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Clinical Pearls

1. Phlebectomy of the varicose veins (ASVAL technique) can lead in selected patients to resolution of saphenous vein reflux.
2. The ASVAL technique to treat varicose veins allows saphenous vein preservation and provides symptomatic relief and optimal cosmetic result in selected patients.
3. Saphenous vein ablation is warranted in patients with advanced varicosities and severe reflux.

system and the clinical outcomes even in the presence of saphenous vein (SV) reflux [1, 2] and achieves an optimal cosmetic result. Despite some prospective studies published on this topic [3], ablation of the SV in the presence of SV reflux is still widely used without a cosmetic approach. That could be explained by the fact that the criteria for the indication of ASVAL are difficult to determine in the absence of adequate validation in the literature by randomized control trials (RCTs) and also because the technique is not routinely taught in training programs. We will explain in this chapter tips and tricks for the understanding and the performance of ASVAL in daily practice.

Introduction

ASVAL (Ablation Sélective des Varices sous Anesthésie Locale) is a relatively new approach for the treatment of varicose veins (VVs) which emphasizes that microphlebectomies improve the hemodynamics of the venous

The Concept of ASVAL

Pathophysiology of Varicose Veins

Varicosities could develop at the level of the reticulum, stemming from the subfascial venous tributaries, which are the most superficial, the most exposed, and have thinnest walls [1]. In a standing position, the pressure is higher at the lower part of the limb reaching 90 mm Hg at the ankle when the valves are open. The subfascial veins could be the first to dilate through decompensation of their parietal weakness. Progression could initially

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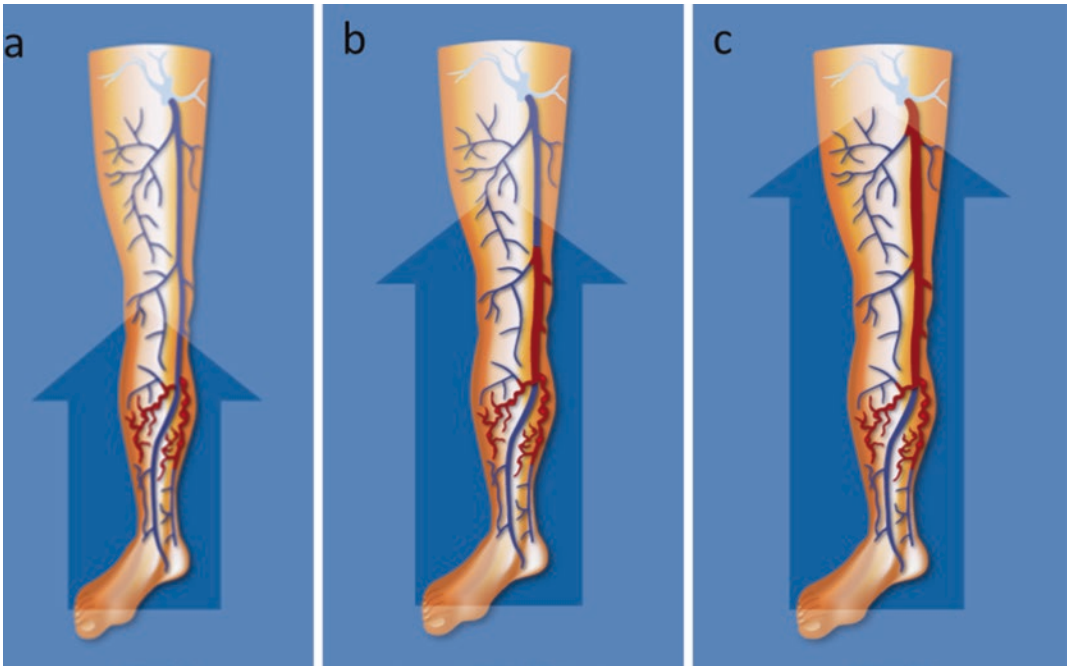


