16

Lesson learned after ten years experience in varicose veins surgery

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INTRODUCTION

Chronic venous insufficiency (CVI) is still a major socio-economic and health problem.[1] Despite CVI rarely presents as an acute or immediately life or limb threatening condition, varicose veins reduce significantly the quality of life of affected patients.

According with several epidemiological studies is estimated that varicose veins present a prevalence ranging between 30% and 40% in adult population in developed countries aged between 16-64 years. Moreover 80% of population had reticular varices.[2, 3] Varicose veins occurred in both sex with similar incidence in male sex (40% men *vs* 37% women) as opposed to the common belief that varicose veins are disease limited to the female sex and many factors such as age, previous pregnancies, high body mass index, lifestyle and hereditary factor were advocated as factors for the CVI development.[4] Surgical treatment would seem to be still the best treatment despite the introduction of new approach as the endovenous ablation (Laser or Radiofrequency) or foam sclerotherapy. Therefore varicose veins surgery represents an important chapter in daily practice of the vascular surgeon. However, it is important to note that the varices remain an important cause of medico-legal claims and present a recurrence rate of 20% often due to technical errors.[5] Herein our experience with the surgical treatment of the varicose veins in the last 10 years is reported.

METHODS

Study design and endpoints

A retrospective analysis of all patients submitted to stripping of the great saphenous vein (GSV) and lesser saphenous vein (LSV) for varicose veins disease at our institution from January 2002 to September 2012 was performed. Their medical data including demographics, comorbidities, operative details and complications were recorded into a database. Operative details regarding anatomy of the sapheno-femoral and sapheno-popliteal junction (SFJ and SPJ), presence of duplication of GSV, major vascular anomalies, type of stripping (long *vs* short) were carried out in all cases (Table 16-I). Treatment of secondary or recurrent varices, management of thrombophlebitis of the GSV and LSV and thromboembolectomy of iliac-femoral venous system were excluded from our study.

Preoperative assessment and indications

In all cases a color-coded ultrasounds examination (US) to evaluate the superficial and deep venous system were carried out. Regarding the superficial system a careful examination was performed about the anatomy and location of SFJ and SPJ, presence of GSV duplication, identifications of all perforator veins with particular attention to the Boyd, Giacomini, Thierry and Dodd posterolateral perforator veins in order to avoid any cause of recurrent varices. A routine skin marking of varices and incompetent perforator veins was performed.

Indications for surgery were to achieve relief of symptoms (night cramps, restless leg, pain, tenderness, sensation of heaviness of leg and chronic aching in the calves, skin irritation) and to treat complications as eczema, recurrent superficial phlebitis, development of subcutaneous and intradermal indurations and varicose ul-

Table 16-I – Demographic data and operative details.		
Male	1313	48.9%
Female	1367	51.1%
Age	48 ± 7.2	(21-75 years)
CEAP		
C1-3	670	25%
C4	1206	45%
C5	536	20%
C6	268	10%
Anesthesia data		
Sciatic /femoral block	2200	82.9%
Spinal	250	9.3%
Local	230	8.5%
Surgical data		
Stripping of GSV	2275	
Long	683	30%
Short	1592	59.4%
Stripping of LSV	85	20.9%
Ligature	of LSV	320
Varicectomies	2140	80%
Anatomical data		
Vascular anomalies	4	0.1%
Type of SFJ		
Type 1	1123	49.4%
Type2	956	42.2%
Type3	150	6.5%
Type4	35	1.5%
Type5	11	0.4 %

ceration or hematoma and bleeding. All patients were classified according with CEAP classification.

Surgical technique

Preoperative skin marking of varicosities in orthostatic position and US marking of incompetent perforating veins were carried out. SFJ was approached with short incision (3-4 cm) one cm above the groin crease. All tributaries were ligated beyond the secondary branching points and the SFJ was divided proximal to the common femoral vein with transfixed suture. The stump was also ligated with polypropylene running suture. Length of residual stump must not be too short to avoid narrowing of the common femoral vein or too long to prevent the risk of thrombus formation. The stripper was usually introduced in the GSV at the level of the ankle after isolation of the distal part of the saphenous nerve and advanced cranially to the SFJ before the completion of high legation. In all cases we felt the stripper subcutaneously during all entire course. In cases of short stripping the stripper can be introduced from the divided saphenous vein downards and recovered distally below the knee (generally after the origin of Boyd perforator vein). We generally performed a perforation-invagination stripping using small atraumatic stripper to reduce damage to the adjacent structures, as the saphenous nerve, lymphatic channels and to reduce the postoperative hematoma in the saphenous tunnel. Standard stripping with commercial stripper device (Babcock) was reserved in cases of very large saphenous vein. In contrast with the beginning of our experience, in which the stripping of the GSV was performed along its entire length, in the last period it was our practice to leave the distal segment of the vein, unless frankly varicose, to reduce soft tissue damage and the risk of lesions to the saphenous nerve.

