

9 - CHIVA for Specialists

Felipe Faccini, Stefano Ermini and Claude Franceschi

<https://doi.org/10.5281/zenodo.6491367>

This chapter describes the cases of CHIVA in which there is a great involvement of the saphenous vein, junction and multiple saphenous collaterals. There is a considerable difficulty in the management, and we do not think surgeons should perform these procedures without prior practical training. Actually, we do not think anyone should perform any surgery without training. The major purpose of the chapter is to explain the procedures and, mainly, explain how the blood will flow after the CHIVA interruptions. We divided that treatment according to the flow in a venous shunt. The escape point includes saphenous junctions and perforators. The reflux pathway involves the saphenous veins and collaterals. The reentry comprises the perforators or normal saphenous veins that drive the blood back to the deep system. We also discuss the re-entry in the chapter about perforators.

Treating the Escape points:

Escape points are the source of reflux according to the CHIVA theory. The main escape points are the saphenous vein's junctions, pelvic/abdominal leaks, and perforators. We map the characteristics of the reflux with a carefully performed duplex scan. Saphenous junction reflux is treated with a crossotomy (not crossectomy) in the greater saphenous vein or proximal ligation in

the small saphenous vein. Pelvic leaks with well-defined leaking points are treated accordingly (see pelvic leaks chapter). We should treat abdominal, leg or pelvic veins that join in a big venous pool and drain reflux to the saphenous vein by ligation of the end of the collateral at the saphenous vein and a few centimeters of phlebectomy.

The crossotomy

In the cases that present saphenous junction reflux coming from the femoral vein, we usually perform a crossotomy. The purpose is to stop the escape of blood from the deep system and maintain the saphenous vein and the normal collaterals to keep blood flow. We should be sure about the source of reflux. The junction should be tested exactly at the exit from the femoral vein with Valsalva and muscle contraction, the reflux should be present in both maneuvers. We should be careful not to consider junctional flow in a patient with reflux distal to the junction. If we do a crossotomy in a non-junctional reflux, we will sacrifice the junction and will not solve the reflux. We commonly see reflux coming from pelvic leaks, abdominal veins and lymph nodes that drain at the groin tributaries. The surgeon should be sure, the reflux source mapped and the map in mind during the groin operation. If the reflux comes from the femoral vein to the saphenous vein directly, we perform the crossotomy. If the reflux comes from a pelvic leak, abdominal vein or lymph node, the source should be treated accordingly.

Groin management is important to the success of CHIVA, and we will describe the crossotomy. We suggest the surgeon starting on CHIVA not to change these technical approaches

