The aim of this review of CHIVA letterature is to organise the articles in 10 groups accordig to the different gools of the articles:

1° ARTICLES FOCUSING ON THE PRESENTATION OF CHIVA THERAPY

2° ARTICLES CONCERNING SUBJECTES OF CHIVA PROCEDURE NOT IN TERMS OF RECURRENCES / CLINIC DATA BUT OF BIOCHEMICAL, HEMODYNAMIC PARAMETERS, THROMBOSES AND COMPLICATIONS.

3° ARTICLES CONCERNING THE RESULTS OF CHIVA PROCEDURE IN TERM OF RECURRENCES / CLINIC DATA WITHOUT COMPARISON WITH OTHER METHODS

4° ARTICLES COMPARING CHIVA RECURRENCES / CLINICAL DATA WITH OTHER PROCEDURES EMPLOING NOT RANDOMIZED STUDIES

5° ARTICLES COMPARING CHIVA RECURRENCES / CLINICAL DATA WITH OTHER PROCEDURES EMPLOING RANDOMIZED STUDIES

6 ° COCHRANE REVIEW AND METANALYSIS

7° ARTICLES OF GENERAL REVIEW

8° CHIVA AND PELVIC LEAK POINTS

9° ARTICLES ABOUT SPARING INCOMPETENT SAPHENOUS TRUNK AND USE FOR ARTERIAL BY-PASS

10° BOOKS AND CHAPTERS ABOUT CHIVA

**ARTICLES FOCUSING ON THE PRESENTATION OF CHIVA THERAPY**

**1) FRANCESCHI C.: The conservative and hemodynamic treatment of ambulatory venous insufficiency**

**Phlebologie. 1989 Nov-Dec;42(4):567-8.**

**2) C FRANCESCHI, G FRANCO : La cure CHIVA Discussion**

**Phlébologie, 1989**

**3) MANDOLESI S, Ballo M, Galeandro I, Filippo S, Migaldi D, Spinelli F, Nasso C, Carbone P, Scaramuzzino L, Passariello F.: The 1st national multicenter study of the CHIVA “Conservative Therapy and Hemodynamics in Venous Insufficiency in Outpatient Departments method of treatment of varices. One-year follow-up”**

**Ann Ital Chir. 1990 Jul-Aug;61(4):425-7.**

Abstract

The authors present clinical and instrumental results of N. 543 operations executed by CHIVA system. These cases are the result of trial performed in seven SIOC (Italian Society of CHIVA Operators) centers executed from November '87 to July '89. Functional and aesthetic results had been very good on over 85% of all cases; superficial thrombosis were verified on 10% of all cases but almost completely asymptomatic. The aa. propose to start a deeper trial on 500 patients choose by rigorous criteria of inclusion.

**4) CONSIGLIO L., GIORGI G.: Terapia di exeresi o conservativa?**

**Minerva Ang. 1991;16, sup.1: pp. 442–3.**

**5) MELLIERE D, Cales B, Martin-Jonathan C, Schadeck M.: Necessity of reconciling the objectives of the treatment of varices and arterial surgery. Practical consequences.**

**J Mal Vasc. 1991;16(2):171-8.**

Abstract

It is unwise to treat patients with varicose veins without thinking about the possibility of atherosclerotic disease occurring later on. The various procedures of stripping, as well as cryosurgery and sclerosis injections in the saphenous veins destroy veins which are at present the best material for femoro-tibial, femoro-popliteal and coronary bypass. Every year, a great deal of limb salvages cannot be achieved because saphenous veins have been previously removed. As arterial disease occurs one or several decades after the venous complaint, every patient with varicose problems may be concerned. Further more, contrary to a frequent opinion, great saphenous veins of varicose patients are often suitable for arterial bypass. As Doppler combined to duplex scan allow to draw a precise map of the superficial venous channels with their endings, amount of flow back, and caliber of the saphenous veins, it is now possible to propose to most patients conservative procedures: ambulatory phlebectomy or sclerosis injections of peripheral veins in case of minor reflux, crossectomy or CHIVA (Ambulatory Hemodynamic Cure of Venous Insufficiency) in case of major reflux, or association of the various technics. Thus, destructing treatments of saphenous veins should be only proposed to patients whose veins are obviously unsuitable for arterial bypass.

**6) FRANCESCHI C.: Conservative hemodynamic ambulatory treatment of venous insufficiency**

**Soins Chir. 1992 Mar;(133):29-31.**

**7) FRANCESCHI C.: Ambulatory and hemodynamic treatment of venous insufficiency (CHIVA cure)**

**J Mal Vasc. 1992;17(4):291-300.**

Abstract

Contrasting with the destructive methods of treating varicose veins, the CHIVA cure (Cure Conservatrice et Hémodynamique de l'Insuffisance Veineuse en Ambulatoire) technique is a conservative and hemodynamic approach of this problem. Based on coherent physiological principles, it proposes rigorous analysis followed by effective correction of the hemodynamic disorders, resulting in lasting benefits on the esthetic, functional and tropic changes associated with varicose veins. The results of the CHIVA technique in several french and european-centers, including over 10,000 procedures performed between 1987 and 1991, confirm the value of the method first described by the author in 1988. They confirm the necessity of respecting the strategic and tactical rules of this new approach and the need for specific theorical and practical training.

