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This single operation involves complete ablation of the varices by via crossectomy and long invaginated stripping, and all phlebectomies were performed under local anaesthesia, for the first time, in ambulatory mode in 1986. Very quickly convinced by the obvious advantages of this operation, which combines efficacy, comfort and aesthetics, we wanted to look back over the previous three years to examine the inconveniences and sequelae of such an operation.

### The study

The study covers 1,475 patients who underwent operations for varices over a two-year period; 1,300 of them underwent long saphenous stripping. Out of these, 700 cases of operations under local anaesthesia, and 500 cases of operations under general anaesthesia were selected, including at least a 10-day follow-up and 60 postoperative days. They were all essential varices without cutaneous lesion. The type of anaesthesia was always freely chosen by the patients, with no anatomical consideration.

### Technique

- Crossectomy with dissection of the femoral vein over several centimetres via as small and medial an incision as possible, in order to reduce mobility and post-operative pain.
- Long invaginated stripping performed in one go either downwards, or partially upwards for the remaining part of the leg in cases of rupture (the incision of the hip is low and is no longer than 7 mm).
- Complete exeresis of the entire varicose network (saphenous branch, perforate, communicating, varix in an external thigh sling, foot varix or external pudental varix) in a single operation using Muller's technique [9,10] with mini-incisions no longer than 2 mm.
- Long invaginated saphenous strippings, whether upwards or downwards, were performed, at the same time, in 5% of cases.

### Local anaesthesia uses crural block and Mepivacain or Lidocain

- In our experiment, the femoral block was successively performed in two ways.
- The direct search for paresthesia and a single injection from 5 to 7 ml of Mepivacain 2% provides a very fast anaesthesia, but one that is not always complete over the whole zone (250 cases).
- The use of an electro-stimulation machine to mark the crural nerve and its branches is a real progression, because it allows simultaneous search for the motor of muscular contraction and a sensitive search for paresthesiae (450 cases). The block is thus more complete, with a lower consumption of anaesthetic drugs: 44 ml Mepivacain per operation when the block is performed by electro-stimulation, and 47 ml when it is performed with search for paresthesia.
- Mepivacain is useful because it is fast acting, it lasts a long time (the block lasts three hours) and above all because it can be used in a diluted form (0.5 or 0.25); this allows

one to increase the size of local injections in order to enlarge the zone of anaesthesia. 596 blocks were performed with Mepivacain, and a further 104 with Lidocain, which is slower and less powerful - reserved in this experiment for varices which are somewhat bigger than the anaesthetic zone of the femoral block (mean of 43.5 ml per operation).

700 operations of this type were performed, 80% of which were women, with age varying from 18 to 77 years, most being between 35 and 40.

The average number of Muller's incisions is 23, with extremes being 6 and 70.

## RESULTS

The results were assessed on the basis of comfort, and on the low number of failures and inconveniences caused by the mode of anaesthesia, with regard to the ambulatory treatment or to the technique itself.

### The comfort of the operation

The comfort of the operation was judged to be excellent in 95% of cases; indeed, only :

- 2% of patients complained about the painful nature of the local anaesthetic injections
- 2% of patients felt that the operation was far too upsetting
- 1% regretted the length of the operation, which was hard to tolerate when it lasted more than 75 minutes, particularly for patients with arthrosis

We must recognise that Mepivacain, because of the broader and deeper anaesthesia it induces, makes the operation more comfortable. Finally, permanent intraoperative psychological contact was vital to how the patient felt about the operation.

### The ambulatory mode

The ambulatory mode did not cause any post-operative incident. No patient had hematoma, haemorrhage or post-operative malaise.

### The failures and inconveniences of local anaesthesia.

No allergic accident was encountered.

- on 38 occasions, a vagal malaise occurred during anaesthesia or at the start of the operation, requiring an injection of Atropine, which was effective (5%)
- on 15 occasions, upon the request of patients, we injected 1 mg of Midazolam, without it having any effect on the ambulatory aspect of the operation (2%)
- on 5 occasions, local anaesthetic was followed by general anaesthetic, 3 times due to an unpleasant perception of the proprioceptive sensations of the operation, once due to an accidental intravenous injection of Lidocain during performance of the femoral block (epilepsy attack), and once due to the accidental injection of Mepivacain (0.5%) into a

vein near the arch during crossotomy (cardiac arrest for 30 seconds, followed by an epilepsy attack).

