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Crossotomy, crossectomy and peripheral recurrences after conservative procedures for varicose veins

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Abstract

Fixing the venous reflux from the Saphenous-Femoral Junction (SFJ) is a key point in the surgical treatment of varicose veins in the territory of the Great Saphenous Vein (GSV). In the context of conservative procedures, this goal can be achieved by disconnecting the SFJ either leaving the gravitational (cranial) SFJ tributaries connected to the distal GSV (crossotomy), or also disconnecting the gravitational (cranial) SFJ tributaries (crossectomy).

In this retrospective analysis we investigated the role of the surgical gesture performed on the SFJ on the development of peripheral recurrences in 671 limbs showing varicose veins in the GSV territory undergone the CHIVA cure over the past 30 years and with a follow-up more than 3 years.

We found that, contrary to the GSV drainage, the surgical gesture on the SFJ was not “per sé” a significant risk factor. Interestingly, we also found that crossotomy resulted in a significantly higher rate of peripheral recurrences only within “draining” GSVs, while within “non-draining” GSVs the surgical gesture on the SFJ did not significantly affect the development of peripheral recurrences.

Introduction

Fixing the venous reflux from the Saphenous-Femoral Junction (SFJ) is a key point in the surgical treatment of varicose veins in the territory of the Great Saphenous Vein (GSV).[1] In the context of conservative procedures, this goal can be achieved by disconnecting the SFJ either leaving the gravitational (cranial) SFJ tributaries connected to the distal GSV, a technique known as "crossotomy",[2] or also disconnecting the gravitational (cranial) SFJ tributaries, a technique known as "crossectomy".

The role of the surgical gesture performed on the SFJ in the development of groin recurrences after conservative procedures has already been addressed in the literature. A previous paper has, in fact, shown that the ligation of SFJ gravitational (cranial) tributaries is a risk factor for groin recurrences,[3] and, more recently, a coherent hypothesis to explain the pathophysiological mechanisms leading to the development of groin recurrences has also been suggested.[4]

Along with groin recurrences, conservative procedures are also burdened by peripheral recurrences, represented by newly developed connections between the GSV trunk and the disconnected GSV tributaries, without reflux from the deep venous system. With this regard, a previous paper has shown that a relevant factor affecting peripheral recurrences is whether the procedure results in a GSV whose drainage into the deep venous system through a perforator vein is always doppler detectable throughout the follow-up ("draining" GSVs) or in a GSV whose drainage into the deep venous system is lacking in some phases of the follow-up ("non-draining" GSVs), with this last condition being a risk factor for peripheral recurrences:[5]

however, the role of the surgical gesture performed on the SFJ in the development of peripheral recurrences has not yet been clarified, and this is the issue addressed in the retrospective analysis reported in this manuscript.

Materials and Methods

This single center, single surgeon/evaluator study included 671 limbs showing varicose veins in the territory of the GSV with SFJ incompetence with incompetent terminal and pre-terminal valves, without pelvic escape points, nor Hunter perforator veins incompetence, nor deep venous incompetence or history of deep venous thrombosis, undergone the CHIVA cure[2] over the past 30 years and with a follow-up more than 3 years.

According to the hemodynamic presentation of the varicose picture, the appropriate CHIVA strategy was chosen in order to result in "draining" GSVs in as many cases as possible. In the case of type III shunt in which the safety condition to apply the CHIVA 2 strategy were lacking, we have chosen the conservative non-hemodynamic strategy, which resulted in about 80% of the "non-draining GSV" (see below).

The venous reflux from the SFJ was fixed either by crossectomy or by crossotomy, without following any pre-established criterium. In both crossectomy and crossotomy, a metallic clip was positioned parallel and flush with the Common Femoral Vein (CFV), also pinching the CFV wall, paying attention to exclude the valve sinuses, and, consequently, the outlet of venae venarum of a potentially present marginal ostial valve into the CFV, and not to leave any organic material (fibrous tissue, fat, CFV wall, *etc*.) between the clip extremities.[4]

The operation was performed under local anaesthesia and pts left the surgery about one hour after the procedure. Follow-ups were scheduled 1 week, 1 month, 6 months and then every year after the operation.

Obesity was defined as a Body Mass Index (BMI) >30. With regard to the CEAP (Clinical Etiology Anatomy Pathophysiology), classification[6] we only considered the item C, as the other CEAP items were the same for all the pts. included in the study (Ep, As and Pr). GSV calibre was assessed at the thigh level, about 15 cm from the groin.[5] Peripheral recurrences were defined as instrumentally detected newly developed connections between the GSV trunk and the disconnected GSV tributaries showing a negative response to the Valsalva manoeuvre, *i.e.* without reflux from the deep venous system.

Statistical analysis was performed using the STATA 10.0 software (College Station, Texas, USA).

Results

Table 1 shows the pre-operative characteristics of the whole group and of the two subgroups, with univariate analyses showing no significant difference with regard to age, sex, obesity, item C of the CEAP classification and GSV caliber between cases undergone crossectomy or crossotomy.

No adverse event occurred either peri-operatively or during the follow-up. The mean follow-up was 10±SD 13.5 yrs.

The surgical procedure resulted in 489 "draining" GSVs (73%) and 182 "non-draining" GSVs (27%). The distribution of the surgical gestures performed on the SFJ was significantly uneven (p=0.003), with an overall higher rate of crossotomies in both "draining" and "non-draining" GSVs, with a relatively higher rate of crossotomies within "draining" GSVs and, accordingly, a relatively higher rate of crossectomies within "non-draining" GSVs (360 crossotomies, 74%, *vs* 129 crossectomies, 26%, within "draining" GSVs and 112 crossotomies, 62%, *vs* 70 crossectomies, 38%, within "non-draining" GSVs).

