

Selective crosssection of the great saphenous vein: results at five years

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Aim. The aim of this study was to analyze the recurrence incidence at five-year follow-up on patients who underwent a selective crosssection of the great saphenous vein, considering the importance of collateral veins of junction and demonstrating that groin recurrence are not dependent on complete crosssection, as supported by traditionalists.

Methods. Five-hundreds and twelve patients were treated in the Department from January 2002 to December 2006 (370 females and 142 males). Mean age was 60 years. All the patients underwent a selective crosssection made by a sole operator, in day-surgery and with local anaesthesia regimen. The study randomized 150 of these patients. All of them underwent clinical venous examinations of the lower limbs and a color Doppler, made by an independent operator at different times after the operation.

Results. Out of 150 patients controlled with color-Doppler only one presented with groin recurrence (0.6% of the patients) own to a technique mistake of the operator. The patient underwent, in fact, a selective crosssection in December 2002, on the left anterior lateral thigh vein, that leads as common trunk together with the external iliac circumflex vein.

Conclusion. On the basis of the present clinical experience it is possible to notice how the internal selective crosssection, saving the tributary veins coming from the abdominal wall, together with the most convenient treatment of saphenous insufficiency, is an efficacious therapy, gives results of undoubtable validity both from the prognostic point of view and considering the rate of groin recurrences in five years.

KEY WORDS: Veins, surgery - Saphenous vein - Groin.

Vein surgery has undoubtedly developed, in the last twenty years, thanks to the new acquisitions

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that modified the indications, and overall, the surgical approach. The classical surgery of superficial venous system has had many improvements, so the "traditional" idea of radical crosssection has been replaced by the "new" selective technique, which may be executed according to the traditional way (open sky) or by the new endovascular techniques.

Anatomically¹ the sapheno-femoral junction (SFJ) is situated on the Scarpa's triangle (limited upper from the crural arch, laterally from the satorius muscle and medially from the adductor middle muscle) where the great saphenous vein (GSV) enters through the cribriform belt, immediately over the Allan-Burns's ligament, that matches a strengthening fold of the cribriform belt. The GSV terminates into the SFJ in a variety of patterns. The SFJ opens behind the femoral vein, about four cm under the crural arch. On this level its more important relationships are:

- with the lymphatic system, especially with Rouviere's lymph node, situated in its cavity and surrounded by four lymphatic groups;
- with arteries, in particular with the superficial external pudendal artery, that is a branch of the femoral artery, which intersect the saphenous crossse;

c) with nerves, in particular with the genito-crural nerve that divides into a genital and a crural branch (often lateral and distant).

The tributary veins of the SFJ lead for the 75% to GSV, and for the 25% to common branches or directly into the deep venous system. The collateral veins² of the SFJ are:

- the external pudendal vein, which courses from a superior cutaneous branch, that collects the reflux blood from pubis mount, to an inferior subfascial branch, which is alimented with blood coming from the scrotum in the male and labium majos in the female. They drain the pubis territory, often they join together with the contralateral pudendal vein and with the dorsal subcutaneous vein of penis or clitoris, communicating with the last through perineal superficial veins;

- the superficial iliac circumflex vein, which drains the trochanteric area, collecting reflux blood, partially from the abdomen or the buttocks;

- the superficial epigastric vein, which arises from the confluence of paraumbilical vessels and drains the lower half of the abdominal wall. In most of the cases, in the interior part of abdominal wall, it anastomoses with the thoracoepigastric vein which runs in the anterolateral wall of the trunk, upwards with the lateral thoracic vein, a tributary of the axillary vein;

- the anterior lateral thigh vein, which arises from the anterior and lateral side of the thigh.

The drainage patterns³ is a pattern formed by the superficial veins and the deep veins that are, on various levels, connected, so that the blood can flow from the superficial to the deep net. In this way also the femoral vein, through the tributary veins of the saphenic belt, receives affluent branches from the genital area, and overall from the abdominal wall. In other words, subcutaneous veins are part of the real cutaneous net of the abdominal wall.

The superficial epigastric vein and the superficial iliac circumflex vein, together with the thoracoepigastric vein and an affluent vein of the venous arch of jugulo, with branches communicating with the internal thoracic, side thoracic and external pudendal veins, form a net of vessels, largely anastomotic, also called vein cutaneous net of the anterolateral wall of the trunk.