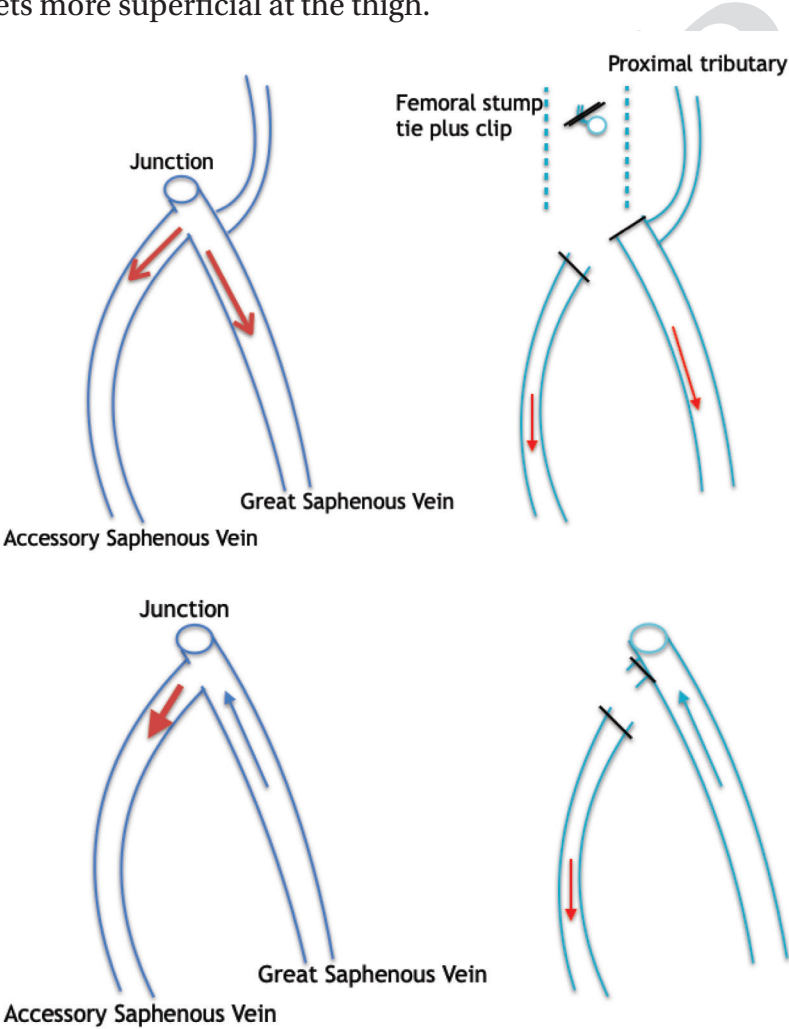
without great thinking and reading. There are distinct types of crossotomies, but every minor detail can cause recurrences ¹. After local anesthesia with lidocaine 1%, we perform an incision and dissection similar to that of crossectomy. We find the saphenofemoral junction and its tributaries and individualize the saphenous arch. At this point, we use silicone bands to pull the saphenous vein and observe the junction itself. We should take care with accessory saphenous veins that might exist and show in the preoperative duplex. At this point, we revise the anatomy and perform a triple non-absorbable ligation between the first tributary and the femoral vein and cut the saphenous vein between the ties (two proximal and one distal). We place a titanium clip close to the femoral vein to avoid leaving a stump. We suture the cribriform fascia with non-absorbable material, and the incision is closed. The idea is to keep all tributaries flowing to the remaining distal saphenous arch. Some cases have the first tributary too close to allow three sutures. In these cases, we may do the 2 proximal ones and leave the distal to receive a needle suture after removing the clamp. As a last resource, we may have to ligate the first tributary.

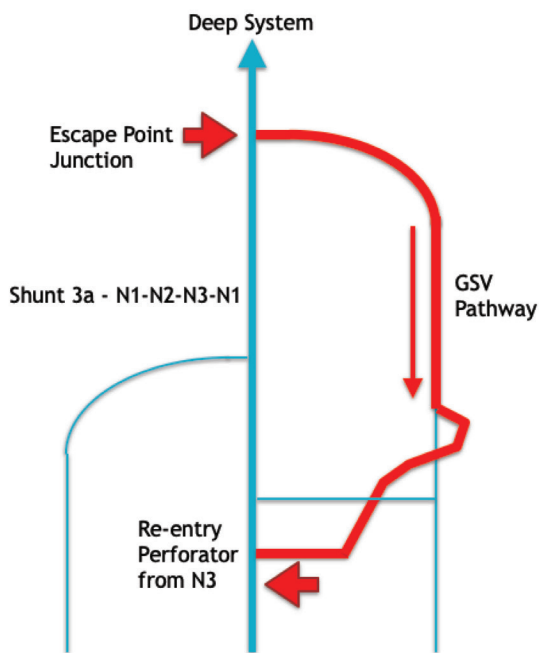
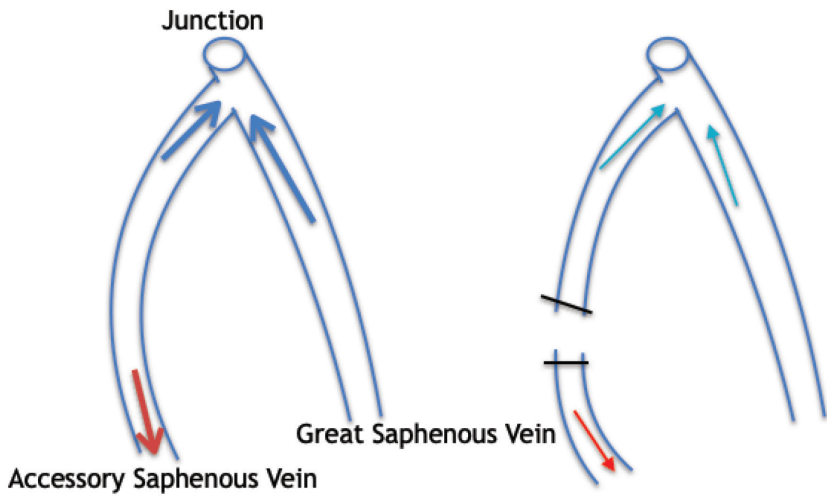
The Accessory Saphenous Veins

