

### **(changes in operative procedures over 7 years)**

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#### **SUMMARY**

The evolution towards more preservation-orientated varicose exeresis surgery comes from the desire to avoid functional vein exeresis; it was made possible by perfecting non-aggressive operations, which were thus easier to repeat; it required the use of preoperative ultrasonic examinations. The progressive systemisation of preoperative ultrasonic examinations helped our operative indications in varicose exeresis surgery to evolve. 3,916 indications of varicose exeresis were studied over a period of 7 years. In 1987, long stripping of the great saphenous vein represented 98% of operative indications. In 1993, long stripping of the great saphenous vein represented only 75% of operative indications. Other sorts of intervention were developed, each of them being hemodynamically justified: the isolated surgery of the short saphenous vein (8%), or of the popliteal area vein (2%), single ablation of a saphenous tributary (11%), partial hemicrossotomy or saphenectomy (2.5%), high, low or medium partial stripping (4.4%). The development of these procedures corresponds to a better knowledge of the hemodynamic venous pathology of the beginning of varicose disease; the study shows the important limits of the interpretation of clinical examination, as well as of the continuous Doppler and of the Duplex scann in the evaluation of short saphenous vein pathology. The frequency of these atypical operations is in constant progression. They are leading, through research into how to better adapt intervention to hemodynamic disorders, to more preservation-orientated varicose exeresis surgery ( 25% of the cases).

#### **INTRODUCTION**

If the lack of understanding of the reflux zones and of exeresis failure bring their share of poor long-term results by the redux, the excess of exeresis, in addition to the venous sacrifice and the pointless operation bring their share of more subtle disadvantages :

- excess of collaterality with possibility of recurrence
- the eruption of unaesthetic postoperative teliangiectasias problems. Indeed, the role of the superficial veins in cutaneous drainage is no longer questioned. The angioscopy has revealed the existence of numerous micro veins on the saphenous vein of the thigh [1]. It was in order to avoid these two excesses that we progressively systemized the preoperative ultrasonic examinations.

In 1986, two events led us to progressively change our operative procedures.

1) we were aware of performing (in order to limit the risk of redux) exeresis operations that were a little too much extensive: we had a 20% increase in teliangiectasis within three months after the operation [2].

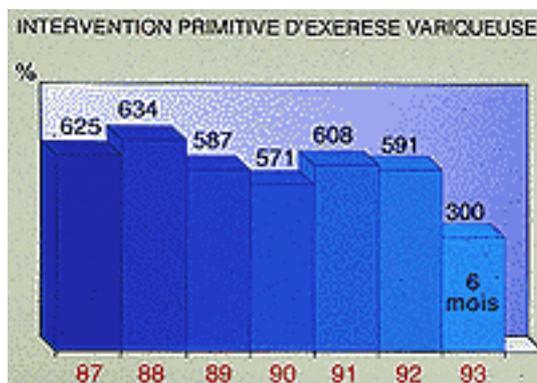
2) The development of less aggressive operations with the systematic use of invaginated stripping, Muller phlebectomy and, above all, local anaesthesia by femoral block which allowed us to obtain less traumatic and less invalidating operations, which were therefore easier to repeat, allowing us to give a "second chance" to reflux zones that we seemed to be reversible.

Nowadays, preoperative ultrasonic examinations have become as necessary for exeresis surgery as for preservation-orientated surgery [3,4]. During recent years, their development and systemisation have allowed our operative indications and procedures to evolve. Given that, due to a lack of long-term experience, we have no improved long-term results with which to justify this new attitude, we thought it would be useful to explain the reflection which led us to this attitude and to provide an evolutionary list, numbered in terms of frequency, of the different types of operations performed during the 7 past years.

### MATERIALS AND RESULTS

The study concerns 3,916 operative indications for early varicose exeresis from 1987 to 1993, thus excluding both preservation-orientated surgery and recurrence surgery. We performed about 660 operations a year.

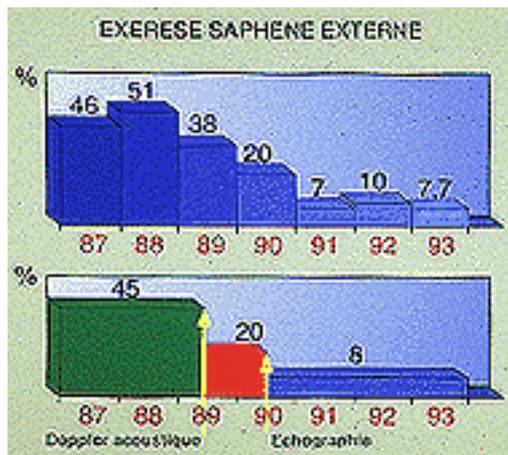
Tab I



#### 1- Short saphenous vein surgery is very demonstrative

Indeed, our indications for short saphenous vein procedure were gradually divided by 5 over a period of 7 years. In 1987, the short saphenous vein operations represented 45% ; today, our indications of short saphenous vein procedures represent 8% of operative indications.