Fig. 14.1 Theory of anterograde evolution of the superficial venous insufficiency from the tributaries up to the saphenofemoral junction. The reflux starts in the tributar-

ies (a). The saphenous vein is subsequently affected and becomes dilated and incompetent (b). The reflux eventually affects the saphenofemoral junction (c)

remain subfascial, creating a dilated, refluxing, or stagnant venous network. When this refluxing network becomes large enough, it could create a “filling” effect in the intrafascial SV, leading to the decompensation of the SV wall, moving cephalad to reach the saphenofemoral or popliteal junction (Fig. 14.1). The SV is the superficial vein with the thickest and most muscular wall. Furthermore, the SV is protected by the splitting of the subcutaneous fascia in which it flows. It would therefore be the last vein to experience decompensation as varicose disease progresses. Numerous publications challenge the theory of descending progression, citing the possibility of local or multifocal early distal evolution, sometimes ascending or anterograde, based on precise and detailed echo-Doppler explorations [4]. Several authors have reported that the ostial valve is frequently competent (>50%) when there is trunk reflux [5, 6].

Practical Application

This pathophysiological theory has two implications:

1. If there is no saphenous reflux, early treatment of VVs would be useful in order to prevent it spreading to the SV.
2. If there is saphenous reflux, and until a certain stage of the disease, first-line therapy should include ablation of the varicose reservoir (VR) and not elimination of the saphenous reflux which is potentially reversible (Fig. 14.2).

Saphenous stripping or ablation would only be indicated in cases where saphenous reflux seems to be irreversible. This approach therefore involves selective management of superficial venous reflux, depending on the clinical and hemodynamic context found in each case. This is the “à la carte” treatment.

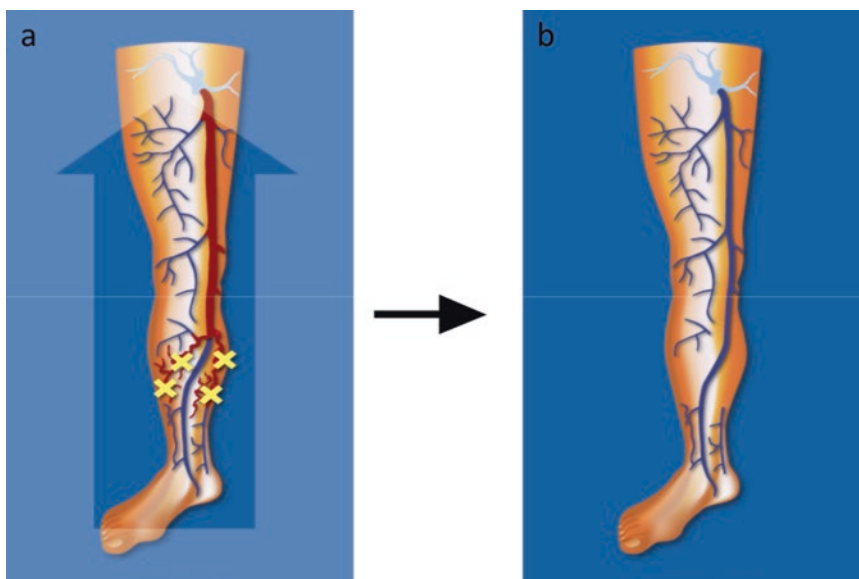


Fig. 14.2 Treatment by ASVAL surgical procedure: phlebectomy of the varicose reservoir (a) can lead to the resolution of the reflux in the saphenous vein (b)

The main argument in favor of this saphenous sparing approach is the physiological role that the SV could play in superficial drainage and its availability as revascularization conduit if needed. Moreover, literature reports the harmful effect that resection of the SV has on the long-term progression of SV insufficiency [7].

Selection of Patients Eligible for ASVAL

The ASVAL is not indicated in the more advanced stage of venous insufficiency where a saphenous ablation should be performed. Based on our experience of more than 10 years in performing ASVAL and the current published literature, we will discuss the selection process to determine the patients that would benefit from ASVAL.

