could be subdivided into: ascending and descending venography and varicography [17, 42–49].
5. Vein pressure measurement.

Investigations should provide an accurate guide for subsequent treatment and should answer the following questions (Q):

Q.1

Where is (are) the main source(s) of reflux? Reflux from deep to superficial systems (saphenous termination, perforator), reflux from abdominal or pelvic veins, no source of reflux.

Q.2

What systems (GSV, SSV, NS), and veins (trunks, tributaries) are fed by the sources. And how can the extent of the varicose network be described?

Q.3

How important is the main source if reflux in the genesis of the varicose veins?

Q.4

What is the nature of the recurrence (causes, mechanisms)?

Q.5

What is the status of the deep venous system?

Q.6

What is the hemodynamic severity of the disease?

Q.7

What is the best therapeutic option? What areas require surgical exploration?

What are the most suitable investigations to answer these questions?

Duplex ultrasound (particularly when colour-coded) outweighs all other diagnostic techniques for recurrent varicose veins. It is recommended that Duplex scanning should be routinely performed with the possible exception of patients with minor, cosmetic trivial, branch varicosities. Duplex scanning provides accurate answers to Questions 1 and 2 and enables a dynamic map to be drawn. Despite arguments developed by Franco [30, 31], no consensus has been obtained on the instrumental grading of reflux. Evaluation of reflux must take into account clinical as well as Duplex information.

It is very often feasible with Duplex alone to demonstrate the mechanisms and causes of recurrences, but correlation between Duplex, operative findings and histology are lacking in the literature. The status of the deep venous system can be satisfactorily assessed with Duplex, which gives reliable information on anatomy, reflux and obstruction, but may not define the etiology is secondary, primary or congenital.

The hemodynamic severity of the venous disease can be assessed by Duplex but only on the basis of anatomy and velocity. For example: the number of incompetent venous segments, their diameter and the duration of reflux. Duplex alone clearly does not give the answer to the best therapeutic option. This point will be discussed later.

Recommendation: In research protocols and for study of REVAS, complete Duplex scanning (including lower limbs, iliac veins and IVC) should be performed before and after treatment.

Venograms: In some cases, Duplex may not provide sufficient information on the sources and nature of the recurrences. In such situations, varicography or popliteal dynamic phlebography are helpful. When deep venous reconstruction is being considered, ascending and descending phlebography may be helpful.

Plethysmography and blood pressure measurement: These techniques can be used for research studies and in severe CVD (CEAP grade 4–6). They assess calf pump function, reflux and obstruction, but give no anatomical information and are of no help in deciding the subsequent treatment.

Classification

Since ultrasonography has been available, several classifications have been put forward [1, 14, 17, 50, 51]. However, these have not been widely used.

This new classification is intended to be simple and practical, to serve everyday clinical practice as well as for undertaking research studies into the epidemiology, clinical status and therapy of recurrent varicose veins.

For proper classification, it is assumed that patients will have been comprehensively investigated as discussed above.

It is recommended that tables used in CEAP [23] (Clinical, Etiologic & Pathophysiological classifications), and those proposed by the Consensus Group [24] (Clinical and Disability Scores) should be employed routinely. Since the original anatomical classification is not appropriate for recurrences, it has been expanded and customised for the specific needs of REVAS as described below:

T is for Topographical sites of REVAS

g is for Groin, **t** for Thigh, **p** for Popliteal Fossa, **l** for Lower leg (including ankle and foot), **o** for Other.

Since more than one territory may be involved in the same limb, topography gives a degree of quantification as to the extent of the recurrences.

S is for Source of recurrence

It is considered essential to identify the source of reflux from the deep system, from which the reflux occurs, when it is present.

0 is for no source of reflux, **1** for Pelvic/Abdominal, **2** for Sapheno Femoral Junction, **3** for Thigh Perforators, **4** for Sapheno Popliteal Junction, **5** for Popliteal Fossa Perforator, **6** for Gastrocnemius Veins, **7** for Lower Leg Perforators.