- 6 occasions, the fact that the area to be anaesthetised was too big meant that the operation had to be performed in two stages; this concerned varices which added, to the crural and femoral-cutaneous regions, major varicose networks over the obturation, abdominogenital or sciatic areas; on two occasions, limited by a maximum dose (60 ml) of Lidocain or Mepivicain, we were obliged to inject Alfentanil in order to be able to finish the operation without compromising its ambulatory aspect.

### **e failures and inconveniences of the operative technique (short term results)**

The persistence of several varices, still visible 2 months after the operation, and accepted as being a failure, is difficult to analyse, as these cases mainly involve patients with major varicose networks and a number of incisions that can easily be more than 50.

On the other hand, for lesser cases of varices (20 incisions), such failure, caused by insufficient preoperative marking, should be avoided by clinical and Doppler examinations that are performed during preoperative preparation; they should be performed twice in order to avoid functional variations due to fatigue, temperature, or to oestro-progestative variations in women's hormonal cycles.

Aesthetic inconveniences are minor. Indeed, Muller incisions (9,10) totally disappear, and in 10% of cases, varicosity diminishes. On the other hand, they increase in 25% of cases, developing over the external face of the thighs or over the internal face of the knees, in areas that do not correspond to hematoma zones or to operative trauma. Varicosities appear 2 to 3 months after the operation, at the end of hormonal cycles. They do not appear to be related to general operative trauma, but rather to the loss of a cutaneous venous drainage route (appearance of varicosity on the hemi-abdomen (twice) after ligation of the upper branch of the superficial iliac circumflex trunk, or on the external face of the thigh following elimination of an antero-external branch of the thigh) and to the oestrogenoprogestative hormonodependence proper to each patient

The neurological sequelae are of most interest. We observed three types :

- Suspended local anaesthesia (7%) is due to a Muller hook clearly catching on to a nerve. This accident, which is virtually impossible to avoid at thigh or leg level, leaves a 10 cm<sup>2</sup> zone of anaesthesia, which totally regresses within a few months. 25% of the time this accident occurs at the back of the foot, leaving a painful and longer lasting area of anaesthesia at the back of the foot or toe. This type of accident at the foot is easier to avoid by being especially meticulous when separating the varicose branches from the terminal nerve branches, which are relatively easy to spot during phlebectomy.
- Sub-malleolar local anaesthesia through ligation of the terminal branches of the long saphenous nerve gives a 10 cm zone of anaesthesia on the malleolus (2.7%). This lesion, which only occurred among the first 300 cases, is now totally avoided by making the sub-malleolar scar during stripping much lower down.
- Injury to the long saphenous nerve or to one of its branches during stripping either leads to total anaesthesia of the lower third of the leg and malleolus (approximately 40 cm), or

to painful anaesthesia of the lower third of the leg, creating a neuroma at the point where the nerve is partially torn away. This type of injury was found in 6 cases of patients operated on under general anaesthesia, and thus represents 1.2% of general anaesthesia cases. With regard to the cases of local anaesthesia, this lesion occurs at the same frequency (1.5%) in the first 200 cases of our experiment. This injury to the saphenous nerve was completely avoided in the 500 cases which followed, through recognition of the specific pain caused by pulling on the long saphenous nerve during stripping (table I). Pulling on the long saphenous nerve during invaginated stripping led to the appearance, despite the femoral block, of intense pain similar to leg cramps, when the return loop became blocked a little way below the Boyd perforator. Observed 19 times since, this irreducible blockage during stripping obliges us to begin again with upward stripping, and to get through this section using the Muller technique which always frees a specific perforator or collateral. In these 19 cases (3%), we were able to fully preserve the long saphenous nerve, as there were no postoperative sensitive neurological lesions (table II) (table III).

