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The venous hemodynamics map to compare the results of chronic venous disease treatments: preliminary results

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***Aim*. Varicose veins are not just a cosmetic problem of the legs but also a major component in the pathogenesis of lower limb chronic venous insufficiency (CVI). The venous hemodynamic map (MEVec) is a software application that enables users to record and collect clinical and diagnostic data on hemodynamic disorders underlying CVI. Map-assisted reporting allows for more uniform comparison of outcomes after CVI treatments. In so doing, MEVec may facilitate consultation between phlebologists working in various different specialties, including vascular surgery, angiology, dermatology, primary care, cosmetic plastic surgery, radiology, and cardiology among others. Because specialists speak different languages when talking about veins, they don't understand each other. The demonstration of this phlebologic Tower of Babel is the extreme variability in the long-term results of a myriad of methods and the inevitably ensuing low scientific reliability.**

***Methods*. We analyzed patients affected by internal saphenous varicose veins caused by incontinence of the saphenous-femoral junction without other refluxes. Doppler ultrasound assessment and interventions were performed by experienced doctors, all teachers at the School of Excellence in Phlebology (SEF), of the Italian Society of Clinical and Experimental Phlebology (SIFCS) study group on MEVeC.**

***Results and conclusions*. Currently, there exists no uniform standard for analysis of outcomes after treatment for chronic venous disease (CVD). With the use of MEVec, however, comparable clinical pictures can be reproduced, independently of the treatment method applied to the disorder. MEVeC can be used to create an objective hemodynamic database of CVI and to retrieve clinical and diagnostic data for standardized comparison of the outcomes of treatments for CVD.**

KEY WORDS: Venous insufficiency - Hemodynamics - Therapeutics.

Varicose veins are not just a esthetic problem of the legs but also a major component in the pathogenesis of lower limb chronic venous insufficiency (CVI).—The venous hemodynamic map (MEVec) is a software application that enables users to record and collect clinical and diagnostic data on the hemodynamic disorders underlying CVI. The use of map-assisted reporting may facilitate uniform comparison of the outcomes after CVI treatments.

The prerequisites for an objective hemodynamic and clinical analysis of the results of CVI treatments are: 1) the capability of the phlebologist to map the results of venous echo color Doppler assessment and 2) the possibility to compare the hemodynamic pictures.

There are various different solutions for the same hemodynamic situation in which the angiologist may prefer a pharmacological approach, the radiologist may prefer endovenous treatment, and the surgeon may opt for traditional surgery. In none of these solutions, however, does the clinician's strategic choice depend on the hemodynamic picture; instead, it is oftentimes the approach he knows best.[2] Furthermore, there is clinical evidence for the non-existence of an "only one solution for the treatment of varicose veins".[3] And since treatment approaches are difficult

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to compare,[3, 4] each case will require individualized therapy or a combination of treatments depending on the specific clinical condition, the findings leading to an accurate diagnosis, and the principles guiding therapeutic choices.[1-4] As recently reported by Hickey and Cooper,[5] it is important to standardize the know-how through appropriate and reproducible clinical and instrumental diagnostic criteria that allow to compare the results regardless of the technique used.

Etymologically, we can say that the phlebologist is an "expert of venous disorders". An expert in a disease is commonly defined as a specialist, a doctor with a postgraduate degree. But because postgraduate education in phlebology is not offered in European medical schools, phlebologists do not receive specific training in this area of medicine. Consequently, if we were to describe the figure of the phlebologist today, we could only say that he is a clinician who treats diseases of the veins. Moreover, phlebology spans several fields, including vascular surgery, angiology, dermatology, primary care, cosmetic plastic surgery, radiology, and cardiology among others. Each speaks its own peculiar language for talking about veins, which is why specialists don't understand each other. The demonstration of this phlebologic Tower of Babel is the extreme variability in the long-term results of a myriad of methods and the inevitably ensuing low scientific reliability.[6, 7]

Emblematic is the significant differences in relapse rates after ablative surgery. Figure 1 presents the incidence of relapses after surgical interventions for varicose veins. In 1996, De Measeneer [4] reviewed statistical studies about relapse rates after ablative surgery and identified the following causes:

— insufficient understanding of venous anatomy and hemodynamics;

— inadequate preoperative assessment;

— incorrect or insufficient surgery;

— development of new locations of superficial-to-deep insufficiency.