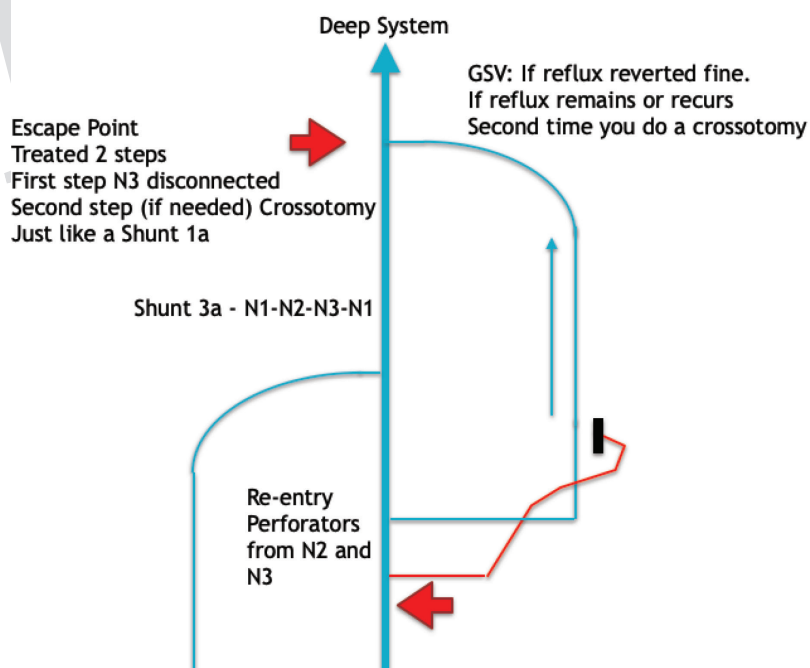
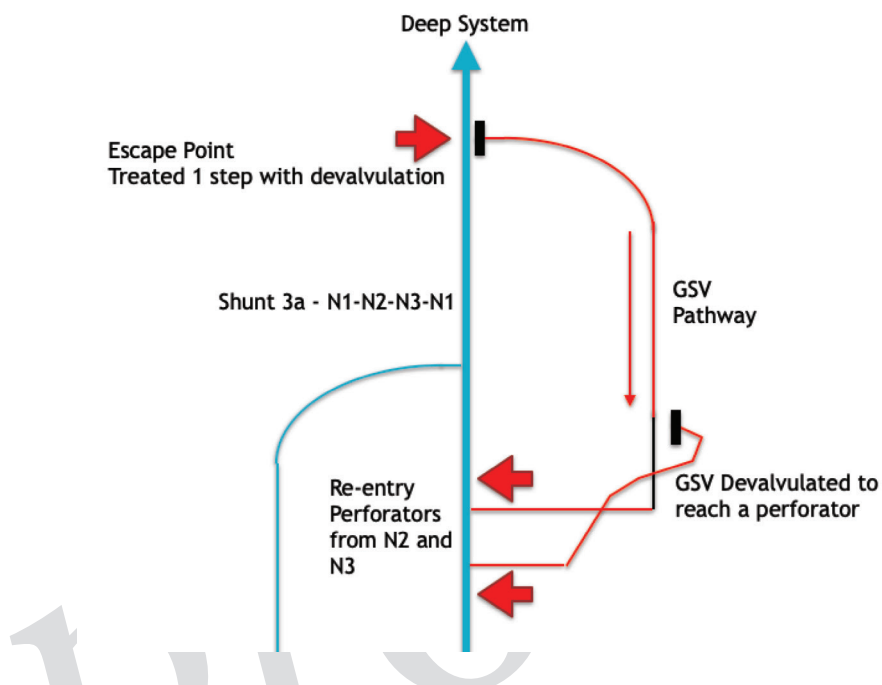
There are 3 situations of reflux at the accessory saphenous veins. The reflux may start on the proximal accessory vein or distal one. The saphenous vein may present reflux concomitant reflux or not. If the saphenous vein has concomitant reflux, we should treat it, performing a crossotomy as described plus a ligation of the accessory vein. If we identify no saphenous reflux, the accessory vein should be ligated proximally or distally, depending on the origin of reflux. We should avoid redo operations at the groin as much as possible.