For LSV the SPJ was routinely marked with US in order to achieve the exact position and to avoid damage to the popliteal fossa nerves and to the sural nerve. The LSV was ligated and invaginated to reduce trauma to the adjacent structures generally in its upper part (up to 5-10 cm).

Phlebectomies were performed according with Muller technique when possible, avoiding in all cases extensive damage to the subcutaneous tissue. Incisions are then closed in standard fashion. In all cases an antibiotic prophylaxis (cephalosporin) was started. No postoperative anticoagulant therapy was given.

Patients were discharged in the late afternoon with compression therapy indications as compression therapy after venous surgery has been shown to be indispensable. Postoperative limb compression reduces the risk of deep vein thrombosis, edema and hematoma formation. We suggested compression with the use of compression bandaging in the immediate postoperative period to control hemorrhage and bruising,

followed by compression stockings for a period of 4 weeks.

Follow-up

Clinical follow-up was carried out at 1, 6, 12 months and then yearly. US examination was reserved in cases of recurrent varices.

RESULTS

Between 1992 and 2012 we carried out 2680 interventions for varicose veins. In the same period we performed also 295 operations for recurrent varicose veins, eighty-four urgent for thrombosis of SFJ and SPJ with ten cases in which an iliac-femoral venous thrombectomy and vena cava filter placement were associated. In seventy-five patients an endovenous laser ablation (EVLA) in patients with not excessive leg varices was preferred.

In 2275 cases (84.8%) a stripping of the GSV and in 405 (15.2%) a ligature (320 cases) or short stripping (85 cases) of the LSV was carried out. In 1592 cases (59.4%) a short stripping of the GSV was performed, in 683 a long stripping of the GSV was carried out. In more of 80% of all patients secondary phlebectomies of reticular veins or perforator veins ligature were carried out on the basis of US examination. According with CEAP classification, patients were classified as C1-3 in 670 cases (25%), C4 in 1206 (45%), C5 in 536 (20%) and C6 in 268 patients (10%).

Sciatic and femoral nerve block was the preferred anesthesia performed in 2200 (82.9%) of patients, spinal in 250 (9.3%) and local anesthesia in 230 cases (8.5%). Wound infection occurred in twenty patients (0.7%), nerve injury of saphenous vein in forty-five (6.5%, in the 683 long saphenous stripping), sural nerve lesion in three cases (3.5%) superficial and deep venous thrombosis respectively in fifteen (0.6%) and one patient (0.03%) (Table 16-II). No major complications occurred. During the same period we performed two common and superficial femoral arteries repairs due to inadvertent iatrogenic lesion, one superficial femoral vein repair and one detachment of stripper from iliac vein. All cases were operated in urgency occurred, however, in patients from other Hospitals.[6, 7] During the follow-up four hundred-twelve patients were lost. Recurrent varicose veins were recorded in two hundred cases (8.5%) at a median of 3 years, mainly originating from incompetent perforating veins at thigh level or at the medial side of the leg.

Table 16-II — Complications.

Wound haematoma	20	0.7%
Nerve lesion		
Saphenous nerve	45	6.5%
Sural Nerve	3	3.5%
Venous Thrombosis		
Deep	1	0.03%
Superficial	15	0.5%
Recurrence	200	8.5%

DISCUSSION

Indications for surgery on varicose veins depend by the clinical criteria. US examinations seem essential to achieve a correct planning of the treatment by knowledge of the level venous of valve incompetence (for long *vs* short stripping) and level of perforator veins incompetence preventing the risk of recurrent disease. In our experience some topics about various steps of varices surgery were learned.