**8) BAILLY M.: Ambulatory and hemodynamic treatment of venous insufficiency (CHIVA cure). Report of an atypical case**

**J Mal Vasc. 1992;17(3):241-9.**

**Abstract**

After a brief introduction describing the principle, strategy and tactics of hemodynamic treatment of venous insufficiency in ambulant patients, the following atypical case is described. Ms P., aged 38 years, presented a functional symptomatology including waking at night and was obliged to get out of bed. Varices were moderately visible but she asked for treatment for esthetic reasons. A future pregnancy was discounted. Clinical examination and the pulsed ultrasound-Doppler cartogram showed incontinence of the internal perineal, opening from the genitofemoral fold and rejoining the summit of Jacomini's vein arch. The dorsal segment of Jacomini's vein was incontinent with a retrograde flux and rejoined an incontinent short saphenous continuing as a type III shunt. The cartogram obtained, the strategy decided and the intervention carried out on 19 June 1990 are illustrated by photographs. At 4 month follow up and despite the heat wave of summer 1990, all functional signs had disappeared and a sufficiently esthetic result had been obtained. Unexpectedly, the patient announced that she was pregnant.

**9) HUGENTOBLER JP, Blanchemaison P.: Ambulatory and hemodynamic treatment of venous insufficiency (CHIVA cure). Study of 96 patients operated on between June 1988 and June 1990**

**J Mal Vasc. 1992;17(3):218-23.**

Abstract

96 patients were treated in two years by Ambulatory and Hemodynamic Treatment of Varicose Veins (CHIVA cure), representing 131 legs that underwent surgery. 71 patients (74%) representing 102 CHIVA cures in the long saphena territory were followed up, with a maximum of 28 months of follow-up. The CHIVA cure represents a new and interesting therapy: ambulatory, painless, it allows a very early resuming of normal life. The follow-up shows that the aesthetic and functional results are especially satisfying and seem to be steady. The CHIVA cure certainly neglects the histological and parietal aspects of venous incompetence but the treatment of the hemodynamic factor is effective. It can be applied on every type of varicose veins concerning the long saphena territory, provided that the deep venous system is normal. The interest of CHIVA cure concerning the short saphena territory remains to be demonstrated. Arteritic patients, patients with coronary arteries diseases, sportmen, young patients with a brief evolutive potential, especially women, are the best indications. The CHIVA cure is a reliable strategy in the short and medium term, offering excellent aesthetic and functional results that still have to be confirmed in the long term and or a large scale.

**10) BAILLY M.: Cartographie CHIVA**

**Encyclopédie Médico–Chirurgicale, Paris 1993, pp. 43–161 – B, pp. 1–4.**

**11) FRANCESCHI C.: La cure Chiva et la critique: 14 réponses et 1 conclusion STV.**

**Sang thrombose vaisseaux, 1993**

**12) ZAMBONI P. et Al.: Video-assisted venous surgery.**

**Ann Ital Chir. 1995 May-Jun;66(3):379-86.**

Abstract

The use of intraoperative angioscopy, till now utilized exclusively in arterial surgery, is now used also in venous surgery. From January 1992 54 patients underwent to video-guided venous surgery: 23 cases of external valvuloplasty of the sapheno-femoral junction (EV-SFJ), 25 cases of hemodynamic correction of varicose veins (French acronyms CHIVA), 5 cases of high ligation plus long saphenous vein intraoperative sclerotherapy (HL-IS) 1 case of sub-fascial perforators interruption (SPI), the only extraluminal videoguided procedure. We have used 3 different video-angioscopes: a 1 mm monofibroscopy let in a 6 Fr Fogarty catheter, a disposable 2,8 mm colangioscope and a 2,2 mm operative angioscope. For the perforators interruption we have utilised the thoracoscope. EV-SFJ: the angioscopy has confirmed the presence of normal valvular cusps in a dilated vein wall in 21 cases, so excluding 2 patients from the planned treatment. At the end of the operation the angioscope has verified the reapproach of valvular cusps. CHIVA: the angioscopy has allowed to identify the exact points of the superficial venous system which should be interrupted, according to the Franceschi's theory. This procedure can avoid the technical errors due to intraoperatory misleadings of the duplex mapping. HL-IS: consists of a classic high ligation followed by long saphenous vein intraoperative sclerotherapy. The angioscopy has allowed a complete deconnection of the long saphenous vein from tributaries and perforators. Furthermore has facilitate the proportional distribution of the sclerosing agent along the long saphenous vein. SPI: the videoassistance have permitted the identification of the insufficient perforating veins reducing their surgical exposures.