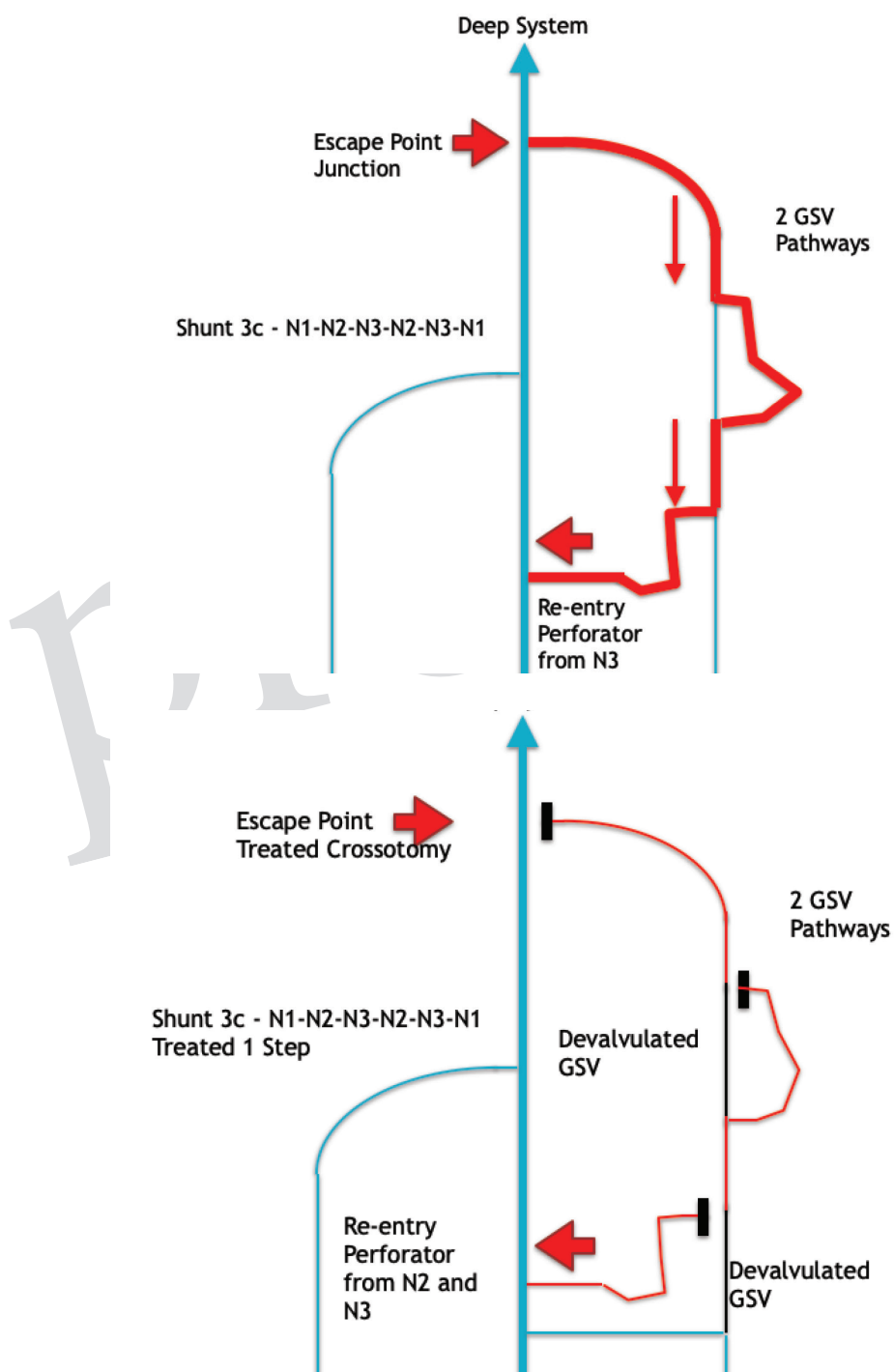
Whenever there is doubt about treating saphenous and accessory veins, it is best to treat both at the same time. The redo operations at the groin demand high expertise and have more complications².