Sapheno-femoral junction

A correct evaluation of the SFJ anatomy is mandatory. It is important a careful knowledge of normal and variants anatomy of the saphenous veins, its tributaries and femoral vessels (Figure 16.1). In classical anatomical nomenclature the saphenous tributaries were medial and lateral accessory saphenous vein, superficial epigastric, pudendal and circumflex iliac veins. Moreover, the GSV flows in the common femoral vein. This classical pattern is rarely observed regarding the number of tributaries and their confluence in the GSV and the confluence of GSV into the common femoral vein. In literature, many systematic classifications were proposed as that

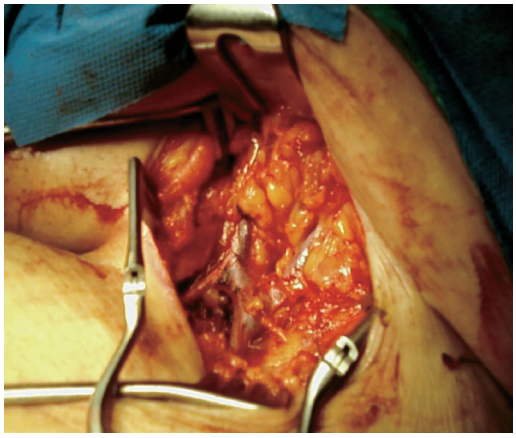

Figure 16.1 "H" morphology of the SFJ.

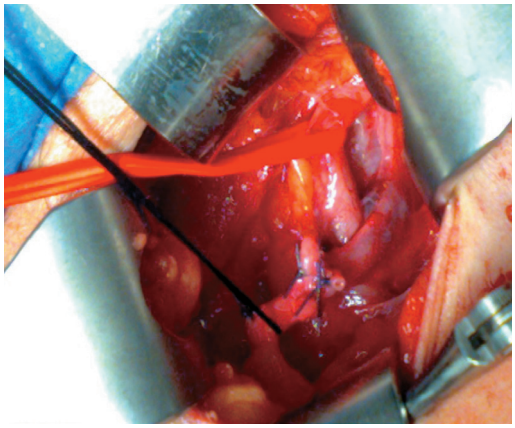

Figure 16.2 Complete transposition of femoral vessels: the common femoral artery (vessel loop) was medially placed to common femoral vein, SFJ and GSV (after ligation of tributaries veins). The GSV cross the bifurcation near the profunda femoral artery.

proposed from Chun et coll. that identified twenty-eigth types of SFJ.[8] However, we preferred the classification of Frullini *et al.*[9] (Table 16-III). Five major variations were encountered. Anomalies of insertion of GSV in the common femoral vein and major anomalies of the femoral vessels as medial position of arteries or vascular ring of saphenous vein with superficial femoral artery were reported with an incidence of 0.1 and 1% [10](Figure 16.2). Incision should be carried out directly beneath the groin crease and small incision were reserved to young or slim patients. The SFJ should not be divided until has been unequivocally identified. A careful inspection of the distal GSV must be performed in order to ligate the Giacomini vein, the medial accessory saphenous vein and to identify a duplication of saphenous vein generally present in 2-5% of cases.[11, 12]

More attention must be delegated to the external pudendal artery, generally double, with the superior running above the GSV and the inferior running, instead, below the GSV to avoid bleeding. All tributaries need to be distally isolated and ligated beyond the secondary branching points minimizing the risk of reconnection and recurrence. Deep pudendal vein generally running below the fascia needs to be isolated and ligated to prevent recurrence of varices. The GSV must be removed to prevent the neovascularization and recurrence of varicose veins.

Sapheno-popliteal junction

An US examination is mandatory to achieve the real position of the junction and to identify any cases of vascular anomaly (junction in the deep femoral vein, plexiform junction) and the position of Giacomini vein (cranial extension of the LSV communicating with the GSV via the

Table 16-III – Classification of Sapheno-femoral junction according with literature review.

Type I	Common trunk between superficial epigastric and circumflex veins. Generally the number of pudendal veins ranging between 1 and 3 (1 is generally underfascial). Lateral and medial accessories saphenous vein are generally present (10-45%).
Type II	Epigastric, circumflex and pudendal veins show a separate confluence. Medial and lateral accessories saphenous vein are generally represented (10-29%)
Type III	No epigastric vein is present . The circumflex and pudendal system show a separate junction (5-7%)
Type IV	Is generally characterized by saphenous duplication or H morphology (5%)
Type V	Only the circumflex vein is represented (1.9%)

posterior thigh circumflex vein). In no cases significant anomalies in deep venous junction were reported.