Tab II



This reduction took place in two stages :

- The first step was the systematic use of acoustic Doppler which allowed us to suppress

about half of the operative indications (at that time, the operation involved a single ligation by means of a mini incision in the popliteal area, or a single short saphenous phlebectomy by means of a Muller hook in its accessible part). This allows us to assume that, with varicose patients, clinical examination brings a lot of false positives [5] as in our experience the short saphenous vein is palpable, and is judged to be dilated with a positive wave sign or Schwartz sign in about 45% cases.

- The second step was the systematic use of echographic marks which allowed us to suppress about half of the residual operative indications, as the existence of an audible reflux on the acoustic Doppler in the popliteal zone only relates to exclusive short saphenous pathology 50% of the time. In other cases, it relates to reflux transmitted from the long saphenous vein by a collateral crossing the popliteal area, or to a Giacomini's vein, to reflux by a popliteal perforator, reflux in the gastrocnemius veins or femoro-popliteal reflux.

In total, we now perform about 8% short saphenous vein exeresis as a first operative procedure in varicose patients, with a ligation close to the popliteal by means of a perfectly centred incision. Experience has showed us that echographic marks are essential if we are to know the origins of short saphenous reflux under preoperative conditions, and to study surgical accessibility to the original point of the short saphenous reflux.

- The reflux may come directly from the Giacomini's vein without connection with the popliteal vein or with a non functional filiform popliteal connection (the popliteal incision may not be indispensable if we perform a continuous invaginated short saphenous Giacomini's vein stripping).
- The reflux may come directly from the Giacomini's vein with a functional non refluxant popliteal connection (the popliteal incision is necessary to preserve the normal function of the short saphenous junction).
- The reflux may come from the femoral vein; in this case, the purely surgical direct approach to the sapheno-femoral junction still cannot be performed, even with a high

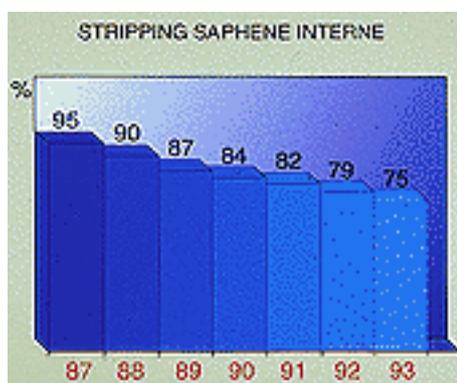
incision (long retractor and operative microscope).

- The reflux may come from the popliteal vein, and the main problem is that of assessing the anastomosis relationship with the gastrocnemius veins.

The habit of working with a binocular loupe with a x4 magnification allows us to understand the limits of the explorative reliability of the short saphenous vein by echography. Indeed, between the low subcutaneous accessible zone and the saphenopopliteal junction, we can generally find, in addition to the virtually constant Giacomini's vein, between 3 and 6 collateral branches, some of which are not even 1 mm in diameter. Ignoring venous neogenesis, these branches may explain the recidivations on long stumps [6].

### 2 - Our indications of stripping of the great saphenous vein fell from 95% in 1987 to 75% in 1993.

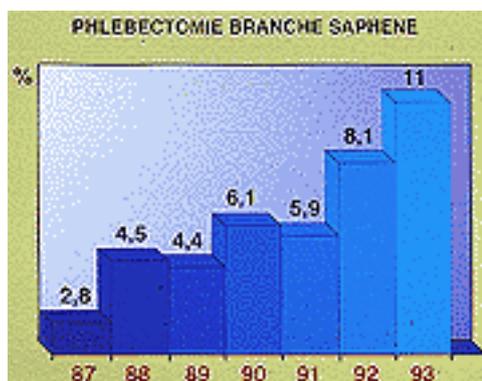
Tab III



Theoretically, the stripping has always been a long stripping of the long saphenous vein in as much as invagination and crural block allow us to avoid the saphenous nerve at the leg. Today, one varicose patient out of four will not undergo stripping for his first operation. The reason is not only because of better marking echo but is also an extension of the operative indications with regard to patients with varices at the initial phase.

Haut de page 3- At the moment, the isolated pathology of a saphenous tributary is found in 11% of patients. It stood at 2.8% in 1987.