De Measeneer concluded by highlighting that the cases of works that assure a surgeon's appropriate training reduce relapses by 5%.

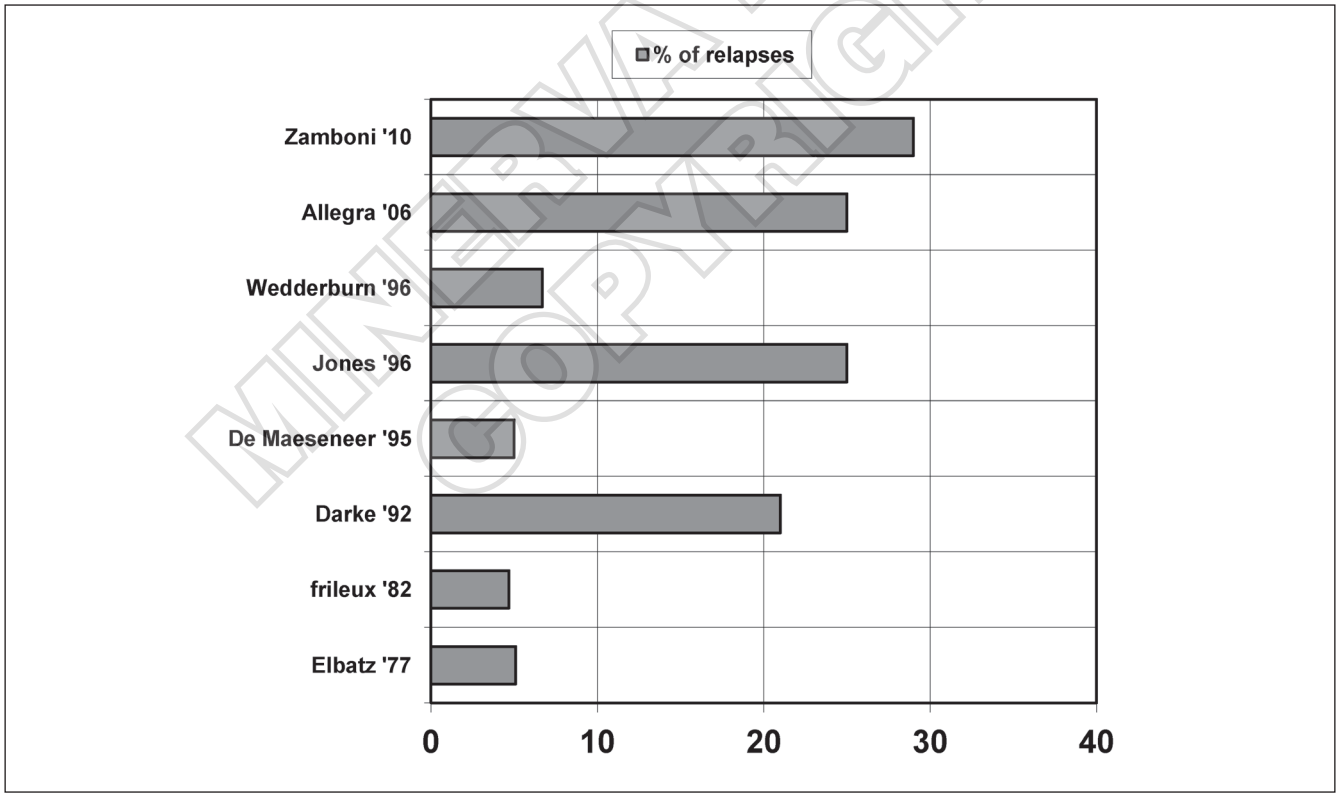

Figure 1.—Different incidence of relapses after surgical interventions for varicose veins.

Different procedures adopt different standards, making it all but impossible to compare the outcomes after treatment. For example, the results of endovenous techniques (laser and radiofrequency ablation, sclerotherapy, ultrasound-guided interventions) are based on recanalization of the saphenous vein or not, whereas ablative surgery (crossectomy venous surgery and stripping) is based on the clinical relapse of varicosities, the reappearance of new varicose veins after traditional surgical treatment, but not on the residual varices, *i.e.*, those present before surgery.