Upwards this net leads to the external jugular vein, to the axillary vein and to the brachiocephalic trunk and downwards it connects to the common femoral vein, creating in such a way a huge communication system

between the superior caval vein and the inferior one. Besides, the net anastomosis with paraumbilical connects the system of the portal vein and the general one.

The crosssectomy is, usually, the first time of operation and can be distinguished in:

- radical, designed by Tavel and Jacobson and revised by Babcock (1907), consists in the ligation and the cut of saphenous vein with all its collaterals, close to the femoral vein;

- selective, that allows to save all the tributary veins coming from abdomen, in other words all the veins placed on an obtuse angle with respect to the saphenic axis.

This study takes into account the recurrence incidence at a five-year follow-up, maximum, on patients who underwent a selective crosssectomy. Given the importance of collateral veins junction, selective crosssectomy is supplanting the "traditional" idea that the non-radicality is directly proportional to groin recurrent varicosities.

Materials and methods

The crosssectomy of the GSV^{1, 2, 4-7} is one of the essential step in the surgery of superficial veins and it requires the sharp dissection of different anatomic levels. The internal selective crosssectomy must follow well-defined rules: the cut must be centered on the groin fold (corresponding to the Scarpa's triangle base) at about 4 cm, having as repere points the femoral artery on one side and the *pubic tuberculum* on the other (at about 3 cm). After cutting the superficial cribriform belt running lengthwise and towards the bottom, to save the lymphatic trunks, the GSV must be exhibited, *i.e.* liberated downwards for about 5 cm, while on the top, making a light traction with an atraumatic vascular plier and light scissors, also the tributary veins of junction are exhibited and separated. Differently from the traditional concept of radical crosssectomy, the veins coming from the abdomen, *i.e.* the superficial epigastric vein and the superficial circumflex iliac vein, are saved, while the external pudendal veins are carefully insulated, ligated with unabsorbable thread 2/0 (Figures 1, 2) and dissected, when an acute angle with the saphenic axis or a T branch from the lower part are present. Then two laces, made of the same thread, are passed at about 1



Figure 1.—Selective crosssection, SFJ isolated.



Figure 2.—Selective crosssection, GSV sectioned, selective crosssection is performed.

cm from the SFJ and immediately down the confluence of saved tributary veins. This method allows to warrant the drain of the stump left *in situ*. At this point the GSV, that can be closed also at the bottom with the same thread or prepared for the following stripping, is carefully dissected. After controlling the area for an accurate hemostasis, the skin is then sutured with an unabsorbable thread 4/0, that could be removed after seven days from the surgery.

From January 2002 to December 2006, 512 patients underwent a crosssection (370 were females and 142 were males). Mean age was 60 years. Two-hundreds and seventy-three patients underwent the crosssection on the right limbs, while 239 underwent a crosssection on the left limbs. All the patients underwent a selective crosssection made by a sole operator, in day-surgery and with local anaesthesia regimen. More precisely the operations were 102 in 2002, 115 in 2003, 97 in 2004, 104 in 2005 and 94 in 2006.

This study is a non-concurrent prospective study, that randomized 150 patients, 30 each year.

Among the patient population 102 were females and 48 males, with an average age of about 57 years (range 25-77). Seventy-five right and 75 left limbs underwent a surgery. All the patients underwent clinical examination of the lower limbs and color-Doppler, made by an independent operator. In details, the surgeries performed in the Department were: selective internal crosssection and 106 short strippings of GSV, five medium strippings and seven long strippings, 28

crosssections with phlebectomies and five isolated selective crosssections.

Results

No death was reported, as well as no morbidity or thromboembolic events. No patient experienced infection due to surgery wounds.

All the patients were advised to use a 2nd class compression stocking for 30 days (Sigvaris 503[®]). Only one groin recurrence was reported after a Duplex scanning control (Table I) (Figure 3) (0.6% of examined) own to a technique mistake of the operator. In fact, the patient underwent a selective internal crosssection in December 2002. The anterior lateral thigh vein, that leads to the common trunk together with the external iliac circumflex vein, was not removed. This mistake was not made during the surgery, nor in the mapping before the operation, considering that the anterior vein was perfectly continous, and also the Valsalva manoeuvre was correct, but the vein has become incontinent after some years from the operation. The position of the vein, that has an acute angle of termination in the GSV, can support the venous reflux after the operation and for this anatomical reason it is necessary to remove it during the selective crosssection. The recurrent varices were treated with two sessions of echoguided sclerotherapy by scleromousse (polidocanol 1% in foam). The residual stump of GSV is always long about 1 cm

TABLE I.—Selective crosssectomy: results.

