

Venous Hemodynamics for GSV sparing graft and improved varicose treatment

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Abstract Since the XIX century, evidence of the hemodynamic causes and efficacy of conservative hemodynamic treatments for varicose disease has been provided by B Brodie, G Perthes and F Trendelenburg, among others. Current studies confirm their prevalence over

destructive and ablative approaches in terms of results and preservation of GSV.

Keywords Venous drainage, CHIVA, progress and phlebology, innovations and phlebology, training in venous carthography

In 1988, faced with the cruel lack of available saphenous grafts due to a history of stripping or sclerosis, I sought to treat the signs and symptoms of venous insufficiency without destroying the GSV.

It need not be worn at night, when the patient is in the recumbent posture, but it should always be replaced as soon as he rises in the morning¹

The “disappearance” of varicose veins when the patient was lying down with legs elevated convinced me of the dependence of varicose vein caliber on the hemodynamic defect due to changes in postural hydrostatic pressure.

This already showed that excess of internal pressure could be compensated by external counter-pressure, which convinced me that the transmural pressure (TMP) was the central hemodynamic parameter of venous pathophysiology.

Trendelenburg's 1-century-old test showed that groin compression of the varicose GSV prevented it from filling up when standing upright. His assistant Perthes' test showed the collapse of GSV while walking when a tourniquet was placed at the root of the thigh. These observations suggested to Trendelenburg the possibility of a "private circulation" and confirmed the hemodynamic nature of varicose disease. Finally, Trendelenburg's success in treating ulcers by simple ligation of the varicose GSV was already paving the way for conservative surgical treatment. The varicose veins were therefore not the cause, but the consequence of an intravenous pressure overload.

Thus, venous insufficiency is always due to excess TMP in the veins and on the venous side of the microcirculation. Conservative hemodynamic treatment therefore consists of reducing intravenous pressure, increasing extravenous pressure or a combination of both.

In the XIX century Benjamin Brodie published the treatment of venous ulcers by compression:

Curiously, hemodynamics, like varicose veins in the past, is still treated as the "Cinderella" of varicose pathology, if we consider the content of phlebology teaching and congresses, where ablative techniques are mainly promoted. Indeed, since the beginning of the twentieth century, all the proposed treatments, instead of seeking to correct the hemodynamic cause of venous insufficiency, consisted of various competing and increasingly sophisticated means of destroying the so-called varicose veins, GSV included, even to the point of preventively destroying those of normal flow and caliber.

I must here make a few observations respecting the use of the roller. It should be applied from the foot upwards.

Technological innovations such as LASER, RF, Glue or HIFU procedures do not represent scientific progress, as they are based on the same principles as the age-old stripping and sclerosis. However, hemodynamics teaches us that excess TMP can be reduced either by compression which increases the external venous counter-pressure² or by elevating the legs to reduce the intravenous gravitational hydrostatic pressure through posture and/or static and dynamic fractionation of the pressure column by ligation and disconnection of diastolic venous shunts (closed or open deviated shunts)³. It also teaches us that removing and destroying veins increases upstream pressure, leading to tissue suffering and to the development of compensatory tributary veins, most often varicose ones⁴.

ASVAL is a GVS-preserving method, though limited to cases where phlebectomy of varicose tributaries suppresses GSV reflux. Whereas CHIVA preserves the GSV in all configurations, notably when it remains refluxing but in the same time no more overloaded, because disconnected from escape points.

Since 1988, I have proposed CHIVA (French acronym for Conservatrice et Hémodynamique de l'Insuffisance Veineuse en Ambulatoire), a conservative hemodynamic treatment able to reduce the intravenous part of TMP, restoring the Static and Dynamic Gravitational Hydrostatic pressure fractioning and disconnecting the closed and open deviated veno-venous shunts¹. The last large review confirms previous RCTs results and reports:

CHIVA seemed to have superior clinical benefits on long-term efficacy for treating varicose veins. However, the conclusion still needs additional trials for supporting evidence⁵.

In particular, Cappelli showed how CHIVA saphenous sparing is beneficial to the hemodynamics of the venous system⁶; where it reports that it's not the

direction of flow antegrade or retrograde (reflux) that is pathogenic, but the excess transmural pressure due to shunts overload and excessive height of the blood column⁷. Similarly, the caliber of perforators cannot be considered pathogenic when they are the re-entry point of a shunt, which is most often the case.

Even incompetent GSV is an eligible graft for bypass. "The potential use of a varicose vein should encourage conservative treatment of the great saphenous vein in patients treated for varicose veins and who present risk factors for atherosclerosis."⁸ and preferable to stripped and then frozen GSVs⁹. Delfrate has shown that a post CHIVA refluxing GSV retains at least normal parietal structural properties and is therefore eligible for arterial bypass surgery¹⁰. At the same time, the calibre of the GSV is reduced¹¹.

The CHIVA method requires strict hemodynamic mapping and surgical technique in order to obtain the expected results, as extensively explained in my last book¹². Its superiority is recognized, but the demand for an in-depth knowledge of hemodynamic pathophysiology and Echodoppler mapping is opposed, even though these qualities are expected of any specialist in venous pathology. Guide lines report:

CHIVA Results with preservation of the GSV better than compression in preventing ulcer recurrence and were at least equivalent to stripping of varicose veins. CHIVA is a complex approach, and a high level of training and experience is needed to attain the results presented in this RCT. It still requires considerable education of venous interventionists willing to learn this approach¹³.

A study concludes *CHIVA performed by experts is best than stripping, but less when performed by non-experts¹⁴.*

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