Recognizing the problems with comparing hemodynamic outcomes of different treatment approaches, we applied the MEVeC. The MEVec is a software application for collecting data on the venous circulation of the lower limbs (based on the venous cartography proposed by Claude Franceschi in 1988 for conservative hemodynamic cure of incompetent and varicose veins in ambulatory patients (CHIVA) (Figure 1). The MEVec allows users to record data on common hemodynamic elements in the treatment of hemodynamic disorders of lower limb varices, so that the clinical pictures can be more easily compared.

Franceschi's venous cartography is similar to the geographic map. As an approximate representation of the paper map of venous circulation, it displays topographic coordinates, it uses conventional symbols, and it displays a related caption.

Figure 2 illustrates the Franceschi cartography and the pictorial hemodynamic map symbols.

The limitations of Franceschi's venous cartography on paper [9] are that it is finalized for a single type of treatment (CHIVA) and that the meticulous collection of echocolor Doppler (ECD) data is time consuming, which is why this otherwise useful method has found limited acceptance. Therefore, the aims of this study were to objectify the information on the map so that it can be applied to all therapeutic approaches to chronic venous disease (CVD) and to simplify the mapping method, limiting it to the sharable contents (shared cartography).

We identified three fundamental concepts gleaned from the literature:

1. ultrasound as the gold standard in diagnosis;[10, 11]
2. the appearance of varicose veins is always related to a hemodynamic disorder that causes superficial venous hypertension;[12]
3. each solution must have as its irrevocable purpose the suppression of all refluxes.[13]

To overcome the difficulty of execution, which precluded Franceschi's venous cartography on pa-

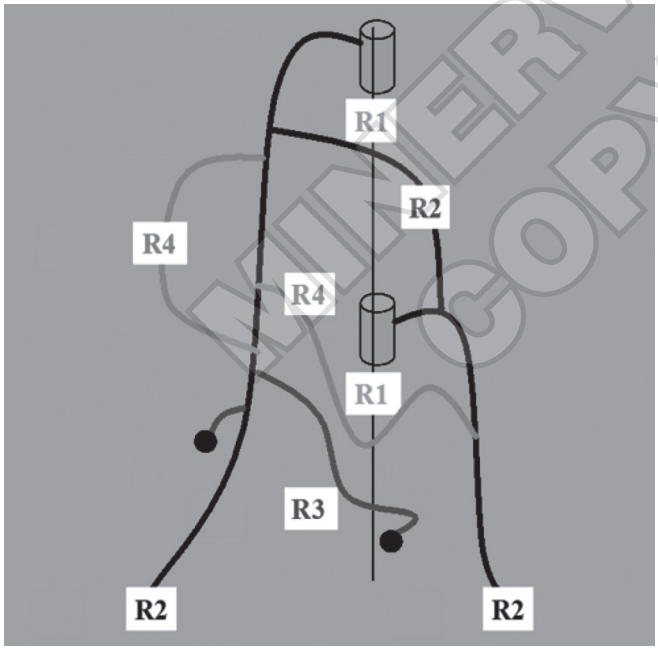

Figure 2.—Franceschi cartography and the hemodynamic simbology.

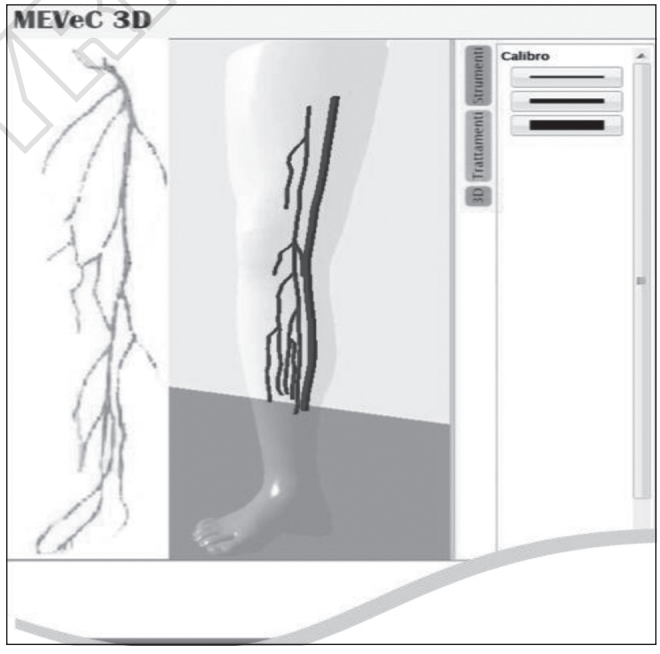

Figure 3.—MEVeC-3D project.