Some cases have reflux proximal to the accessory vein, but no reflux at the saphenous vein itself. We perform a ligation of the proximal connection of the accessory vein with the great saphenous vein or femoral vein. The cases of distal reflux at the accessory vein is treated by ligation of the accessory vein where it gets more superficial at the thigh.









Pelvic Leaks and Abdominal Tributaries

There is a full chapter about pelvic leaks but the relation of these leaks with saphenous reflux is worth mentioning. Non-ostial saphenous reflux sometimes comes from a pelvic leak or proximal tributary. The great or accessory saphenous vein has no reflux at its connection to the deep system at the saphenous-femoral junction, but distal to this connection it receives a tributary that drains reflux and creates saphenous reflux. This reflux may be Valsalva positive or not depending if the tributary comes from a real pelvic leak or a junction of superficial collaterals.

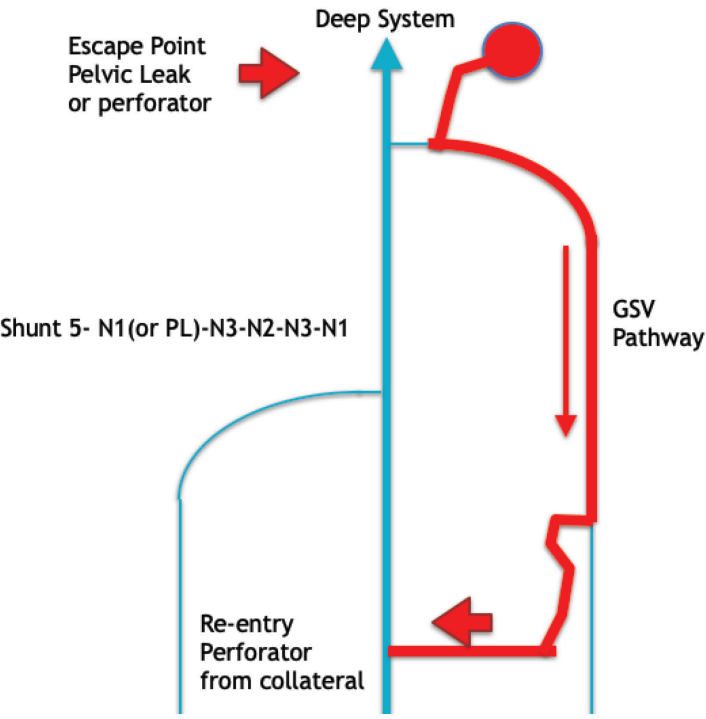
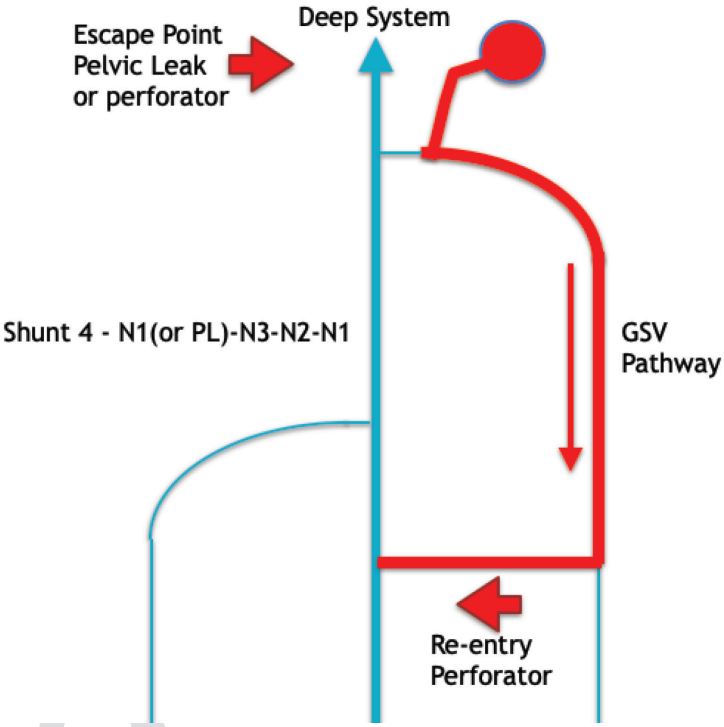
In these cases, with a competent terminal valve of the saphenous vein but reflux at the preterminal valve, we do not warrant a crossotomy. We may treat the proximal pelvic/abdominal vein and/or the distal collateral through what the reflux leaves the saphenous vein. Cases with abdominal/pelvic leak should have the leak treated to control the disease. This approach may or may not resolve the saphenous reflux, depending on saphenous size and presence of a perforator at the saphenous pathway of the reflux.