**13) ZAMBONI P. et Al: Haemodynamic correction of varicose veins (CHIVA): An effective treatment?**

**Phlebology 1996, 11, pp. 98-101.**

**14) LEONI V., MISURI D.: IL TRATTAMENTO DELLE VARICI DEGLI ARTI INFERIORI MEDIANTE CHIVA 2. NOSTRA ESPERIENZA**

**UO di Chirurgia Generale Ospedale S.M.N Firenze - academia.edu 1996**

**15) A BANHINI, C Franceschi, X Mouren, P Caillard et Al.: Superficial venous insufficiency**

**JOURNAL DES MALADIES VASCULAIRES, 1996**

**16) FRANCESCHI, C.: Physiopathologie hémodynamique de l'insuffisance veineuse des membres inférieurs**

**(1997) Actualités Vasculaires Internationales, 22, pp. 17-27**

**17) FRANCESCHI C.: La Cure Hemodynamique de l’Insuffisance Veineuse en Ambulatoire.**

**Journal des Maladies Vasculaires. 1997 ; 22 (2) :91-95**

**18) CAPPELLI M. et Al.: Criteri di scelta della Strategia CHIVA**

**Arch. Soc. Ital. Chirurgia 4, 118, 1998**

**19) CAPPELLI M.: POSTERS-Conservative surgery of the saphenous trunks**

**Journal des Maladies Vasculaires, 1999**

**20) E MENDOZA: Einteilung der Rezirkulationen im Bein: anatomische und physiologische Grundlagen der CHIVA-Methode**

**Phlebologie, 2002**

**21) CRIADO E. et Al.: Conservative hemodynamic surgery for varicose veins.**

**Semin Vasc Surg. 2002 Mar;15(1):27-33.**

Abstract

Conservative hemodynamic surgery for varicose veins is a minimally invasive, nonablative technique that preserves the saphenous vein and helps avoid excision of varicosities. It represents a physiologic approach to the surgical treatment of varicose veins based on knowledge of the underlying venous pathophysiology gained through detailed duplex scanning. A change in venous hemodynamics is attained through fragmentation of the blood column by interruption of the refluxing saphenous trunks, closure of the origin of the refluxing varicose branches, and preservation of the communicating veins that drain the incompetent varicose veins into the deep venous system. After surgery, varicose veins regress through a reduction in hydrostatic pressure and efficient emptying of the superficial system by the musculo-venous pump. Obvious advantages of this technique are that it is done in an ambulatory setting, minimizes the risk of surgical complications, and permits a rapid return to full activity. The long-term hemodynamic improvement and recurrence rate of this technique remain to be established.

**22) MENDOZA, E.: CHIVA - Alternative oder Ergänzung zum Stripping?**

**(2002) Vasomed, 14, pp. 6-17.**

**23) HACH W. : What is CHIVA? [Was ist CHIVA?]**

**(2002) Gefasschirurgie, 7 (4), pp. 244-250.**

Abstract

The French phlebologist Claude Franceschi introduced the "Cure conservatrice et hémodynamique de l'insuffisance veineuse en ambulatoire" (CHIVA; ambulatory conservative and hemodynamic treatment of venous insufficiency) in 1988. It is based on Perthes' observation (1895) that varicose veins fill on standing and empty on walking when a tourniquet is applied to the thigh. This hemodynamic situtation is intended to be mimicked in CHIVA by graded surgical corrections of the varices. Franceschi's method is based on the theory of the four venous networks differing in the degree of harm they cause when affected. Different shunting patterns are referred to this theory, a shunt being a connection between one venous network and the next. Recirculation R1 designates the intrafascial leading veins. The R2 network comprises the stem veins. They, too, are thought to be situated intrafascially within a special saphenous fascia, which is visible on ultra-sound imaging. The R3 network comprises the epifascial collateral veins in the subcutaneous fat layer regardless of diameter; and reticular veins and capillaries and starburst varices make up R4. The surgical principle consists in flush ligation and division of the great or small saphenous vein junction without crossectomy. The effect of this is that a retrograde stream of blood is still fed into the preserved varicose stem vein, but it is reduced by that part of the retrograde flow that comes from the common femoral vein. Ultrasound diagnosis of the competent perforating veins and conservation of drainage into the deep venous system are considered very important.

**24) MENDOZA E.: Classification of the recirculations in the leg: Anatomic and physiologic bases of the CHIVA-method**

**Phlebologie 2002, 31 (1), pp. 1-8.**

Abstract

Recirculation in varicose veins was firstly thought of by Trendelenburg and further developed by Hach. This idea is also the basis on which Claude Franceschi founded his treatment for insufficient veins - CHIVA (in English ACHM). He divided the veins of the legs in the nets R1, R2 and R3. Deep veins correspond to R1, saphenous veins to R2 and epifascial tributaries to R3. Depending on the participation of these nets in the recirculation of a varicosity, Franceschi divided the recirculations in four types, which he called shunts (type I to IV). On these shunts he based the therapeutic decisions for the CHIVA-method. Most of the shunts are type I or III. In this cases the reflux fills the saphenous veins directly from the deep veins via a crosse or a perforator vein. The study of these models of recirculation throws a new light on the understanding of the distally dilated perforator veins, as well as on the direction of blood-flow in the different segments of the veins. Therefore it is interesting not only for persons that perform the CHIVA-method. Without having understood these concepts, it is impossible to judge upon CHIVA.