R is for Reflux

Although it is recognised there are limitations in quantifying the degree of reflux from various sites, the clinician should estimate the clinical significance of reflux. This estimate should be based on both the Duplex and Venographic information, and an evaluation as to how the degree of reflux relates to the overall clinical situation. **R +** is for clinical significance probable, **R -** for clinical significance unlikely, **R?** for clinical significance uncertain.

N is for Nature of sources

This initial classifies the source as to whether or not it is the site of previous surgery and describes the cause and timescale of recurrence respectively.

● Ss is for Same Site

1: technical failures, 2: tactical failures, 3: neovascularisation, 4: uncertain, 5: mixed

- **Ds** is for Different (New) Site
 - 1: persistent (known to have been present at the time of previous surgery)
 - 2: new (known to have been absent at the time of previous surgery)
 - 3: uncertain/not known (insufficient information at the time of previous surgery)

C is for Contribution from persistent incompetent saphenous trunks

AK: great saphenous (Above Knee), **BK:** great saphenous (Below Knee), **SSV:** short saphenous, **Ø:** neither/other.

Certain clinical data should be gathered and reported in the medical file:

F is for possible contributory Factors

gF: General: Family history, obesity, pregnancy, hormones.

SF : Specific: Primary deep venous incompetence, post-thrombotic syndrome, iliac vein compression, congenital (angiodysplasias), lymphatic, calf pump dysfunction.

Methods of treatment

Compression

Graduated compression is frequently recommended and obviously improves symptoms and signs, but it does not cure the disease. Medical stockings and bandages of various strength and elasticity can be used. Walking and physical activities are encouraged.

Drugs

Drugs are prescribed to improve oedema and symptoms. The most commonly used are the flavonoids but many others exist. These agents are not routinely used in all countries.

Operational procedures: sclerotherapy and surgery

These share the same goals: to eliminate reflux from deep to superficial systems and to suppress varices in order to decrease the venous pressure, minimise complications, prevent worsening of CVD and avoid further recurrences. These are indicated and applied

according to the findings of clinical assessment and instrumental investigations.

Sclerotherapy

Sclerotherapy and Ultrasound Guided Sclerotherapy (USGS) can be used for all types of varices primary or recurrent. Various techniques have been described. Sigg, Fegan and Tournay's techniques are the most frequently used but many other variations exist. To date there is no general agreement on the techniques, doses, concentrations, and sclerosing agents [52]. This is probably even more true for REVAS. Some degree of consensus is however required if the efficacy of the technique is to be evaluated.

USGS in REVAS has been described [53, 54]. Different protocols are adopted when dealing with large diameter varices: North American and Australian phlebologists use higher concentration of sclerosants and compression from the first session, while French phlebologists progressively increase doses and volumes and do not use compression. The endpoint of both technologies should be to obtain an immediate and durable venospasm (occlusion or constriction of the veins). Injections should begin at the main and more proximal sources of reflux. Good results with USGS have been published in the treatment of primary varices [55] and possibly also in REVAS (perforating veins [38, 56]). In the opinion of the working group, this technique is worth further evaluation.

Surgery

General principles: exploration of a previously operated site: in order to avoid scar tissue, lymphatic nodes and small venous channels, the deep vein is approached first. Flush ligation and resection of the stump is recommended. Construction of a barrier between the deep veins and superficial tissues can be achieved by means of muscle or fascia flaps, or by suturing a patch over the deep vein. This procedure is intended to prevent neovascularisation. Eradication of all associated varices is recommended. Phlebectomy and/or sclerotherapy can achieve this result.

Specific approaches:

Groin (sapheno-femoral junction). Many approaches have been used [1, 4, 57-64] without comparative evaluation. Construction of a barrier with a patch has given encouraging [6, 7, 12, 64] and disappointing results [65].

Thigh. The residual trunk of the long saphenous vein can be avulsed by stripping (pin stripping according to OESCH [66] is recommended) or stab avulsion. Incompetent perforators can be treated by hook phlebectomy

[67] or by a direct approach, the latter needs large incisions that are cosmetically unsatisfactory.