**TABLE I : Frequency of saphenous nerve injuries per anaesthetic mode General anaesthesia**

	<b>General anaesthesia</b>	<b>Loco regional anaesthesia</b>	
	500	200	500
Injury to the saphenous nerve	6	3	0
	1,2 %	1,5 %	0 %

**TABLE II : Technique avoiding injury to the saphenous nerve during invaginated stripping Loco regional anaesthesia**

<b>Loco regional anaesthesia</b>	<b>Painful impassable blockage during invaginated stripping</b>	<b>Technique for passing through</b>	<b>Neurological injury to the saphenous nerve</b>
200	3	Powerful hypnotic or antalgic	3
500	19	Müller's technique	0

**TABLE III : Frequency of neurological complications in strippings under loco regional anaesthesia Neurological complications**

<b>Neurological complications</b>	
Transitory suspended local anaesthesia	7 %
Sub-malleolar local anaesthesia	2,7 % 0 %
Injury to the saphenous nerve	1,5 % 0 %

## DISCUSSION

This retrospective study gives rise to certain points of reflection :

- It is possible to perform exeresis varicose surgery (stripping and ambulatory phlebectomy) under local anaesthesia in a single operation in almost all the cases, with proper tactical knowledge of the local anaesthesia. The radical exeresis of varices is a question of principle which needs to be discussed on the basis of a highly accurate pre-

operative examination. Indeed, whilst we are liable to short-term recidivation by maintaining a vein fed by a reflux, we are also liable to varicose eruptions if we suppress a drainage vein in a cutaneous zone. This explains the need to perform more flexible exeresis operations; exeresis when required, on the basis of a real preoperative functional venous cartography. This less radical approach to exeresis is very well accepted; it is justified by its more "repeatable" aspect, an operation without sequelae performed under ambulatory local anaesthesia. This atraumatic surgical technique allowed us to orientate our operative indications towards more preservation-orientated operations.

- The stripping and the complete exeresis of the varices is only possible in ambulatory mode, with 4 to 6-hour post-operative hospitalisation, if there is a completely rigorous and atraumatic operative technique. As local anaesthesia considerably decreases postoperative bleeding, it minimises post-operative hematoma, and thus decreases pain when walking. The absence of intraoperative vasoplegia associated to an acceleration in deep venous circulation would explain the low thromboembolical risk [13,14]. Indeed, we had no postoperative thromboembolical accidents with systematic prevention using low molecular weight Heparin for a period of one week.
- The indication for long stripping has been disputed for some time, due to the fact that this type of stripping only concerned one of the three branches of the long tibial saphena (sometimes sub aponeurotic) but mainly due to the neurological complications in the extraction of the saphenous nerve which followed 20 to 50 % of cases of classical stripping of the Babcock type [4]. The anatomical relationships of the nerve of the vein explain the risk of them being torn away, due to the intimate contact of the nerve all along the leg, and in some places due to the particularly strong adherence between the nerve and the adventitia [8]. Furthermore, the increased distance between the nerve and the vein at the extremity of the malleolus (observed 10 times out of 60 anatomical cases [8]) might explain the lesser risk of nervous injury with a low sub-malleolar incision.

The risk of neurological injury may be decreased by performing classic downward stripping: 27% of risk as opposed to 50% in upward stripping [2,5,11]. The ascension of the stripper head entering the reverse V formed by the divisional branches of the saphenous nerve provokes a definitive extraction of the latter whilst downward stripping provokes partial lesions by friction - stretching; these lesions are certainly more frequent, but they are often transitory and regressive [2,11] (table IV).

**TABLE IV : Frequency of the saphenous nerve injuries according to the type of stripping Injury to the saphenous nerve during stripping**

<b>Injury to the saphenous nerve during stripping</b>	
Upward Babcock type stripping	50 % (Cox)
Downward Babcock type stripping	27 % (Cox)
Invaginated stripping under general anaesthesia	1,2 %
Downward stripping by telescoping	0,5 % (Degni)
ated stripping under loco regional anaesthesia	0 %

Invaginated stripping performed under general anaesthesia allows us to considerably reduce this risk, as it is found in 1.2% of the 500 cases of general anaesthesia, and in 1.5% of the first 200 cases of local anaesthesia where we retrospectively had the impression that we had injured the nerve through our lack of experience. This stretching does not correspond to any particular zone of adherence [8] but to a collateral branch being put under tension and strangling the nerve or one of its collateral branches (always between 10 or 20 cm under the knee interlineation). We came across such blockage in the stripping (due to intertwining) 19 times in the following 500 cases; this painful blockage could be freed by section of a venous collateral of the saphena.