Table 2 shows the distribution of peripheral recurrences according to the GSV drainage (top) and to the surgical gesture performed on the SFJ (bottom). As expected, the rate of peripheral recurrences was significantly lower within "draining" GSVs when compared to "non-draining" GSVs. On the contrary, the rate of peripheral recurrences was higher, though not significantly, within crossotomies when compared to crossectomies.

Table 3 shows the distribution of peripheral recurrences within "draining" and "non-draining" GSVs according to the surgical gesture on the SFJ. Within "draining" GSVs crossotomy resulted in a significantly higher rate of peripheral recurrences, while within "non-draining" GSVs the surgical gesture on the SFJ did not significantly affect the development of peripheral recurrences.

Discussion

In this retrospective analysis we investigated the role of the surgical gesture performed on the SFJ in the development of peripheral recurrences and we found that, contrary to the GSV drainage, the surgical gesture on the SFJ was not "per sé" a significant risk factor. Interestingly, we also found that crossotomy resulted in a significantly higher rate of peripheral recurrences only within "draining" GSVs, while within "non-draining" GSVs the surgical gesture on the SFJ did not significantly affect the development of peripheral recurrences.

A possible interpretation of our results could be that, when performed in the context of conservative procedures, crossectomy and crossotomy result in opposite hemodynamic effects: the former interrupts the hydrostatic column weighting on the distal superficial veins but may jeopardize the venous drainage of the lower abdominal wall, while the latter does preserve the venous drainage of the lower abdominal wall through SFJ tributaries but does not interrupt the hydrostatic column weighting on the distal superficial veins as SFJ tributaries and their branches show flow-oriented valves or are valve less. This, on one side, may explain why crossectomy results in a higher rate of groin recurrences, that are represented by superficial and deep cavernomas,[4] and, on the other, may explain why crossotomy results in a higher rate of peripheral recurrences only within "draining" GSVs. In fact, after crossotomy, the lack of interrupting the hydrostatic column in a "draining" GSV leaves unchanged the hydrostatic pressure at the level of the disconnected GSV tributaries and this would foster the development of peripheral recurrences.

In conclusion, crossectomy has already been shown to be a relevant risk factor for groin recurrences[3] and the present study shows that crossotomy is a relevant risk factor for peripheral recurrences in the cases in which the procedure results in a "draining" GSV, a target that, by definition, should be achieved in as many cases as possible undergone the CHIVA cure.

Thus, it appears quite sensible to address the question of whether in the context of conservative procedures the SFJ reflux should be fixed by crossotomy, taking the risk of peripheral recurrences, or by crossectomy, taking the risk of groin recurrences. The answer is, obviously, that crossotomy should be preferred in any case, because treating a peripheral recurrence, either by surgery or by sclerotherapy,[7] is, definitely, much less engaging than treating a groin recurrence.

A further contribution about the long-term efficacy of crossotomy and crossectomy in the treatment of patients with varicose veins by GSV sparing surgery could come from the results of a multicenter, randomized trial, which is in progress.[8]

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Table 1. Characteristics of the whole group and of the two subgroups, with univariate analysis.

	Whole group (n. 671 limbs, n. 577 pts.)	**Crossectomy (n. 199 limbs, n. 190 pts.)**	**Crossotomy (n. 472 limbs, n. 387 pts.)**	***p (*)***
Age at operation, (yrs), mean ± SD	57±12,8	57,8±12,5	56,7±12,9	*0.331*
Female sex, (Y/N), n.(%)	442 (77)	145 (76)	297 (77)	*0.917*
Obesity, (Y/N), n.(%)	74 (13)	30 (16)	44 (11)	*0.146*
2, n.(%)	93 (14)	32 (16)	61 (13)	
3, n.(%)	381 (57)	105 (53)	276 (58)	
CEAP Classification - item C 4 a, n.(%)	10 (1)	3 (2)	7 (1)	*0,299*
4 b, n.(%)	155 (23)	45 (23)	110 (23)	
5, n.(%)	0 (0)	0 (0)	0 (0)	
6, n.(%)	32 (5)	14 (7)	18 (4)	
GSV caliber, (mm), mean ± SD	7,2±1,6	7,3±1,7	7,1±1,6	*0.147*

SD, Standard Deviation

(*) From Student "*t*" test or Fisher "*exact*" test or Pearson "*chi-square*" test, as appropriate

Table 2. Peripheral recurrences according to the GSVs drainage (top) and to the surgical gesture performed on the SFJ (bottom).

	"draining" GSVs (n.489 limbs)	**"non-draining" GSVs (n.182 limbs)**	***p* (*)**
Peripheral recurrences, n.(%)	89 (18,2)	57 (31,3)	***<0.001***
	Crossotomy (n. 472 limbs)	Crossectomy (n. 199 limbs)	*p* (*)
Peripheral recurrences, n.(%)	110 (23,3)	36 (18,1)	*0.152*

GSV, Greater Saphenous Vein; SFJ, Saphenous Femoral Junction

(*) From Fisher "exact" test

Table 3. Peripheral recurrences within “draining” and “non-draining” GSVs according to the surgical gesture performed on the SFJ.

	Crossotomy (n. 360 limbs)	**Crossectomy (n. 129 limbs)**	***p* (*)**
Peripheral recurrences, n.(%), within "draining" GSVs (489 limbs)	78 (21,7)	11 (8,5)	***<0.001***
	Crossotomy (n. 112 limbs)	**Crossectomy (n. 70 limbs)**	***p* (*)**
Peripheral recurrences, n.(%), within "non-draining" GSVs (182 limbs)	32 (28,6)	25 (35,7)	*0.328*

GSV, Greater Saphenous Vein; SFJ, Saphenous Femoral Junction

(*) From Fisher "exact" test