per from becoming a universal tool, the MEVeC-3D project was carried out in collaboration with researchers from the Science and Technology Park, University of Bari. The MEVeC (Figure 3) was designed to be a versatile tool for collecting and unifying anatomic and hemodynamic data to facilitate comparison between the outcomes of treatments of CVI.

Materials and methods

The study population was patients with internal saphenous varicose veins caused by saphenous-femoral junction incontinence without other refluxes. The inclusion criteria were restricted to patients with varicose veins of the great saphenous vein and its collateral veins of the thigh, excluding those with varicose veins caused by non-saphenous refluxes or incontinent perforating veins. Ultrasound Doppler assessments and interventions were performed by experienced doctors, all teachers at the School of Excellence in Phlebology (SEF) of the Italian Society of Clinical and Experimental Phlebology (SIFCS) study group on MEVeC.

The inclusion criteria were: age 30-45 years of both genders; primary varicose veins of the great saphenous vein not under medical therapy, elastic compression stocking, or physiotherapy for more than 3 months; similar lifestyle habits; and classification in CEAP Class C2 Ep As Pr. The study involved 40 limbs of 40 patients (20 males and 20 females; mean age, 41 years) classified in CEAP Class C2 Ep As Pr, with internal saphenous vein reflux. The data of the ECD assessments were collected using the MEVec program. The patients were divided into two groups of 20 patients each (10 males and 10 females per group). Group A underwent traditional surgery (crossectomy and short stripping) and group B received laser ablation. Follow-up assessment was performed 6 months postoperative.

Results

Group A: ostial reflux (N.=1, 5%); no saphenous vein reflux. Group B: ostial reflux (N.=3, 15%) and saphenous vein reflux (N.=4, 20%) but only 1 (5%) longer than 0.5 s. The reflux in group A was caused by a voluminous incontinent pudendal subostial vein not observed during crossectomy (Figures 4-6). Two of the three ostial refluxes in group B had an incontinent confluence of the epigastric vein with other collaterals; the remaining one had subostial incontinence (Figure 7).[14, 15]

The primary aim of this study was to verify the objectivity of evaluation by means of MEVec of the hemodynamic outcomes achieved with two different treatment methods. Treatment results were not considered in relation to relapses and symptoms, as this will be an area of focus for future studies.

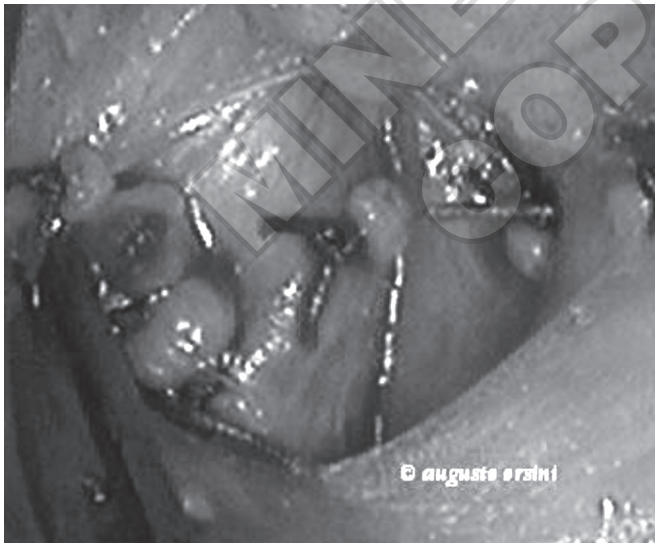

Figure 4.—Ligation of the pudendal subostial vein.