**25) JUAN-SAMSO' J.: Venous haemodynamic surgery in the treatment of varicose syndrome**

**(2003) Angiologia, 55 (5), pp. 460-475.**

Abstract

Aims. The objective of this study is to update our knowledge of the different aspects of this subject, i.e. the rationale behind the method used, the anatomical-functional terminology employed, strategic principles and ways they can be applied. The results reported from the different series available are also analysed. Development. The CHIVA cure technique (ambulatory and haemodynamic treatment of venous insufficiency) was described by Franceschi in 1988. After the initial expansion of the procedure, its use diminished because it had not been submitted to adequate testing. Later standardisation of the method has led to different groups' adopting the strategy with satisfactory results. The terminology put forward by the European CHIVA Association in 2002 allows the different types of strategies in this therapy to be applied accurately. It must be noted that in the register of activities of the Spanish Society of Angiology and Vascular Surgery (SEACV) for the year 2002, a third of the varicose veins submitted to surgery in Angiology or Vascular Surgery units or services in Spain were performed using venous haemodynamic surgery. Conclusions. No definitive evidence exists (randomised prospective clinical trials are under development) in favour of the CHIVA cure, yet the data available do support this procedure as an alternative to stripping in the treatment of varicose veins.

 26) **CAPPELLI M.; Molino Lova R.; Ermini S. Franceschi C.: Nouvelle approche de la physiopathologie de l’insuffisance veineuse superficielle: conséquences thérapeutiques**

**Phlébologie 2002, 55, N° 1, 27 – 31**

**27) E CRIADO, J Juan, J Fontcuberta and J M Escribano: Haemodynamic surgery for varicose veins: rationale, and anatomic and haemodynamic basis**

**Phlebology Vol 18 No. 4 2003 pag 158-166**

Abstract

The treatment of varicose veins has traditionally been ablative in nature and implemented without intent to improve the haemodynamic condition of the lower extremity veins. Haemodynamic surgery attempts to treat varicose veins by changing the reflux pattern while preserving the most efficient venous drainage channels. To implement this treatment modality it is necessary to have a clear understanding of the physiologic principles and the different reflux patterns that form the basis of haemodynamic surgery. Haemodynamic surgery is an emerging treatment for varicose veins, and has received little attention in the English literature. The rationale, and functional and anatomic basis of haemodynamic surgery for varicose veins are herein described.

**28) J JUAN J M Escribano E Criado: Haemodynamic surgery for varicose veins: surgical strategy**

**Phlebology 2005 Vol 20 No. 1 pag: 1-13**

Abstract

The haemodynamic approach for the treatment of varicose veins is a minimally invasive, non-ablative procedure that preserves the saphenous vein. The strategic principles for the implementation of this treatment include fragmentation of the venous pressure column, interruption of the venous segments where reflux originates, preservation of the superficial venous outflow channels to allow adequate drainage of the residual superficial system, and excision of the superficial varicose veins that remain undrained. This treatment modality requires a thorough understanding of the haemodynamic and anatomic rationale on which haemodynamic surgery is construed to tailor a treatment plan individually for each patient. The principles for the implementation of this strategy for the treatment of varicose veins are described here and the results are discussed.

**29) C FRANCESCHI C., Bahnini A.: Reponse a article-Mise au point concernant les commentaires sur la cure CHIVA dans l'article des Drs P. Pittaluga et S. Chastanet. Commentaire de P. Pittaluga.Phlebologie, 2008**

**30) F. PASSARIELLO: Suppression of the sapheno-femoral reflux by pure non-saphenous phlebectomy and anatomical structure of the reflux**

**ACTA PHLEBOL 2008;9:105-7**

 Aim. Recently, several hypotheses on varicose veins origin were pro- posed. 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 desi- gned 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 abla- tion 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 comple- tely the varicose pathology, while in other cases it is completely unsatisfying.

**31) C. FRANCESCHI C.: Hémodynamique de la maladie postphlébitique : conséquences diagnostiques et thérapeutiques**

**Journal des Maladies Vasculaires 2008 Volume 33, numéro S1**

ABSTRACT

Keywords: Venous insufficiency, Postphlebitic disease

Goal. - To show how recent knowledge of venous hemodynamics makes it possible to advance not only the classic concepts of pathophysiology, but also the diagnosis and treatment of postphlebitic disease.

Problematic. - Postphlebitic disease is a mixture in variable proportions of obstacles to flow and reflux, both responsible for tissue drainage disorders whose clinical functional and trophic consequences are of uneven severity. The advances in conceptual tools should allow a more detailed understanding of these phenomena, with the result that the diagnostic means of investigation can be optimized and therapeutic strategies rationalized.

Description. - Difference between the internal pressures PI and external atmospheric pressure, altitude (PE) which are exerted, on both sides, of the wall of the vein and its capillaries, the transmural pressure PTM is the cardinal variable of the function venous. It thus modulates tissue drainage and venous gauges. Too high due to either too low PE or too high PI (PR residual pressure too high due to lower arteriolocapillary resistance or obstruction of flow, hydrostatic pressure orthostatic PHS not reduced due to lack of dynamic fractionation PHS FDPHS). This fractionation is obtained by the systolodiastolic action of the PVM which alternately closes the upstream and downstream valves. The ineffectiveness of PVM results either from muscular inactivity (immobile standing or lying posture, paralysis), or from direct or indirect valve incontinence (deep and superficial closed shunts). Postphlebitic disease combines the effects of FDPHS defect and excess RA in varying proportions. Its treatment must logically reduce PTM by increasing PE (compression), reducing PI (PHS by decubitus, FDPHS by repairing defective elements of PVM, PR by respect and / or creation of open vicarious shunts).