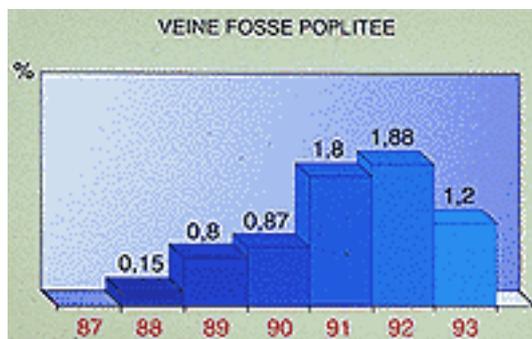
Tab IV



It is an isolated reflux on a tributary, above all of the great saphenous vein, mainly at the thigh level and often in antero-external position; the junction is just below a continent saphenous valve. The volume of blood feeding the reflux of this tributary partly comes from the normal flux of the upper trunk and certainly from a partial aspiration of retrograde blood in the low saphenous vein : this explains certain minima, functional, reversible refluxes [7], at the level of the saphenous - reflux by aspiration of the volume of blood in the refluent tributary. We very often observe a decrease in the diameter of the saphenous vein and a disappearance of the saphenous reflux after suppression of this tributary [8].

#### **4- The resection of a perforator of the popliteal area, unknown in 1987, has been found in almost 2% of cases over recent years.**

Tab V

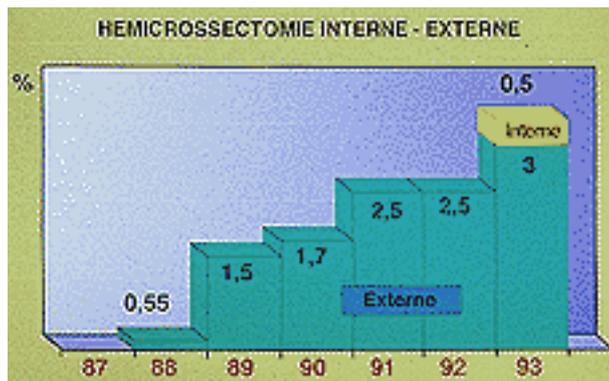


This extremely twisted and flimsy perforator requires very precise preoperative echographic mapping of its femoro popliteal implantation.

#### **5- First tributary of the great saphenous vein.**

Over the last two years, we have seen an increasing proportion (2.5%) of operations for complete ablation of an first lateral saphenous tributary or, more recently, first posterior saphenous tributary with a minimal approach to the saphenofemoral junction : hemicrossotomy . The echography allows us to differentiate between the true first lateral saphenous tributary and the junctions first tributary-saphenous vein in reversed V or Y shape, and false H-shaped junctions in which the proper reflux of the lateral first tributary is fed by subcutaneous or circumflex abdominal branches.

Tab VI



The preoperative Doppler examination allows us to separate two different conditions when the junction is a true junction in a reversed Y V shape.

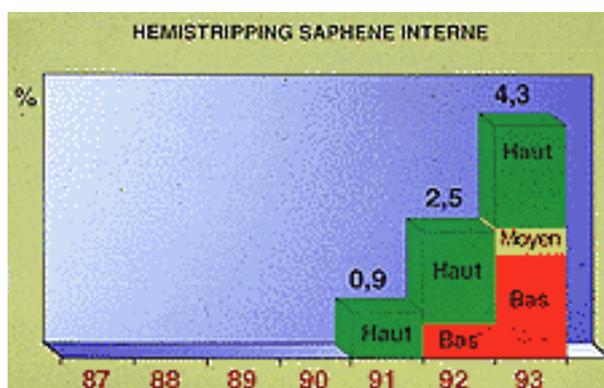
a) There is no ostial femoro saphenous reflux, nor great saphenous vein reflux. The reflux can be found only in the anterior saphenous, considered here as a refluxing tributary of a very high variety, and treated as such by phlebectomy and elective ligation close to its saphenous implantation.

b) There is an ostial femoro saphenous reflux only propagated on the anterior saphenous vein, the great saphenous vein being protected by its reinforced first valve, acting as an ostial valve. This condition is rarer and the way in which it is treated will be strongly facilitated by the preoperative exploration of the vasa.

- Phlebectomy and single ligation of the lateral saphenous vein close to its saphenous implantation.
- Phlebectomy of the anterior saphenous vein and single ligation of saphenofemoral junction leaving an exit for the saphenous flux in the collateral of the junction [9].

**6- Partial saphenectomy is a mode of operation that stems directly from preoperative cartography (4.4% in 1993).**

Tab VII



The most frequent (2.5%): high or proximal partial stripping involves treating an ostial saphenous vein reflux, blocked truncal on a continent valve at about 20 cm from the sapheno

femoral junction and which slopes onto a varicose lateral branch, often antero-lateral; there is an important difference in diameter between the refluxing trunk and the normal trunk at the level of bifurcation. KOYANO [10] finds 4% of refluxes of this type out of 309 saphenous examinations.