Extent of the Varicosities

We have reported that the extent of the VR is a determinant factor for the hemodynamic and clinical efficiency of ASVAL [1]. The extent of the VR was evaluated according to the number of

zones to be treated (NZZ) by phlebectomy, with each limb divided into up to 32 zones in the pre-operative clinical mapping (Fig. 14.3). Each limb was divided into four surface areas (anterior, posterior, lateral, and medial), and then each surface area was divided into eight zones: the thigh into three zones (the upper third, middle third, and lower third), the calf into three zones (the upper third, middle third, and lower third), plus one zone for the knee, and one zone for the foot. This arrangement reflects our clinical examination technique, in which we examine each lower limb in a standing position, from the front, from the back, and from each of its profiles (medial and lateral). We observed a significant linear trend between the outcomes after ASVAL and the NZZ: when the NZZ was above seven, an abolition of the saphenous reflux was 6.81 times more likely obtained ($P = 0.037$) and a symptom relief 2.91 times more likely achieved ($P = 0.004$).

Ultrasound Duplex Preoperative Assessment

During the ultrasound duplex assessment with the patient standing upright, the test of

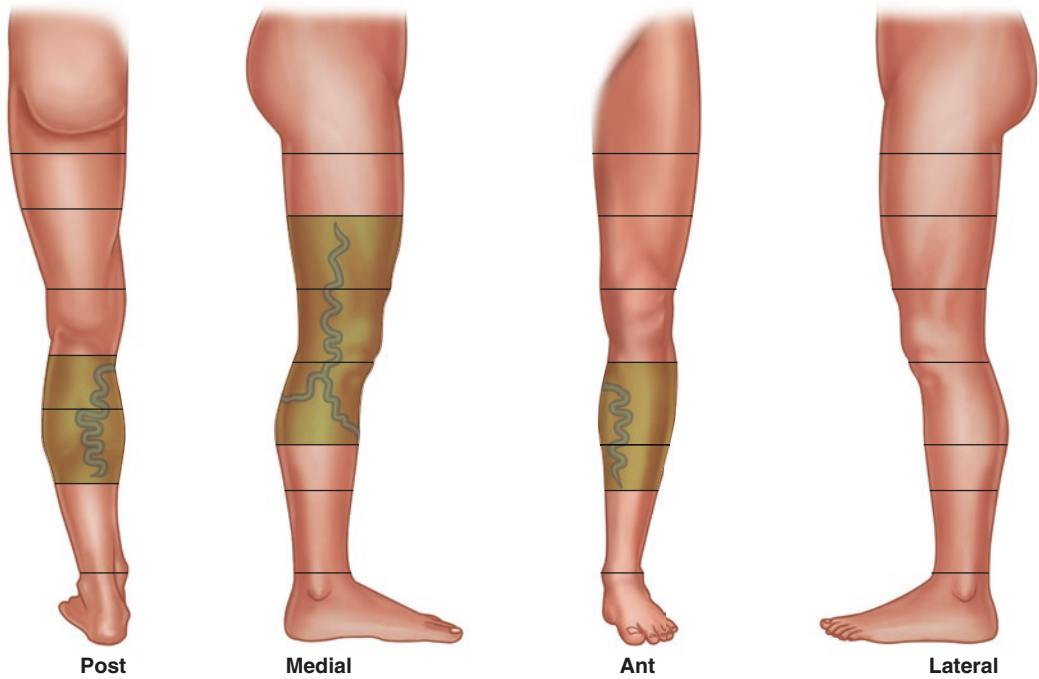


Fig. 14.3 Preoperative clinical mapping shows an example of a limb divided in seven zones for treatment of varicose veins

reversibility (TR) is considered as positive if the reflux of the SV is completely abolished by the compression of the varicose tributary with a finger at the moment of the sudden release of manual compression on the calf. We have reported the value of the TR in a study on 293 lower limbs: the positive predictive value of the TR for the abolition of reflux of the GSV was 95.7% and 94.7% at 1 and 2 years of follow-up [8]. On the other hand, the negative predictive value was weak at 36% and 14% at 1 and 2 years of follow-up, and the preoperative positivity of the TR did not have any correlation with the symptom relief or the cosmetic improvement. It means that if the positivity of the RT is a major criterion for the preservation of the SV, its negativity is not enough at the opposite to ablate the SV. Indeed, we have observed that even when the RT was negative, an abolition of the saphenous reflux, a cosmetic improvement, and/or a symptom relief can be achieved, probably because the RT is not technically feasible in the presence of multiple varicose tributaries.