Stripping

Several randomized trials showed that routinely stripping reduce the recurrent varicose veins due to neovascularization prevention and disconnection of all thigh perforators.[13, 14] We preferred the invaginated stripping because this tends to reduce the trauma, bleeding and lymphatic channels damage during the stripping, although no data in literature seem to justify a routinely perforation-invagination approach in contrast with classical stripping.[15] In all cases the stripping must be performed in distal direction to avoid lesion on the bifurcation of the saphenous nerve that present an incidence of 10-40% with severe morbidity in 2.6% of all cases.[16] In our experience and according with literature data, the introduction of short stripping resulted in significant statistical prevention of these complications without any increase of recurrent varices of the distal saphenous vein (from 6.5% to 0%).[17] In any cases the Boyd perforator vein must be ligated to prevent the varicose involvement of distal saphenous vein. Indeed the Cockett veins are tributaries of posterior accessory great saphenous vein (Leonardo's vein) and not involving the distal saphenous vein. Regarding the length of stripping a careful study of distal saphenous vein is mandatory to reduce the number of long stripping.

Varicectomies

They must be careful performed especially at level of lateral popliteal fossa and fibular neck to prevent nerve lesion of common peroneal nerve.

CONCLUSION

Despite varicose vein seems to be easy surgery, it is essential a correct planning and experience training to avoid early complications and to reduce the risk of recurrence to have good results and to avoid the risk of medico legal claims. A perfect knowledge of anatomy and its possible variants is mandatory to achieve good results.

REFERENCES

1. Ruckley CV, Evans CJ, Allan PL, Lee AJ, Fowkes FG. Chronic venous insufficiency: clinical and duplex correlations. The Edinburgh Vein Study of venous disorders in the general population. J Vasc Surg 2002;36:520-5.
2. Evans CJ, Fowkes FG, Ruckley CV, Lee AJ. Prevalence of varicose veins and chronic venous insufficiency in men and women in the general population: Edinburgh Vein Study. J Epidemiol Community Health 1999;53:149-53.
3. Fowkes FG, Lee AJ, Evans CJ, Allan PL, Bradbury AW, Ruckley CV. Lifestyle risk factors for lower limb venous reflux in the general population: Edinburgh Vein Study. Int J Epidemiol. 2001;30: 846-52.
4. Lee AJ, Evans CJ, Allan PL, Ruckley CV, Fowkes FG. Lifestyle factors and the risk of varicose veins: Edinburgh Vein Study. J Clin Epidemiol 2003; 56:171-9.
5. Tennant WG, Ruckley CV. Medicolegal action following treatment for varicose veins. Br J Surg 1996;83:291-2.
6. Marcucci G, Accrocca F, Antonelli R, Siani A. The management of arterial and venous injuries during saphenous vein surgery. Interact Cardiovasc Thorac Surg 2007:432-3.
7. Siani A, Marcucci G, Siani LM, Baldassarre E. An undescribed iatrogenic complication of varicose vein surgery: entrapment of the stripper in the proximal deep venous system. World J Surg 2007;31: 1528.
8. Chun MH, Han SH, Chung JW, Cho SS, Ko JS, Chung IH, Chung GB, Lee MS, Kang HS, Park SS. Anatomical observation on draining patterns of saphenous tributaries in Korean adults. J Korean Med Sci 1992;7:25-33.
9. Frullini A., Fabbrucci P. La giunzione safenofemorale - Ediz Minerva medica 199.
10. Nabatoff RA.Anomalies encountered during varicose vein surgery. Arch Surg 1978;113:586-588.
11. Forty J. Anomalous relationship between femoral artery and vein: a case report. Clin Anat 1990;3:195-198.
12. Marcucci G, Antonelli R, Accrocca F, Siani A. A rare anomaly of the femoral vessels: complete transposition of the femoral artery and vein. Interact Cardiovasc Thorac Surg 2010;11:838-9.
13. Dwerryhouse S, Davies B, Harradine K, Earnshaw JJ. Stripping the long saphenous vein reduces the rate of reoperation for recurrent varicose veins: five-year results of a randomized trial. J Vasc Surg 1999;29:589-92.
14. Cheatle T. The long saphenous vein: to strip or not to strip? Semin Vasc Surg 2005;18.:10-4.

15. Khan B, Khan S, Greaney MG, Blair SD. Prospective randomized trial comparing sequential avulsion with stripping of the long saphenous vein. Br J Surg 1996;83:1559-62.
16. Morrison C, Dalsing MC. Signs and symptoms of saphenous nerve injury after greater saphenous vein stripping: prevalence, severity, and relevance for modern practice. J Vasc Surg 2003;38:886-90.
17. Wood JJ, Chant H, Laugharne M, Chant T, Mitchell DC.A prospective study of cutaneous nerve injury following long saphenous vein surgery. Eur J Vasc Endovasc Surg 2005;30:654-8.