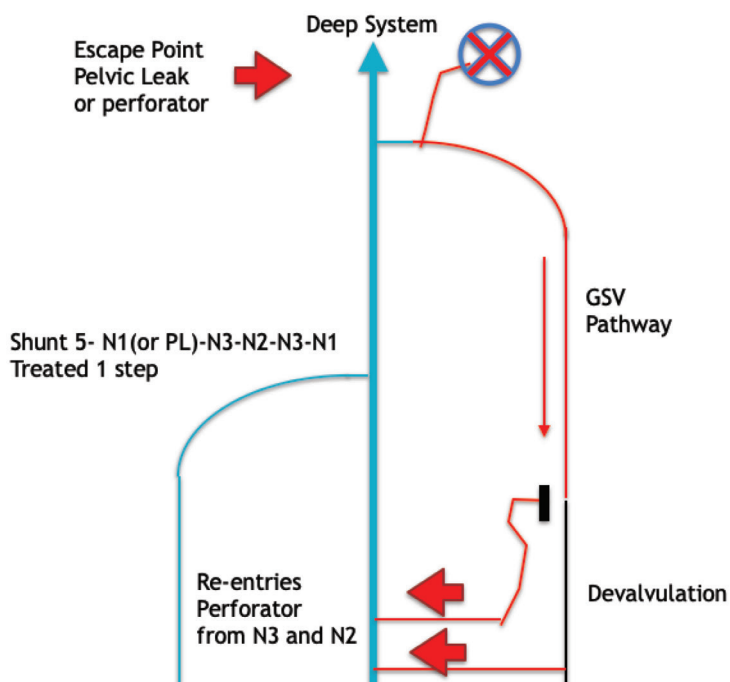
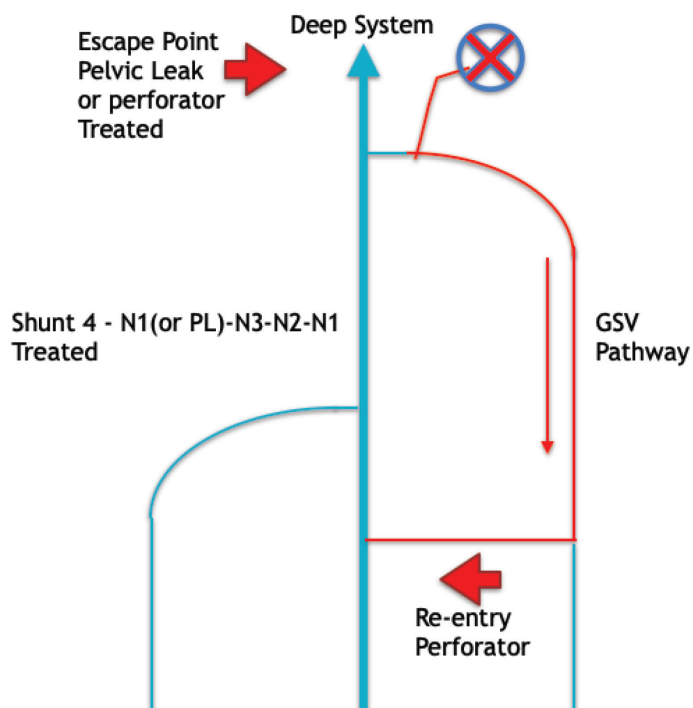
In these cases, there are 2 important rules. If the terminal saphenous valve is competent, there is no sense in performing a crossotomy. The surgical procedure for these cases is pelvic leak/abdominal tributary resolution and ligation of the distal collateral of the saphenous vein. Many of these patients have milder cases, and might be treated with sclerotherapy of the proximal collateral and/or distal one (see hemodynamic sclerotherapy chapters).