Phlebectomy Reflux Elimination Success Test (PREST) Prediction Model

Biemans et al. [3] have reported a PREST prediction model including CEAP classification, number of refluxing segments, GSV diameter (above the tributary), and reflux elimination test result, in order to give a preoperative score that correlates with a probability of restoring GSV competence. For example, for patients with GSV reflux in one segment (3 points), C2 (3 points), positive reflux elimination test result (2 points), and GSV diameter of 5 mm (6 points), the model can predict that phlebectomy will be effective in 90% (total of 14 points).

Other Criteria

We have reported that a reflux reaching the malleolus was a mandatory criterion for the abolition of the SV reflux after ASVAL [1].

The nulliparity is a criterion that should be taken into account for the preservation of the SV in young women. The benefit of the ASVAL treatment for nullipara patients has been reported for the reduction of complexity, signs, and symptoms in the event of varicose vein recurrence after pregnancy [9].

The young age and the absence of symptoms with a cosmetic concern are also criteria that plead in favor of the preservation of the SV.

Technique

Skin Marking

The skin marking before the surgery is mandatory to perform a thorough ablation of the VR. We have highlighted that the removal of a large VR is one of the key to get good clinical and hemodynamic outcome after ASVAL [1]. It also diminishes the risk of lymphatic complication after VVs surgery.

Anesthesia

The administration of tumescent local anesthesia is essential for ASVAL. It is a very effective anesthesia, and it reduces dramatically the bleeding because of the subcutaneous high pressure obtained with infiltration of a large liquid volume. In addition, the volume of the mixture leads to a hydrodissection of the perivenous tissue facilitating the extraction of the vein. It gives to the surgeon an excellent comfort for removing all size of VVs. It has been reported that using isotonic bicarbonate instead of saline solution would improve further more the efficiency of the lidocaine and allow to reduce the total amount of lidocaine used, enabling to inject large volume of tumescence and therefore to treat large surface on the lower limb [10]. Since 2008, we use a mixture of 500 cc isotonic bicarbonate combined with 14 cc of 1% lidocaine and 1% epinephrine. As we are far below from the toxic doses, we don't have any restriction regarding the amount of mixture that can be infiltrated. An infiltrative pump is generally used in order to get a homogenous

infiltration, but a set of syringes could also be used. The infiltration is done around the vein and parallel to the skin with a 45° angle 21 Gauge needle, making a back and forth movement to decrease the pain during the injection by decreasing the local increase of pressure. We start the injection at one side, and it progresses side by side, each new stick being done in a previously infiltrated area to avoid any pain. One can use a topical anesthetic in addition to tumescent local anesthesia to decrease the pain of the first stick, but it is not essential.

Microsurgery

The use of loops is mandatory to remove the VVs by microphlebectomy. We use a 2X350 magnification in order to be precise enough without losing the peripheral vision.

The incisions are done with a 18-gauge needle. Depending on the quality of the skin and the size of the vein, a 21- or 25-gauge needle can be used. The bevel of the needle makes a flap on the skin that facilitates the penetration of the hook through the skin and gives an excellent cosmetic result (Fig. 14.4). The purpose of the flap is also to make the skin adaptable to the vein size. If the vein size is large, the skin will enlarge easily because of the flap. As it is a tangential and irregular flap, the skin healing will be invisible contrary to a perpendicular incision performed with a blade which makes the scars more visible.