Conclusion. - Thanks to these concepts, treatments for venous insufficiency can now be rationally adapted to the different hemodynamic configurations mapped by ad hoc diagnostic methods*.*

**32) FRANCESCHI C.: So as to avoid any misunderstanding about Cure Conservatrice et Hemodynamique de l'Insuffisance Veineuse en Ambulatoire (CHIVA).**

**Phlebology. 2010 Aug;25(4):212; author reply 213.**

Comment on: Venous haemodynamics: what we know and don't know. [Phlebology. 2009]

**33) MOWATT-LARSSEN, Shortell C.: CHIVA.**

**Semin Vasc Surg. 2010 Jun;23(2):118-22.**

**Abstract**

Based on a theoretical hemodynamic model, CHIVA (conservative hemodynamic cure for venous insufficiency) is an ultrasound-guided, minimally invasive surgical strategy performed under local anesthesia for the treatment of patients with varicose vein disease. After careful duplex mapping, the surgeon performs flush ligation procedures at the proximal origin of key points of reflux while meticulously maintaining superficial venous drainage to prevent varicosity recurrence. The saphenous veins are preserved. The strategy has been shown in studies to be safe and effective.

**34) MOWATT-LARSSEN, Shortell CK.: Treatment of primary varicose veins has changed with the introduction of new techniques.**

**Semin Vasc Surg. 2012 Mar;25(1):18-24.**

Abstract

New technologies have produced a revolution in primary varicose vein treatments. Duplex ultrasound is now used for preoperative diagnosis, postoperative surveillance, and during many procedures. Ultrasound has also altered our understanding of the pathophysiology of chronic venous disease. Laser and radiofrequency saphenous ablations are common. Classic techniques, such as sclerotherapy, high ligation, stripping, and phlebectomy, have been improved. Magnetic resonance venography, computed tomographic venography, and intravascular ultrasound have improved diagnostic capabilities. New strategies like ambulatory selective varices ablation under local anesthesia (ASVAL) and conservative hemodynamic treatment for chronic venous insufficiency (CHIVA) raise important questions about how to manage these patients.

**35) DUMITUR CASIAN: Metode contemporane de tratament al maladiei varicoase**

**Buletinul Academiei de Ştiinţe a Moldovei. Ştiinţe Medicale**

**Numărul 1(33) / 2012 / Pag. 319-322**

ABSTRACT

The long term results of classic surgical treatment of varicose veins are not completely correspond to requirements of physicians and wishes of patients. The modern methods of varicose veins treatment include endovenous thermal or chemical ablation and “conservative” interventions (CHIVA, ASVAL). According to the literature review, these methods provide the high efficacy of treatment and are associated with low rate of complications and recurrence of disease. Widening of spectrum of curative methods contribute to the individualization of varicose veins treatment.

**36) LARISSA PFISTERER, Gerd König, Markus Hecker, and Thomas Korff:**

**Pathogenesis of varicose veins – lessons from biomechanics**

**VASA Volume 43 · Issue 2 · March 2014 pag: 88-99**

Summary

The development of varicose veins or chronic venous insufficiency is preceded by and associated with the pathophysiological remodelling of the venous wall. Recent work suggests that an increase in venous filling pressure is sufficient to promote varicose remodelling of veins by augmenting wall stress and activating venous endothelial and smooth muscle cells. In line with this, known risk factors such as prolonged standing or an obesity-induced increase in venous filling pressure may contribute to varicosis. This review focuses on biomechanically mediated mechanisms such as an increase in wall stress caused by venous hypertension or alterations in blood flow, which may be involved in the onset of varicose vein development. Finally, possible therapeutic options to counteract or delay the progress of this venous disease are discussed.

Key words: Varicose veins, shear stress, circumferential wall tension, endothelial cells, vascular smooth muscle cells, remodelling

**37) GIANESINI S, Occhionorelli S, Menegatti E, Zuolo M, Tessari M, Spath P, Ascanelli S, Zamboni P.: CHIVA strategy in chronic venous disease treatment: instructions for users.**

**Phlebology. 2015 Apr;30(3):157-71**

Abstract

Along the years, scientific clinical data have been collected concerning the possible saphenous flow restoration without any ablation and according with the CHIVA strategy. Moreover, in 2013 a Cochrane review highlighted the smaller recurrence risk following a CHIVA strategy rather than a saphenous stripping. Nevertheless, the saphenous sparing strategy surely remains a not-so-worldwide-spread and accepted therapeutic option, also because considered not so immediate and easy to perform. Aim of this paper is to provide an easily accessible guide to an everyday use of a saphenous sparing strategy for chronic venous disease, highlighting how even apparently too complicated reflux patterns classifications can be fastly and successfully managed and exploited for a hemodynamic correction.

**38) P. ZAMBONI S.Gianesini: Surgical Technique for Deep Venous Reflux Suppression in Femoral Vein Duplication**

**(CHIVA in the deep system)**

**EJVES Short Reports Volume 30, 2016, Pages 10-12**

Background

Deep venous surgery is a challenging field with limited indications. Femoral vein duplication (FVD) is a frequent anatomical variant (55% prevalence). The aim was to describe a simple technique for managing deep venous reflux in FVD, when just one of the two segments exhibits deep venous reflux.