Small Saphenous Vein

The small saphenous vein poses difficulties because of the relation of its junction with important nerves and great anatomical junction variants. The CHIVA procedure is under local anesthesia, lowering nerve damage risk. However, the damage is a possibility and some surgeons prefer to avoid approaching the area. The anatomy usually does not poses difficulty as we prepare the operation with a careful duplex scan. We should evaluate the Giacomini vein and common connection with muscle veins. The Giacomini vein can have physiologic flow towards the foot; thus we should check its size and reflux characteristics. We should notice additional connections between the small saphenous vein and the deep system, both at its junction and at posterior perforators.

The surgical procedure is ligation of the saphenous vein at its connection to the deep system and excision of a few centimeters of it. If there is an additional connection to the deep veins, it is ligated as well. If the Giacomini vein drains at the small saphenous vein close to its junction, it should be spared, draining to the popliteal vein/junction. The deep muscle veins using the saphenous-popliteal junction to enter the popliteal vein should also be preserved. The ligature should be distal to the Giacomini vein and to the muscle veins entering the popliteal vein to preserve their physiologic drainage. Some centers avoid dissecting the junction of the small saphenous vein for fear of nerve damage. They do a distal ligation and complete the proximal vein treatment with sclerotherapy ³, we do not use this approach because most times we touch a nerve during local anesthesia the patient warns us.





The Pathway

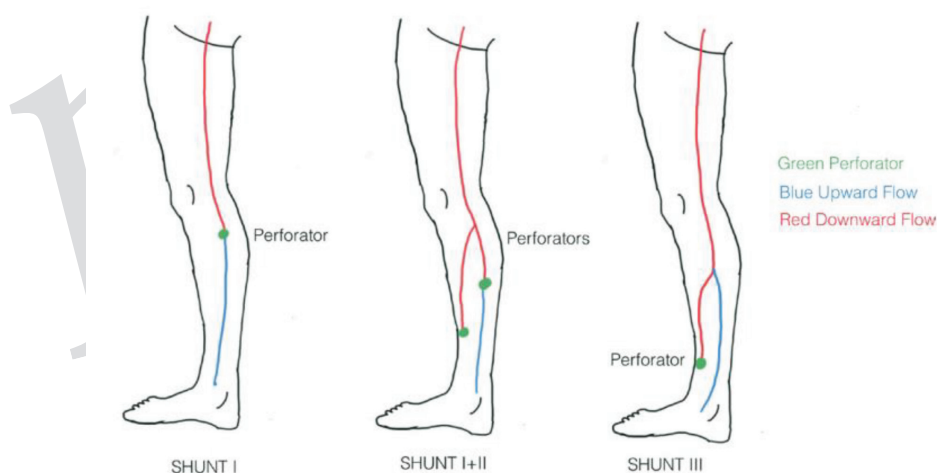
Once the proximal part of the reflux is treated, we should focus on the pathway of reflux, the veins from the source to the destiny of reflux. We should take care not to leave collaterals or saphenous veins without drainage. If we leave a portion without drainage to the deep system, we will probably have a superficial thrombophlebitis at that portion. Thus, we should map where the blood is going to in case we stop a reflux connection.

A collateral should be ligated where it **exits** the deep system (a pelvic leak, for example) or where it **exits** the saphenous vein. The “**entrances**” of the collateral to the deep system (perforator) or the saphenous vein should be left as drainage. Sometimes the collateral is long, even though the ligation of its exit may suffice hemodynamically, esthetic results are less than optimal. Here we perform additional fractionating of the blood column at this collateral, always keeping its drainage.

The saphenous vein should maintain drainage to a perforator if we are to ligate its junction. Every collateral ligated should also keep drainage. The easiest way to think about drainage (or re-entry) is that the perforator becomes the “new saphenous junction”, once the real one is not working well. Luckily, the new re-entry is down at the leg and has gravity at its favor. If the drainage is optimal and the saphenous vein keeps its flow after mimicking collateral treatment during the duplex mapping, we proceed the all-in-one CHIVA procedure. If the reflux ceases totally during the maneuver, we should decide the best approach to deal with the case.

