Suppression of the sapheno-femoral reflux by pure non-saphenous phlebectomy and anatomical structure of the reflux

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Aim. Recently, several hypotheses on varicose veins origin were proposed. Accordingly, a non-saphenous foam procedure was shown to achieve successful results in the suppression of the sapheno-femoral reflux, being its persistence limited to a small percentage of treated cases. The aim of the present note is to illustrate the hemodynamic basis of these reflux suppressing failures.

Methods. Two hemodynamic theoretic simulations were designed to represent adequately this hemodynamic condition. The sapheno-femoral reflux can be classified according to Teupitz into two kinds of different shunts: ShI and ShIII. The ablation of the varicosity’s of the non-saphenous superficial network can achieve the disconnection of Sh III and VI, but in no way of Sh I. So that, if the main reflux is a ShI the sapheno-femoral reflux does not disappear after the phlebectomy.

Results. The thorough study of the patient’s cartography makes the choice of the surgical strategy easier and more precise.

Conclusion. Depending on the structure of the reflux and as to immediate results, GSV ablation can sometimes solve completely the varicose pathology, while in other cases it is completely unsatisfying.

Key words: Femoral artery - Varicose veins, surgery - Hemodynamics.

Recently, greater saphenous vein (GSV) conservative surgery has been widely debated in two online Internet Yahoo! mailing lists, CHIVALAB and VASCULAB. In these discussions, several hypotheses on varicose vein origin were proposed and different approaches on conservative lower limb vein surgery were compared, as an alternative to classical (stripping) or modern (LASER, radiofrequency, foam guided sclerotherapy) ablative methods.

Resuming, the main point of the debate regarded using an isolated phlebectomy (a surgical or a chemical one), able by itself to suppress the sapheno-femoral reflux (ASVAL method), or adopting a surgical approach, tailored on the analysis of the structure of the venous net, suppressing the escape points, fractionating the hydrostatic pressure and disconnecting the venous-venous shunts (CHIVA). In a recent message on VASCULAB, J. Bergan sent a pre-print release of an interesting paper, which shows that a non saphenous foam procedure can achieve successful results in the suppression of the sapheno-femoral reflux, being its persistence limited to a small percentage of treated cases.

Materials and methods

The aim of the present note is to illustrate the hemodynamic basis of these reflux suppressing failures, giving hints for eventual further investigations.

Methodology

Two hemodynamic examples of MEVc (Italian acronym for computerised Hemodynamic Venous Map) were drawn by means of the VNet Model.
which uses data coming from the venous echo-Doppler of the lower limbs to provide the MEVc and the simulation of the individual venous net. Here the VNet model was used to generate two non-real, theoretic simulations, designed to represent adequately the hemodynamic topic under debate.

**The hemodynamic example**

Apart of several hemodinamically less important conditions, the sapheno-femoral reflux can be classified according to Teupitz \(^8\) essentially into two kinds of different closed shunts:

1. the Shunt I, which has a re-entry point in a perforator connected directly to the saphenic trunk, so that there is no pathology out of the GSV;
2. the Shunt III, which has a re-entry point in a perforator connected indirectly to the saphenic trunk, through an accessory vein (N3),\(^9\) which can undergo to a phlebectomy

Practising a phlebectomy in a Shunt I is possible, provided that there is another associated non-saphenous shunt, typically a Shunt VI, in which two perforators are linked through a superficial (N4) non-saphenous path.

These two different cases in the right (Shunts I+VI) and left (Shunt III) lower limbs are presented in Figure 1.

**Results**

In order to make the comprehension easier, here are the shunts active in the right lower limb: Sh I (Figure 2A), Sh III (Figure 2B), Sh VI (Figure 2C).

The ablation of the varicosity’s of the non-saphenous superficial network can achieve the disconnection of Sh III and VI, but in no way of Sh I. So that the sapheno-femoral reflux does not disappear after the phlebectomy.
Here are the shunts active in the left lower limb: Sh III (Figure 3A), Sh III (Figure 3B).

The ablation of the varicosities' of the non-saphenous superficial network can achieve the disconnection of both the Sh III, so that the sapheno-femoral reflux disappears.

**Discussion and conclusions**

The thorough study of the patient’s cartography can provide important information on the venous hemodynamics of the lower limbs, in order to make the choice of the surgical strategy easier and more precise. The cartographic assessment can be useful also in previewing the effects of other surgical procedures.

As to this example, consider that, as to immediate results, GSV ablation is not able to solve completely the pathology of the right lower limb, while instead it is completely satisfying for the left one.

**Riassunto**

Abolizione del reflusso safeno-femorale con una procedura non-safenica e struttura anatomica del reflusso

**Obiettivo.** Di recente, sono state proposte alcune ipotesi sull’origine delle vene varicose. In accordo con esse, una procedura non-safenica con schiuma è efficace nell’abolizione del reflusso, la cui persistenza è limitata a una piccola percentuale dei casi trattati.

**Metodi.** Sono state effettuate due simulazioni emodinamiche teoriche per rappresentare adeguatamente questa condizione emodinamica. Il reflusso safeno-femorale può essere classificato secondo Teupitz in due tipo di shunt: ShI and ShIII. L’asportazione delle varicosità della rete superficiale non-safenica può ottenere l’interruzione degli ShIII e ShVI, ma in nessun modo degli ShI. Per cui, se il reflusso principale è uno ShI, il reflusso safeno-femorale non scompare dopo la flebectomia.

**Risultati.** Lo studio accurato della cartografia del paziente rende più facile e precisa la scelta della strategia chirurgica.

**Conclusioni.** A seconda della struttura del reflusso e tenendo in considerazione i soliti risultati immediate, l’asportazione della safena interna può talvolta risolvere completamente la patologia varicosa, mentre in altri casi è completamente insoddisfacente.

**Parole chiave:** Arteria femorale - Vene varicose, chirurgia - Emodinamica.

**References**

1. Vasculab, the Vascular List! and Chivalab are two on line Internet Yahoo! mailing lists, available respectively at http://it.yahoo groups.com/vasculab and http://it.yahoo groups.com/chivalab. Subscribed members are actually 1 263 and 196, respectively.