Methods

The technique consists of closing the refluxing femoral branch with a titanium clip. In this way abolition of reflux along the duplicated vessel is achieved, together with the restoration of femoral vein drainage.

Results

The technique is feasible and associated with improvement in limb haemodynamics.

Conclusions

Thanks to the high prevalence of FVD, the proposed technique provides an opportunity to treat a larger number of cases affected by primary or post-thrombotic deep venous reflux.

**39) PUSKÁS A. et Al.:HAEMODYNAMIC MAPPING OF CHRONIC VENOUS INSUFFICIENCY:THE CONCEPT OF SHUNTS**

**VÉNÁK BETEGSÉGEI Érbetegségek, XXIII. évfolyam 4. szám, 2016/4.**

ABSTRAC

It is well-known that the diagnostics of chronic venous insufficiency has been revolutionised by the introduction of duplex ultrasound. Refined manoeuvres and techniques contribute to the clarification of anatomical and haemodynamic details which are necessary for planning different steps in treatment. According to fluid dynamic science, the shunt is a pathway which diverts the flow into another channel system. Veno-venous shunts are venous tubes which diverts the venous blood from the physiological backflow through an insufficient veno-venous connection, which means a large extra amount of blood burdens these shunting venous channels. These shunts cause a flow and pressure overload, which results in high venous transmural pressure in this part of the venous system, which causes varicose dilatations, and symptoms and complaints for the

patient. According to the haemodynamic concept, these phenomena are the consequences of hight transmural pressure. This is because the extra amount of venous blood causes a faster speed of

low which changes the flow from laminar to turbulent. As a consequence of the turbulent flow, the pressure on the venous wall increases, which slowly dilates the lumen of the vein. With the usage of duplex ultrasound the following shunt elements can be identified:

(1) Escape point, where venous blood escapes from the deep to the superficial layers, which is opposite the physiological direction of flow.

(2) Shunt pathway, comprising all venous segments which make up the shunt and drains the superfluous venous blood burdening this system.

(3) Re-entry point drives the extra blood back to

the deep veins.

Four basic shunt types and some further subtypes can be distinguished by venous haemodynamics. Ultrasound mapping of them is a key point of therapeutic strategy. A good map is mandatory for a good treatment.

The basic shunt types are the following:

a) Closed shunt – venous blood starts its way at the escape point and goes to the re-entry point and again to the escape point, which means the recirculation of blood between these venous

segments.

b) Open deviating shunt – in these shunts blood never returns to the escape point. Valsalva manoeuvre is negative and venous blood is deviated by a branch of the saphenous stem.

c) Open bypass shunt – bypasses occlusions and obstacles. Occluded or stenosed or congenitally missing parts of the deep venous system mean a high resistance of flow is bypassed by a

superficial compensatory pathway. This type of shunt can have a vital significance in the circulation of the limb, therefore they must be preserved in any intervention.

d) Mixed shunt – is a combination of open bypass and active closed shunts.

The world of shunts is a great challenge for a practising phlebologist. There are many variations, so duplex ultrasound mapping is time-consuming at the beginning, but with some experience this becomes routine

**40) FELIPE PUCINELLI FACCINI et Al.: CHIVA to spare the small and great saphenous veins after wrong-site surgery on a normal saphenous vein: a case report**

**J. vasc. bras. vol.18  Porto Alegre  2019  Epub Jan 14, 2019**

ABSTRACT

CHIVA (Cure Conservatrice et Hemodynamique de l’Insufficience Veineuse en Ambulatoire) is a type of operation for varicose veins that avoids destroying the saphenous vein and collaterals. We report a case of CHIVA treatment of two saphenous veins to spare these veins. The patient previously had a normal great saphenous vein stripped in error in a wrong-site surgery, while two saphenous veins that did have reflux were not operated. The patient was symptomatic and we performed a CHIVA operation on the left great and right small saphenous veins. The postoperative period was uneventful and both aesthetic and clinical results were satisfactory. This case illustrates that saphenous-sparing procedures can play an important role in treatment of chronic venous insufficiency. Additionally, most safe surgery protocols do not adequately cover varicose veins operations. Routine use of duplex scanning by the surgical team could prevent problems related to the operation site.

**ARTICLES CONCERNING SUBJECTES OF CHIVA PROCEDURE NOT IN TERMS OF RECURRENCES / CLINIC DATA BUT OF BIOCHEMICAL, HEMODYNAMIC PARAMETERS, THROMBOSES AND COMPLICATIONS**

**1) CAPPELLI M. et Al.: Considerazioni sul ruolo fisiopatologico delle perforanti nella varicosi essenziale, quale presupposto alla concezione terapeutica dell’intervento CHIVA**

**Ospedali d’Italia – Chirurgia nov–dic 1991, vol. XLIV n°6, pp.**

**425–438.**

**2) ZAMBONI P. et Al.: Alternative saphenous vein sparing surgery for future grafting**

**Panminerva Med 1995; 37:19**

There are two possibilities: External valvuloplasty and CHIVA. Clinical, ecographic parameters, pressure values and R.L.R have been evaluated