Popliteal fossa. Different types of incisions and approaches have been described [1, 4, 64, 67–72] but not evaluated. A transverse skin incision and longitudinal fascia section is recommended.

Leg perforators. They can be treated by a subfascial direct approach or by a Subfascial Endoscopic Perforator Section (SEPS).

Deep veins. Deep venous reflux must be suspected in REVAS, abnormalities observed are Post-Thrombotic Syndrome and Primary Deep Venous Reflux (PDVR). In selected cases of PDVR, valvuloplasty can be considered [73].

Pelvic venous problems. Even though surgical (open or laparoscopic) ligations have given satisfactory results, the trend is in favour of coil embolisation.

Factors predisposing to recurrence, recommendations for primary prevention

Factors of recurrence

1. Recurrence from inadequate or incomplete initial treatment
 - (a) tactical error: failure to adequately identify initial pathology.
 - (b) technical error: failure to carry out technically adequate primary treatment.
 - (c) incomplete: failure to complete the primary plan of treatment.
2. Recurrence from evolution or progression of varicose disease.

There are no scientific data concerning the mechanism responsible for the progression of the disease. But clinical observation suggests a list of factors which may accelerate the process sex, heredity, hormonal status (especially pregnancy [9, 19, 74, 75], but also contraceptives and hormone replacement therapy); occupation; sports; nutritional habits; inherited abnormality and; deep venous reflux [76–79].

Prevention

1. Preoperative duplex 'mapping' (before any primary operation) is strongly recommended [71, 80–87].

To obtain qualitative and quantitative infor-

mation concerning the various leakage points in order to avoid incomplete surgical treatment.

To evaluate anatomic variants.

To locate perforators or atypical sources of reflux.

To evaluate the deep venous system.

2. Surgical technique

The majority of authors emphasise the absolute necessity of performing 'flush' sapheno femoral/popliteal junction ligation and division. No residual stump should be left and all tributaries must be divided beyond their bifurcation, in French 'crossectomie' (not just simple high ligation). There is no convincing evidence of the usefulness of the 'patch procedure', special fascia closure or intimal coagulation to prevent further recurrence located in the groin. [12, 16, 65].

The flush ligation-division must be performed in association with removal of the main venous trunk [3, 5, 88–91]. Most authors perform limited removal to below the knee.

3. Perioperative treatment

Some surgeons routinely prescribe low molecular-weight heparin to prevent deep vein thrombosis, but there is no evidence to substantiate this approach. Prevention of DVT should follow the general rules for prophylaxis. In addition prophylaxis is recommended for all patients with a predisposition to DVT (past history of DVT, family history of DVT and coagulation disorders). The general opinion was that postoperative compression is useful in preventing hematomas, which are the sources of chronic inflammation and discomfort. [92]. Long-term compression might prevent REVAS but no current data exist.

4. Follow-up

Patients should be assessed clinically and by Duplex within 6 months after the surgical procedure, in order to identify persistent reflux between the deep and superficial systems and to determine the presence of residual veins and the possible need for further treatment. Long term follow-up by (clinical examination and duplex if necessary) should be carried out in all patients for a minimum time of 5 yr. It is not known yet whether hemodynamic recurrence without obvious clinical recurrence leads to further REVAS [5]. Post-operative and late sclerotherapy is thought to enhance the quality of the treatment and to reduce the rate of recurrence [93].

Indications for treatment of REVAS

Patients with REVAS can be divided in two main categories: (i) Patients complaining of symptoms or esthetic concerns, or presenting with signs of chronic venous disease (CVD); or (ii) subjects attending a routine follow-up (whether a personal or physician's decision). Perrin [11] evaluated 145 limbs in 105 patients with symptomatic recurrent varices and found that 82% of the patients spontaneously requested treatment. The symptoms consisted of leg pain (82%), poor cosmetic appearance (52%), oedema (48%), or ulceration (11%). Quigley [21] has investigated 100 limbs in 70 consecutive patients with REVAS. Pain or itching was present in 37%, swelling in 35%, cosmetic complaints in 20%, cramps, eczema, and bleeding from a varix in 2%; Skin changes were observed in 40% including active or healed ulcers in 29%.