Between upward stripping of the Babcock type [1] with external sharp oliva, and invaginated stripping, the stripping by telescoping with a rigorously intravenous oliva would appear to be an intermediate solution that is much easier to perform and far less traumatic. Degni [3] reports 0.5% of neurological complications out of 2,000 cases with strippings of this type. It is thus logical to assume that the traumatic risk mainly depends on the size of the oliva used for the stripping (table IV).

One classic criticism of invaginated stripping is that it leaves in place flaps of adventitia which might participate, by neovascularisation, in the reconstitution of a venous fragment or to the connection of a perforate with subcutaneous veins. This neovascularisation [6,7] is the result of a certainly under-estimated phenomenon in the ethiology of long-term recidivation. We were unable to prove the repermeabilisation of a saphenous path after an invaginated stripping.

The evolution of our experiment allowed us to decrease the contraindications to local anaesthesia, which are now of a psychological order only. Certainly, obesity is always a problem [12] but the use of the block by electro-stimulation makes the anaesthesia more efficient. The importance and the number of varices may be an argument in favour of local anaesthesia due to the low level of intraoperative bleeding, which makes the operation more comfortable. Finally, the spread of varices over the limb is also an argument in favour of local anaesthesia because patient mobilisation is then much easier.

## CONCLUSION

At the end of this study, we can say :

- that, paradoxically, loco regional anaesthesia by a femoral block leads to improved surgical results by reducing the thromboembolical risk and by allowing the surgeon to avoid all neurological injury during the stripping.
- that ambulatory loco regional anaesthesia allowed the operative indications to evolve towards more preservation-orientated operations, which were better adapted to the great variety of varicose disease.

## REFERENCES

1. Babcock W.W A new operation for the extirpation of varicous vein of the leg . Med. J. N. York.1907 ; 86 : 153-156

2. Cox S.J., Welwood J.M., Martin A. Saphenous nerve injury caused by stripping of the long saphenous vein . Br. Med. J. , 1974 ; 1 : 415-417
3. Degni M. Un nouveau type d'extirpateur de veine saphène interne ou externe. Phlébologie 83. A. Davy., J. Van Der Stricht 1989. Ars Medici Congress Series , 825-830.
4. Fullarton G.M., Calvert M.H. Intraluminal long saphenous vein stripping : a new technique minimizing perivenous tissue trauma. Br. J. Surg. 1987; 74: 255
5. Garnjobst W. Injuries of saphenous nerve following operations of varicose veins .Surg. Gynecol. Obstet. ,1964 ; 119 : 359-361
6. Glass G.M. Neovascularization in recurrence of the varicose great saphenous vein. Following transection . Phlebology , 1987 ; 2 : 81-91.
7. Glass G.M., Prevention recurrent saphenofemoral incompetence after surgery of varicose veins. Br. J. Surg. 1989 ; 76 : 1210
8. Holme J.B., Holme K., Sorensen L.S. The anatomic relationship between the long saphenous vein and the saphenous nerve. Acta Chir Scand 1988; 154 : 631-633
9. Muller R. La Phlébectomie Ambulatoire . Phlébologie , 1978 ; 31 : 273-278
10. Muller R. La Phlébectomie Ambulatoire. Helv. Chir. Acta, 1987 ; 54 : 555-558
11. Ramasastry S.S., Dick G.O., Futrell J.W. Anatomy of the saphenous nerve : relance to saphenous vein stripping . Am. Surgeon. 1987 ; 53 : 274-277
12. Rettori R. L'obésité modifie-t-elle les techniques chirurgicales ? Phlébologie , 1988; 41 : 576-584
13. Van Der Stricht J., Goldstein M., Van Hoorn M., Delcroix G. Etude des indications et des résultats des saphènenectomies et des scléroses /in : crossectomie et stripping ,pp. 123-129 Paris, Expansion Scientifique 1962
14. Van Der Stricht J. La saphènenectomie par invagination sur fil. Presse Med. 1963 ; 71 : 1081-1082.