The smaller the hook is, the better the cosmetic result will be. In our experience the best tool is the Muller hook n°0. The phlebectomy should be atraumatic and with a precise skin marking that enables a micro-incision in front of the vein, avoiding scratching the subcutaneous tissues to get the veins. It is recommended to avoid leaving a piece of VVs to be as efficient as possible and in order to get the best cosmetic result since it limits the risk of staining. One important trick is to cut the fibrotic tissue around the vein. This fibrotic tissue is easily cut on the hook with a blade N°11, using the loops. The division of the fibrotic tissue facilitates the extraction of the vein and

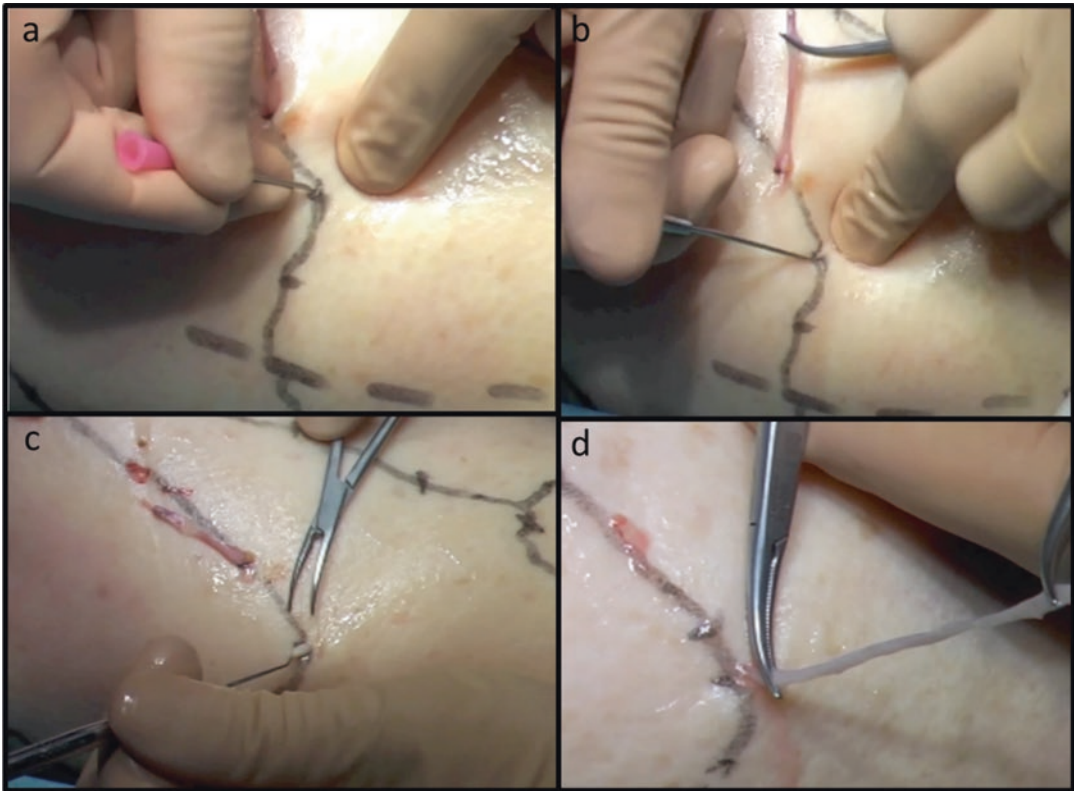


Fig. 14.4 Microphlebectomy technique. A micro-incision is made with 18-gauge needle (a). A hook is introduced (b), and the vein is exteriorized (c). The vein is

removed with the hook and a fine clamp with attention to avoid tearing the vein (d)

decreases the risk of it breaking during the pullout which would prolong the procedure. Vein breaking also poses a risk of bleeding and pigmentation if a remaining piece of vein is left under the skin. The ligation of connected veins is essential to decrease the bruising and to get the best cosmetic results. Taking additional time to meticulously finish all the steps improves the quality of the healing and improves the return to daily activities.