CHIVA 1 step versus 2 steps

There are cases in which the patient has a saphenous vein with reflux from the junction to a collateral, and this collateral drains its reflux to a perforator. We perform the collateral finger compression test and the reflux disappears totally at the saphenous vein. This is called shunt type III. The simple ligation of the N3 collateral will probably result in saphenous thrombosis (much like an ablation without the heat), and this destroys the saphenous vein and causes development of collaterals and telangiectasias. To sum up, thrombosis creates all the undesired effects we want to avoid.



There are 2 options to deal with these cases and preserve the saphenous vein. We may divide the procedure in 2 steps. First, we perform the ligation of the collateral and keep the saphenous-femoral junction to operate in another procedure, if needed. Many cases will have flow reversion and the saphenous vein regains upward flow. Other cases will not have flow reversion, and we will have to do the junction procedure a few months after. The second

alternative is to perform a devalvulation of the saphenous vein distal to the collateral to help reflux get to a saphenous perforator in the leg. In this procedure, we perform the crossotomy, the N3 collateral ligation and devalvulation of the distal saphenous vein. The surgeon does it in the first procedure. The two-step procedure is the mainstay, as studies have shown that saphenous phlebitis causes skin varicosities.

The choice depends on several aspects. The patient may perceive the second operation like a recurrence and not a planned second step. We have seen even vascular specialists arguing that even if we plan it, they would consider it a recurrence. The insurance companies may not want to pay for the second procedure. We usually try to perform the first alternative and perform a 1-day approach when a reason exists to do so (insurance, patient desire). Some case peculiarities may help foresee the result. We avoid junction procedure when patients have a short segment of saphenous vein, <6.5 mm saphenous vein and no femoral reflux. These cases have a better chance of flow reversion with long-term results. The overall chance of flow reversion in all cases is greater than 40% in the first year and close to 30% at three years. A study showed that the results of 2 stage CHIVA operation for SHUNT III is good, as 89,7 % of patients referred as cured and 10.3% felt improvement, no failures at three years according to patient assessment ⁴.

Flow Reversal versus Shunt Zero

Shunt zero refers to the desired result of CHIVA when the reflux, column of blood or perforator position prevents reversion of flow. We see a long-lasting low speed reflux during muscle diastole. It is the result of eliminating the reflux source and drains

to perforators. The transmural pressure is usually diminished and the clinical result of these cases is good and long-lasting. We should identify these cases and explain it to the patient, as they may be submitted to duplex scans by other teams and have saphenous stripping or laser indicated due to a reflux. The reflux of Shunt Zero is benign and should not be considered for intervention.

When we treat a collateral that is responsible for the reflux correctly, two cases may happen. First, the distal blood drive versus proximal column of blood and perforator position makes it easier for the blood to get to the deep system at the saphenous junction. In these cases, we may keep the junction and the saphenous vein loses reflux after operation. The second case happens when the position of perforators and higher column of blood prevents upward flow. In these cases, we should adequately ligate the junction and create a shunt zero draining to a perforator.

Bibliographic References

1. Delfrate R, Bricchi M, Franceschi C. Multiple ligation of the proximal greater saphenous vein in the CHIVA treatment of primary varicose veins. *Veins and [Internet]*. 2014; Available from: <http://www.pagepressjournals.org/index.php/vl/article/view/1919>
2. Matkovski PD, Oliveira da Rocha Filho J, de Souza Rocha A, Laurindo Cabral A, Knihis CA, Gonçalves da Rocha Loures JM, et al. Tratamento da recidiva da crossa da veia safena magna por acesso proximal. *Jornal Vascular Brasileiro [Internet]*. 2017;16(4):335-8. Available from: <http://www.redalyc.org/articulo.oa?id=245054655007>
3. Li X, Fan L, Ren S, Li X. Outcomes of Foam Sclerotherapy plus Ligation versus Foam Sclerotherapy Alone for Venous Ulcers in Lower Extremities. *Ann Vasc Surg [Internet]*. 2017 Nov;45:160-5. Available from: <http://dx.doi.org/10.1016/j.avsg.2017.06.055>
4. Escribano JM, Juan J, Bofill R, Maeso J, Rodríguez-Mori A, Matas M. Durability of reflux-elimination by a minimal invasive CHIVA procedure on patients with varicose veins. A 3-year prospective case study. *Eur J Vasc Endovasc Surg [Internet]*. 2003 Feb;25(2):159-63. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/12552478>