The decision whether to obtain further investigations and proceed to treatment depends on the presenting complaint and the clinical findings. When there are only vague symptoms of heaviness, aches, etc) and if there are neither varices nor hemodynamic abnormalities on Duplex scan: grade 1 compression stockings are indicated. There is no evidence that proves the efficacy of veno-tonic drugs in this situation. Sclerotherapy or local stab avulsion on request of patients can be used to treat cosmetic problems.

When hemodynamic abnormalities are found in asymptomatic patients, the treatment depends on the severity of the non-invasive findings, and in all cases requires follow-up. No precise data exists on further evolution of these patients.

In symptomatic patients presenting with varices and hemodynamic abnormalities, the treatment should address the sources of reflux and remove the varicose networks as well.

Treatment of sources of reflux: In patients suffering from severe CVD (Grades 4 to 6 of the CEAP classification), and in patients with sources of reflux of probable clinical significance, surgical treatment is usually indicated. Ultra Sound Guided Sclerotherapy (USGS) is an interesting alternative but had no objective or long-term evaluation enlists. In patients with clinical and instrumental REVAS, the following policy is proposed:

'Same sites': (R +) surgery is recommended; an evaluation of USGS with long-term follow-up must be undertaken before this is recommended. If R - , follow-up with Duplex is advised. If R? suppression of the source of reflux can still be recommended but no evidence exists. It is important to emphasise that the recurrences at the same sites are mostly located at sapheno-femoral or sapheno-popliteal junctions.

'Different sites' are mostly represented by the other saphenous systems and incompetent perfor-

ators. The treatment will vary according to their location and the clinical status of the patient. Medical leg perforators appear to be satisfactorily treated by subfascial endoscopic perforator surgery (SEPS) when skin changes are present, provided there is no deep venous obstruction. In other circumstances or locations, perforators can be treated by the usual techniques. The indications for perforator surgery have yet to be defined.

Treatment of varicose networks: there is no consensus on the best techniques to be used but when a persistent saphenous trunk is present, the stripping using Pin Stripper [66] and USGS are possible options. Sclerotherapy and stab avulsions are appropriate for all other varices. Comparative studies of the various methods are not available.

Co-existing deep venous insufficiency has serious implications [73, 76-78]: a more severe clinical symptoms a higher rate of recurrence, poor results of redo surgery. Treatment of primary deep venous incompetence should be considered possible, when justified by clinical severity.

In conclusion, many prospective and comparative studies are necessary: comparison between surgery and USGS in: junctional recurrences (technical failures or neovascularisation); perforator incompetence; comparison of sclerotherapy and stab avulsion in the treatment of varicose networks; assessment of measures to prevent neovascularisation such as the interposition of prosthetic material at the sapheno femoral junction.

Results of treatment of REVAS

There are few data on the results of REVAS. None exists on sclerotherapy or USGS treatments with long term follow-up. A small number of papers report follow-up data.

Eklof [1] and Juhan [2] reviewed the published outcomes after reoperation for REVAS and conclude that 'the long term results show a recurrence rate approximately 35% after redo surgery'. Davy [94] was the first to postulate neovascularisation. He examined the case histories of 400 patients with REVAS. Of these, 107 (95 female, 12 male) recurred even though they were given correct treatment initially and complementary sclerotherapy. All patients had had preoperative venography, but there was no information on the presence of reflux at the sapheno femoral junction or in the deep system. After this redo surgery in the groin, which confirmed that the sapheno femoral junction had been ligated flush to the femoral vein, complementary sclerotherapy was carried out. Twenty-three cases were cured (21.5%), 47 cases showed moderate improvement (44%) and 37 cases (all females) had a poor result (34.5%). Despite some bias, this study suggests that

surgery does not deal efficiently with neovascularisation in the groin.