**3) PINTOS T., SENIN E., RAMOS R., RODRIGUEZ E., MARTINEZ PEREZ M., Trombosis de safena interna post–CHIVA. Incidencia, factores condicionantes y repercusiones clınicas, Presented at the XLVII National Congress of the Spanish Society of Angiology and Vascular Surgery, Valladolid 2001.**

Pintos et al. Studied 165 patients after CHIVA treatment and compared the presence of postoperative superficial venous thrombosis of the GSV in different groups. 101 patients (61%) were treated with CHIVA 1 or 2, 64 patients (39%) with a non-draining method consisting of CHIVA 1+2 (simultaneous closure of the saphenous-femoral junction and CHIVA 2 points with type 3 shunt) . The preoperative mean diameter of the GSV was 0.78 cm (0.28 to 1.70 cm). All patients carried out prophylaxis with low molecular weight heparin for 15 days after the operation, and wore class II compression stockings for 6 weeks. Controls were performed by ultrasonography at 1, 3 and 6 months after surgery.

The incidence of superficial venous thrombosis of GSV in the CHIVA 1 or 2 group was 9 patients (9%) while in the CHIVA group non-drained 25 patients (38%).

The difference between the incidence of superficial venous thrombosis in the two groups was statistically significant (p <0.001).

This shows that the relatively high incidence of superficial venous thrombosis from the first publications on the CHIVA technique it has been negatively affected by the use of the CHIVA 1 + 2 procedure. If the CHIVA 1 + 2 (non-draining) procedure is not used, the incidence of superficial venous thrombosis decreases significantly. (Comment by Paolo Zamboni)

**4) ZAMBONI P., CISNO C., MARCHETTI F., QUAGLIO D., MAZZA P., LIBONI A., Reflux elimination without any ablation or disconnection of the saphenous vein. A haemodynamic model for venous surgery, Eur. J. Vasc. Endovasc. Surg., 2001 Apr, 21(4): pp. 361–9.**

The aim of this prospective study was to verify the possibility of reflux suppression in GSV without any crossectomy and / or stripping procedure. The authors studied about forty patients with primary chronic venous insufficiency of all clinical classes, with demonstrated Doppler incompetence of both the saphenous-femoral junction and the large trunk of the GSV, with the presence of a re-entry perforator placed along a saphenous tributary. The air plethysmography and duplex data were both collected before the intervention and at 1 and 6 months after. The duplex investigation showed the presence of an antegrade flow and the disappearance of reflux in the GSV in 100% of cases after 1 and in 85% at 6 months (Comment by Paolo Zamboni)

**5) FRANCESCHI C.: CHIVA effectiveness score: the correct one is below.**

**Eur J Vasc Endovasc Surg. 2012 Sep;44(3):351; author reply 352.**

Comment on: Validation of a new duplex derived haemodynamic effectiveness score, the saphenous treatment score, in quantifying varicose vein treatments. [Eur J Vasc Endovasc Surg. 2012]

**6) MALDONADO-FERNANDEZ et Al.: Postoperative complications of CHIVA technique for the treatment of chronic venous failure**

**(2010) Angiologia, 62 (3), pp. 91-96.**

Abstract

Introduction. The most commonly used technique for varicose vein surgery is saphenectomy, although haemodynamic surgery (CHIVA) has been becoming increasing popular in the last decade in our country, probably, due to its good postoperative recovery and fewer complications. Objective. To describe and quantify postoperative complications of CHIVA technique in our experience as well as that reported in the literature. Methods. Retrospective descriptive study of 269 limbs operated on by our group and analysis of 2,793 audited limbs described in the literature. Results. The main complications in our patients were: 17 cases in 269 limbs (6.33 %), distributed as follows: 11 symptomatic saphenous vein thrombosis, two temporary paresthesias, two groin haematomas, one wound infection, and one headache after spinal anaesthesia. Complications reported in the literature: 208 cases in 2,793 limbs (7.44 %), distributed as follows: 82 symptomatic saphenous vein thrombosis, 70 neuritis and paresthesias, 25 minor skin infections, 9 haematomas, 7 groin infections, 6 lymphatic groin leakages, 4 deep vein thrombosis, and one groin haemorrhage. There is no mortality or major complications associated with this procedure. Conclusions. CHIVA surgical approach to chronic venous insufficiency is accompanied by a rapid recovery and active life with a 7 % complication rate, which are mostly benign and do not hinder recovery. Symptomatic saphenous vein thrombosis is the most common complication after surgery for varicose veins using this technique. © 2010 SEACV. Published by Elsevier España, S.L. All rights reserved.

**7) MENDOZA E., BERGER V., ZOLLMANN C., BOMHOFF M., AMSLER F., Calibre reduction of great saphenous vein and common femoral vein after CHIVA**

**Phlebologie, 2011, 40(2): pp. 73–78**

**8) MENDOZA E., Diameter reduction of the great saphenous vein and the common femoralvein after CHIVA Long–term results, Phlebologie, 2013, 42: pp. 65–69.**

The diameters of the GSV and the common femoral vein (CFV) reflect the hemodynamic overload of venous disease. This study was designed to answer Prof. Hach's question in 2002, who asked if the femoral vein was overloaded after CHIVA.