Year of operation	2002	2003	2004	2005	2006
N patients (June 2007)	30	30	30	30	30
Groin recurrences	1	—	—	—	—
Total groin recurrences 1 (0.1%).					

and it is continually washed by the venous flow from the collateral veins: no thrombosis of the stump ever occurred.

Discussion and conclusions

The selective crosssectomy² derives from various considerations done on some pathological or non pathological states, due to a venous insufficiency. In fact, studies on the tributary veins of SFJ have improved thanks to hepatopathy, as origin of portal hypertension, and above all pregnancy. Such studies, concentrating in particular on the flow of all junction tributaries, have demonstrated that all the veins coming from the top have no reflux, but a downflow from the areas drained from the same veins. As the patterns of recurrences are highly variable and there are often multiple sites of venous recurrences (Table II), a number of causes of recurrent varicose veins can be defined. Besides, as known from years, the new vasculogenesis can be favoured also by the surgical cutting of a venous vessel; in fact the total of small veins, meduse head, usually canalize again a lower venous trunk, generally called "cavernoma". A new concept in the study of recurrent varicose veins is that neovascularization occurs through the direct communication of new vessels from the femoral vein to superficial refluxing veins. Most surgeons discussing the problem of recurrent varicosities emphasize a thorough groin dissection with exploration of the femoral vein to ensure that no superficial connections in the groin go directly to the femoral vein. This concept may be entirely erroneous; maybe the ablation of drainage of the abdominal wall veins leads to varicose recurrence. Endovascular radiofrequency or laser ablation techniques allow ablation of the GSV without groin dissection, and Duplex examination in these cases may show absence of neovascularization.³ Maybe a careful groin dissection is the cause of neovascularization. Besides, operators noticed a great rapidity in these

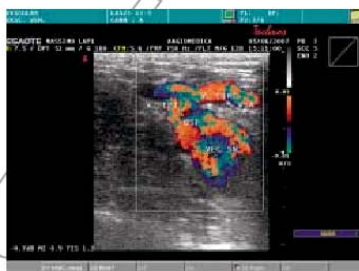


Figure 3.—Groin recurrence after selective crosssectomy: incontinence of the antero lateral thigh vein in orthostatism at Valsalva.

TABLE II.—Lower limb recurrences after operation.

Year of operation	2002	2003	2004	2005	2006
N patients (June 2007)	30	30	30	30	30
Dodd	7	6	4	1	—
Boyd	1	—	—	—	—
Cocletti	—	2	1	—	—
Isolated varices	4	3	4	4	—
Recurrences per year	12 (40%)	11 (37%)	9 (30%)	5 (17%)	—
Total recurrences 37 (25%).					

kind of operation, but also a reduced traumaticity of tissues and lymph nodes, always close to SFJ. The comparison of the present study with the others published on the radical crosssectomy was also important. For instance Allegra *et al.*,⁸ in 2007, noticed that, among the 862 patients observed in five years with a color-Doppler ultrasonography, 109 had groin recurrences, about 13% of the patients; while Hartmann *et al.*,⁶ in 2006, controlled with color-Doppler ultrasonography 265 limbs of 210 patients with a 14-year follow-up and noticed in 6.1% of the patients a reflux coming from the tributary veins of the SFJ (from superficial epigastric vein or external pudendal) while the 31.5% of the patients presented with a reflux coming directly from the SFJ. Only the 6.9% of the subjects presented with recurrences with a diameter larger than 3 mm and had to undergo a recrosse SFJ operation. This study observed that after 14 years, in absence of evi-

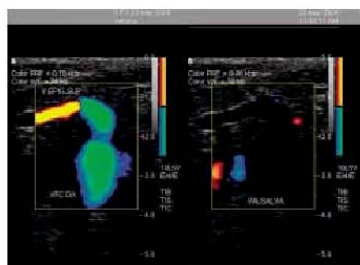


Figure 4.—Selective crosssection at five years of follow-up: no reflux or recurrences and superficial epigastric vein drainage.