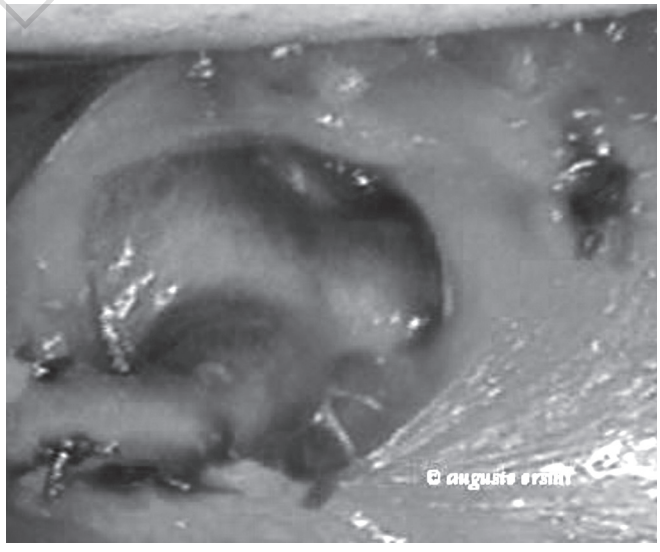

Figure 5.—Ligation of the pudendal subostial incontinence.

Figure 6.—Flebography of varicose reoccurrence starting from pudendial subostial incontinence.

Discussion and conclusions

Currently, there exists no uniform standard for outcomes analysis of treatments for CVD. MEVec allows for the reproduction of comparable clinical pictures, independently of the treatment method. The tool can be used to create an objective hemodynamic database of CVI and to compare the results of treatment methods for CVD in a more standardized fashion.

Riassunto

La mappa emodinamica venosa per confrontare i risultati delle terapie per le malattie venose croniche: risultati preliminari

Le vene varicose non sono solo un problema estetico delle gambe, ma dovrebbero essere considerate essenziali nella patogenesi dell'insufficienza venosa cronica (IVC) degli arti inferiori. La Mappa Emodinamica Venosa (MEVec) è un software che permette di registrare e raccogliere i disturbi emodinamici che sono alla base della insufficienza venosa cronica; questo metodo di segnalazione sulla mappa permette di confrontare uniformemente i risultati di tutti i trattamenti IVC .

Oggi quindi tra flebologi ci sono diversi medici: chirurgo vascolare, angiologo, dermatologo, medico di base, chirurgo plastico estetico, radiologo, cardiologo ecc. Tutti parlano di vene in una lingua diversa, è per questo che non si capiscono a vicenda: la babele flebologica. La dimostrazione di ciò è l'estrema variabilità dei risultati a lungo termine di varie metodiche e la scarsa affidabilità scientifica del metodo. Abbiamo analizzato pazienti affetti da varici della vena safena interna causate da incontinenza di giunzione safeno-femorale, senza altri riflussi. La valutazione ecografia Doppler e gli interventi sono stati fatti da medici con esperienza, gli insegnanti della Scuola di Eccellenza in Flebologia (SEF), della Società Italiana di Flebologia Clinica e Sperimentale (SIFCS) gruppo di studio sulla MEVeC (Shared venosa emodinamica mappa). Anche se al momento ancora non esiste uno standard uniforme di analisi dei risultati delle diverse proposte terapeutiche per il trattamento della CVD, con il MEVec vi è la possibilità di riprodurre quadri clinici comparabili , indipendentemente dal metodo di trattamento usato.

PAROLE CHIAVE: Insufficienza venosa - Emodinamica - Terapie.

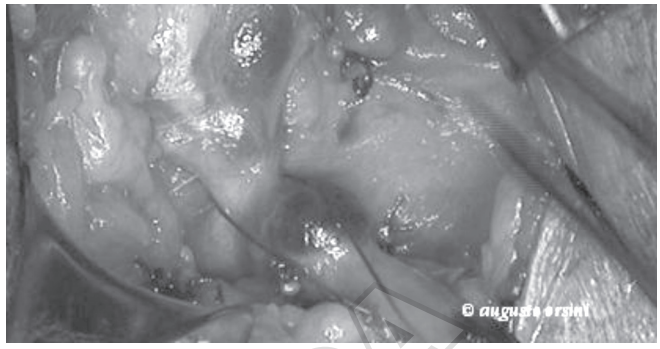

Figure 7.—Large epigastric varicose vein.

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Conflicts of interest.—The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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