The reverse situation was found in 1.8% cases - a saphenous reflux only fed by a thigh perforator and which concerns all the inferior portion of the great saphenous vein. The difference in diameter is more spectacular. The partial inferior saphenectomy allows one to respect the saphenofemoral junction and the last 20 centimetres of the saphenous vein.

The intermediate condition is less frequent (0.5%). The saphenous reflux, fed by a thigh perforator, slopes onto a collateral saphenous tributary downstream from a continent valve which preserves the low saphenous section.

## DISCUSSION

After a period of extensive saphenous varicose exeresis, properly justified by the improved clinical results [11,12], over the last ten years a more preservation-orientated tendency has developed, based on 3 different arguments :

- 1) The first one is an intellectual argument regarding principle; this is the CHIVA method where the pathological trunk remains permeable and retains its retrograde flux.
- 2) The second is an argument of necessity for arterial vascular reconstruction (SEEGER) [13]. Some authors [14-17] have shown that the long term clinical results were comparable in the saphenous crossotomy stripping association and in the crossotomy perforator ligation association.

These authors showed that the pathologic one-eyed long saphenous trunk remained permeable in 78% of cases (HAMMERSTEN [18] JAKOBSEN [19] FRIEDEL [14] RUTHERFORD [20] ) and that it was perfectly usable in more than 90% of cases, with a diameter of >2.5 mm and a disposable length of 60 cm in spite of the isolated segmental thrombosis.

Although the risk of needing a reconstructing arterial procedure for a patient who has already undergone a stripping is low (13 cases out of 580 patients having undergone a stripping 20 years earlier: LOEGREN [21]), the preservation argument in varicose exeresis surgery is totally valid.

- 3) The third argument is physiological; it involves preserving the functional saphenous trunk or parts of the functional saphenous vein from exeresis. Indeed, the ablation of a normal cutaneous drainage path invariably involves telangiectasias. BLANCHEMAISON [22] reported, in angiography, the existence of micro vessels of cutaneous drainage on the saphenous branches of the thigh.

The importance of the flux in the crural drainage path is well shown by the immediate upstream distension which often follows ligation of the branches of the saphenofemoral junction.

Furthermore, needless surgical aggression in the varicose patient may be the cause of a pathologic tissue reaction, diffuse neoangiogenesis, source of malignant varicose recurrence (COUFFINHAL [23]) or of inguinal or neoarch neoangiogenesis (GLASS [24-26]).

The development of ultrasonic exploration machines, and of the coloured Doppler echocardiography should increase the 25% percentage of preservable saphenous trunk because they are functional in exeresis surgery.

Out of 722 lower limbs examined in varicose patients, LARGE [17] only finds 52% sapheno-femoral reflux. GOREN [16] finds only 64% sapheno-femoral reflux among 230 examinations of varicose patients. KOYANO [10] gives 69% long refluxes out of 309 limbs examined and 24% of short refluxes below the knee. The percentages are interesting because they denounce a very mechanistic old theory which first of all said that reflux was ostial sapheno-femoral, then truncal before reaching the saphenous branches. GOREN [16] observes 10% of refluxes due to collateral saphenous vein reflux with preservation of the ostial and truncal saphenous function.

In our study, we observed 11% of isolated refluxes of saphenous tributaries out of the 300 files studied in 1993 and 3% isolated refluxes of a saphenous tributary sloping on the sapheno-femoral junction and respecting the saphenous function. Today, it would seem that there are more than 14% isolated refluxes of a saphenous tributary evolving as a mode of starting a truncal varicose disease.

The precise evaluation of saphenous pathology requires, as a minimum, a Doppler echocardiography. Indeed, out of 946 clinical explorations of the short saphenous vein between 1987 and 1990, we observed 50% false positives at clinical examination: palpable dilated short saphenous vein, with sign of positive percussion but which did not present any reflux under 4 MHz continuous Doppler. Franco [5] gives one third of false positives at clinical examination.

The evaluation of short saphenous pathology cannot be performed under continuous Doppler examination: in our experiment between 1990 and 1993, out of 251 positive continuous Doppler examinations, we eliminated 59% false positives under Doppler Ultrasonography.

Out of 75 continuous Doppler examinations, GROUDEN [27] observes 58% false positives with 48% transmitted short saphenous refluxes, 5% popliteal refluxes and 5% popliteal refluxes linked to short saphenous reflux. In total, over the last three years, (e.g. 1499 files), we observed 8.2% short saphenous refluxes under Doppler Ultrasonography.

## CONCLUSION

This evolutive study allows us to show that systematic echo mapping has diversified our operative indications in exeresis varicose surgery, and has led us to a more preservation-orientated form of surgery. All the patients with great saphenous vein preservation, operated on in 1992 and 1993 passed satisfactory hemodynamic checks on the 30th day after the operation. In spite of our inability to look back very far, it seems logical to think that the hemodynamic precision of the operative indication will be profitable in the long term.

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