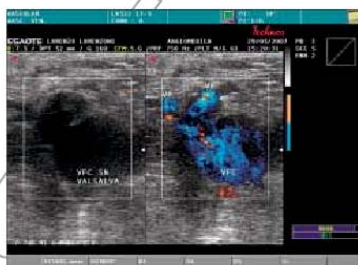


Figure 6.—The same case: selective crosssection, no reflux or recurrences, external pudendal vein and superficial epigastric vein drainage.



Figure 5.—SFJ incompetence.

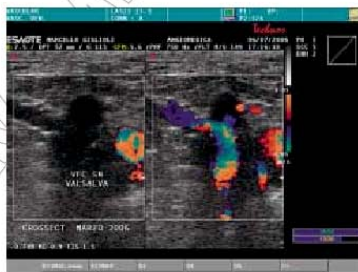


Figure 7.—Selective crosssection: no reflux or recurrences, superficial iliac circumflex vein and superficial epigastric vein drainage.

dent surgical mistakes, almost one patient out of three presented with some relapsing junction after a radical crosssection operation and neovascularization was the main cause, while obesity was a widespread risk factor.

According to the clinic experience on 150 patients, it is possible to observe that internal selective crosssection, saving the tributary veins coming from the abdomen, together with a convenient treatment to base saphenic insufficiency, revealed an efficacious therapy, giving results of undoubtable validity both from the

prognostic point of view and from the follow-up. Groin recidive rate is, in fact, reduced, almost null, at five years (Figures 4-7). The unique case of groin recurrences has reinforced the idea of removing all the veins that can origin a reflux. This means that to obtain an optimum result in time all the tributary veins of SFJ must be carefully isolated, given that T branches of external pudendal veins and superficial iliac circumflex veins from the lower part are rare. All these anatomic conditions must be paid a maximum attention, veins that lead to the bottom must be removed,

being a sure origin of reflux and therefore timely recurrences. In the past 10 years surgery has upgraded minimal invasive or endovascular approaches: the two most accredited techniques are radiofrequency and endolaser ablation. The purpose of these techniques is to close the GSV arising 2 cm below the SFJ. Thus all, or nearly all, collateral tributaries are not removed, but the results in terms of recurrences from the saphenous stump seem to be better than those gained with the radical crosssectomy.^{5,9,10}

These new techniques (selective crosssectomy and endovascular techniques) could overturn 50 years of surgical approach and tradition to inferior vena cava, but they must be confirmed in the following years.

Riassunto

La crosssectomia selettiva della vena grande safena: risultati a cinque anni

Obiettivo. Lo scopo di questo studio è di riportare l'incidenza di recidive, con follow-up a cinque anni, su pazienti operati con tecnica di crosssectomia interna selettiva, sostenendo l'importanza delle vene collaterali della crosse e mettendo in discussione così la "tradizionale" idea che le recidive inguinali siano causate da crosssectomia incompleta.

Metodo. Dal gennaio 2002 al dicembre 2006 sono stati operati 512 pazienti (370 di sesso femminile e 142 di sesso maschile) con un'età media di circa 60 anni. Tutti i pazienti sono stati sottoposti a intervento di crosssectomia interna selettiva, effettuato da un operatore unico, in regime di day-surgery e anestesia loco-regionale. Il presente studio ha riguardato una casistica selezionata, con metodo random, di 150 pazienti. Tutti i pazienti sono stati sottoposti a esame clinico ed eco-color-Doppler venoso agli arti inferiori eseguito da un operatore indipendente, a tempi diversi dall'intervento.

Risultati. Su 150 pazienti controllati è stato rilevato solamente un caso di recidiva inguinale, pari allo 0,6% del totale, dovuto a un errore tecnico dell'operatore, visto che al

paziente, sottoposto a crosssectomia interna selettiva nel dicembre del 2002, è stata lasciata in sede la vena safena accessoria anteriore, che sbocca come tronco comune insieme alla vena cavi confluisce illica esterna.

Conclusioni. In base all'esperienza clinica condotta sui 150 pazienti esaminati, si evince come la crosssectomia interna di tipo selettivo, con risparmio delle vene tributarie provenienti dall'alto, associata al trattamento adeguato dell'insufficienza safenica di base, si è rivelata un'efficace terapia, fornendo risultati di incontestabile validità dal punto di vista prognostico. Inoltre, il tasso di recidive inguinali a cinque anni, si è drasticamente ridotto, ed è quasi nullo.

PAROLE CHIAVE: Chirurgia vascolare - Vena safena - Inguine.

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