Postoperative Management

The use of stitches is not necessary since the incisions are performed with the 18-gauge needle. The use of Steri-Strips is recommended in order to avoid blisters. The walking is immediate at the end of the procedure, and the patient

could leave the hospital/office 1 h after. The patients are encouraged to walk at least 2 h on daily basis until postoperative day 8. They also can resume exercise activities the day of the surgery and swim the day after if one applies a protective film spray on the Steri-Strip. In our experience, wearing a stocking is not necessary after the first postoperative day following microphlebectomy [11].

Results

The follow-up (12, 24, 36, and 48 months) after an ASVAL procedure shows freedom of GSV reflux in 69.2%, 68.7%, 68.0%, and 66.3%, respectively, improvement of symptoms in 84.2%, 83.4%, 81.4%, and 78.0%, respectively, improvement of esthetics in 93.2%, 92.7%,

91.6%, and 89.9%, respectively, and freedom of varices recurrence in 95.5%, 94.6%, 91.5%, and 88.5%, respectively.

Conclusion

The ASVAL technique calls into question the usual approach to systematically treat the SV by high ligation and stripping or by endothermal or chemical ablation in the presence of VVs with a SV reflux. It leads at the opposite to a modern concept of an individualized “à la carte treatment” since every patient has a different clinical and hemodynamic situation of the disease at the time of treatment, which cannot match to a “one size fits all” that represents the traditional strategy. We have now at our disposal simple tools to evaluate the patients, select the good indications, and perform properly the ASVAL technique.

The microphlebectomy technique used for performing ASVAL is a mini-invasive revisited technique of phlebectomies described many years ago, with an addition of new tools, new tips and tricks, and of a new local anesthetic technique enabling to reach the highest cosmetic patient expectation.

References

1. Pittaluga P, Chastanet S, Réa B, Barbe R. Midterm results of the surgical treatment of varices by phlebectomy with conservation of a refluxing saphenous vein. *J Vasc Surg.* 2009;50:107–18.
2. Pittaluga P, Chastanet S, Locret T, Barbe R. The effect of isolated phlebectomy on reflux and diameter of the great saphenous vein: a prospective study. *Eur J Vasc Endovasc Surg.* 2010;40:122–8.
3. Biemans A, Van den Bos R, Hollestein LM, et al. The effect of single phlebectomies of a large varicose tributary on great saphenous vein reflux. *J Vasc Surg Venous Lymphat Disord.* 2014;2:179–87.
4. Labropoulos N, Kokkosis AA, Spentzouris G, Gasparis AP, Tassiopoulos AK. The distribution and significance of varicosities in the saphenous trunks. *J Vasc Surg.* 2010;51:96–103.
5. Abu-Own A, Scurr JH, Coleridge Smith PD. Saphenous vein reflux without incompetence at the saphenofemoral junction. *Br J Surg.* 1994;81:1452–4.
6. Chastanet S, Pittaluga P. Influence of the competence of the sapheno-femoral junction on the mode of treatment of varicose veins by surgery. *Phlebology.* 2014;29(1S):61–5.
7. Creton D. Diameter reduction of the proximal long saphenous vein after ablation of a distal incompetent tributary. *Dermatol Surg.* 1999;25:394–7.
8. Pittaluga P, Chastanet S. Predictive value of a preoperative test for the reversibility of the reflux after phlebectomy with preservation of the great saphenous vein. *J Vasc Surg Venous Lymphat Disord.* 2014;2:105. [abstract].
9. Pittaluga P, Chastanet S. Varicose vein recurrence after pregnancy: influence of the preservation of the saphenous vein in nullipara patients. *Blucher Med Proc.* 2014;1:81–2.
10. Creton D, Rea B, Pittaluga P, Chastanet S, Allaert FA. Evaluation of the pain in varicose vein surgery under tumescent local anaesthesia using sodium bicarbonate as excipient without any intravenous sedation. *Phlebology.* 2012;27:368–73.
11. Pittaluga P, Chastanet S. Value of postoperative compression after mini invasive surgical treatment of varicose veins. *J Vasc Surg Venous and Lymphat Disord.* 2013;1:385–91.