Perrin [11] reported the results of redo surgery on 145 limbs and 105 patients with REVAS. All of them had a major reflux from the deep system feeding the recurrent varices, which was treated by corrective surgery with or without additional phlebectomy. Post-operative sclerotherapy was performed in all patients. Independent (external audit) follow-up after 5–6 yr revealed an 85% objective improvement. There was a (better improvement of signs and symptoms than cosmetic appearances). In these circumstances, it seems that redo surgery followed by sclerotherapy might be a desirable sequence. The lack of a well-documented and large series on the treatment of REVAS is obvious and highlights the need for prospective studies.

Guidelines for prospective REVAS studies

The REVAS project has highlighted that the evidence base for much of phlebological practice is tenuous. This is not only a reflection of the paucity of high quality clinical trials in the literature but also a lack of agreement on the terminology definitions and classification of venous disease. In the recent development of the CEAP classification has been an important landmark.

In order to build a scientifically convincing evidence base and to achieve a degree of comparability between studies a greater degree of international consensus and conformity is required. The following issues were identified by the REVAS working party and suggestions put forward for studies.

General principles

Terminology and definitions

Phlebology has numerous eponymous nomenclatures in its literature particularly when describing venous anatomy and surgical procedures. While reflecting the valued contributions of many eminent predecessors these nomenclatures obscure clarity and precision. Authors when using terms for pathological states, procedures and clinical observations such as chronic venous insufficiency, recurrent varicose veins etc should define what they mean. It is time to move to a precise terminology.

Clinical trials

While there will continue to be a place for reports of surgical series and new techniques these are no longer acceptable as a basis for clinical management policies, especially if such policies have important health care cost implications. Much more of phlebological practice requires to be evaluated by clinical trials, which should be of sufficient size and of strict

statistical design to ensure meaningful analysis and outcomes. Furthermore, since it is now recognised that single trials seldom provide sufficiently firm evidence on which to base important management policies; trials need to be designed with protocols that have enough in common with related trials in the field to facilitate grouping of data. In addition to clinical end points trials should wherever possible include socio-economic data in the form of quality of life and healthcare cost analyses.

Where for any reason clinical trials are not feasible then the principles of precise universally agreed terminology, definition, classification, pre- and post-operative patient assessment, adequate numbers for statistical analysis and duration of follow up require to be applied to the process of quality assurance.

Specific recommendations for future studies

1. Epidemiology and socio-economics: Prospective epidemiological studies with adequate duration of follow-up are required in which risk factors, investigations, treatment procedures and socio-economic aspects are documented in detail from the outset.
2. Pathology: Better understanding is required concerning the correlation between pre- and post-operative patterns of anatomy and physiology, the interventions, whether surgical or sclerotherapy and the pathological processes of recurrence.
3. Patient assessment: Further studies on the relationship between symptomatology and objective assessments would be valuable. The indications for intervention in venous disease should be fully documented e.g. by the CEAP classification including disability scores. However since the symptoms customarily attributed to varicose veins are in the main non-specific they should be supported, in studies of recurrent varicose veins, by objective assessments with duplex scanning and/or tests of venous function before and after intervention. In order that the outcomes of therapies can be evaluated and studies compared it is essential that patient populations be fully defined both in terms of their clinical status and the patterns of valvular insufficiency in the superficial and deep systems before and after the intervention.
4. Therapy: Many prospective studies and clinical trials are required. A few examples follow.
 - Risk factors for varicose recurrence.
 - The relationship between varicose recurrence, pre- and post-operative patterns of venous insufficiency and the nature of the interventions.
 - The value of routine pre-operative duplex scanning prior to first time surgery for varicose veins.
 - 1 The value of routine post-operative scanning in

the early detection and management of persisting reflux.

- The relationship between hemodynamic and clinical recurrence.
- The role of compression therapy in preventing recurrence.
- Measures to prevent neovascularisation.
- Role of follow-up sclerotherapy after surgery in preventing recurrence.
- Ultrasound guided sclerotherapy versus conventional sclerotherapy in junctional recurrence and perforator incompetence.

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