Hach hypothesized that tributary blood (R3) that flowed through the saphenous vein (R2) into the deep veins (R1) usually through the saphenous-femoral junction could overload the femoral vein. Usually this blood would never circulate through the femoral vein, while after crossotomy in the CHIVA treatment, it will flow retrograde and drain through a perforating vein of the thigh or calf. Therefore, after surgical treatment, the femoral vein and the common femoral vein (CFV) distal to the saphenous-femoral junction would be overloaded by the blood returning from the perforating vein. The aim of this study was therefore to investigate the long-term effects of CHIVA treatment on CFV diameters. Patients underwent interventions aimed at maintaining drainage (CHIVA 2 in one or two phases, depending on the hemodynamic pattern).

In an initial phase, the evolution of the GSV diameters at the level of the proximal thigh and the CFV diameter in an upright position was measured (Mendoza 2011).

383 patients with 470 treated legs (84.4%) repeated a duplex examination between 8 and 25 weeks after surgery. The GSV and CFV diameters were compared before and after the surgery. The GSV diameter went from 6.1 mm before surgery to 4.5 mm after surgery in the female group and from 6.8 mm to 5.1 mm in the male group. The diameter of the common femoral vein went from 14.0 mm before surgery to 13.7 mm after surgery in the female group and from 16.5 mm to 16.1 mm after surgery in the male group, all of these

results showed a statistically significant difference.

In a second study (Mendoza 2013), the long-term effect on diameter was checked after 5 years in 43 patients included in the first study.

In addition, the clinical class (CEAP) and filling time were

compared with preoperative values ​​and after 8 weeks.

The diameter of the CFV and the diameter of the GSV decreased significantly even after 5 years, the CEAP clinical class decreased from 2.77 \_ 0.81 before surgery to 1.72 \_ 1.10 after 5 years (p = 0.007). The venous filling time measured with photoplethysmography was significantly longer from 15.24 \_ 6.18s to 21.61 \_ 9.2s after 5 years from the intervention (p = 0.022).

The authors therefore concluded that not only in the short term, but

also as a long-term result, the CHIVA intervention reduced both the CFV and GSV diameter and the C of the CEAP clinical classification and improved the venous filling time. (Comment by Paolo Zamboni)

**9) MENDOZA E.: Crossectomy of the great saphenous vein with the CHIVA method**

**(2004) Vasomed, 16 (2), pp. 46-48.**

Abstract

During the last years a lot of new techniques to treat varicose Veins were introduced in Germany. They question established concepts, specially the treatment of refluxive great saphenous vein with safeno-femoral incompetence. CHIVA treats the groin-region in a different way than the classical accepted crossectomy and stripping of saphenous vein. The saphenous vein and healthy side branches of the crosse are left in situ, just double ligation of the safeno-femoral junction is performed. This technique is explained with fotos and pictures: Disection of safeno-femoral junction, double ligation of safeno-femoral junction, once just at the level of femoral vein and twice just below the side branches.

**10) DELFRATE R., BRICCHI M., FRANCESCHI C., GOLDONI M., Multiple ligation of the proximal greater saphenous vein in the CHIVA treatment of primary varicose veins,**

**Veins and Lymphatics, 2014, 3: pp. 19–22, https://www.pagepressjournals.org index.php/vl/article/view/vl.2014.1919.**

The aim of this study was to determine if a crossotomy was needed or if a ligation could be performed for safety reasons on patients operated on an outpatient basis.

199 legs were followed-up after the saphenous-femoral interruption in the CHIVA context with three different techniques.

Common to all techniques was to place a titanium clip (10 mm long and 1 mm thick) flush with the femoral vein in order to prevent the presence of a residual saphenous stump.

- First group: (N = 61) Crossotomy (with interruption of the saphenous-femoral junction, 29 months follow-up);

- second group: (N = 82) triple ligature of the saphenous vein (TSFL performed with a suture covered with non-absorbable thread (14 months follow-up);

- third group: (N = 56) Triple polypropylene ligature (TPL; 12 months follow-up).

In the first two groups the percentage of new refluxes to the Valsalva maneuver at SFJ level was 6.1%, in the second (which however had a shorter follow-up) the presence of reflux on the SFJ at Valsalva was 4.9% , without statistically significant differences. In the third group, a percentage of channelization of 37.5% was detected after one year, the difference between group 3 and 1, as well as with group 2 was highly significant with p <0.001 (Comment by Paolo Zamboni)

**11) MENDOZA E, AMSLER F., CHIVA with endoluminal procedures: LASER versus VNUS –treatment of the saphenofemoral junction, Phlebologie, 2017, 46: pp. 5–12.**

From its description, the CHIVA strategy has always been performed with open surgical techniques.

After the introduction of endoluminal thermal techniques, this first approach aimed to compare LASER and / or Radio Frequency in the obliteration of the saphenous-femoral junction in the CHIVA context.

104 patients were studied before and at 3 and 6 months after GSV treatment with CHIVA strategy using endoluminal thermal techniques to close the inguinal segment (75 patients with VNUS [Closure – Fast], 29 LASER [1470nm, Radial Intros]).

A significant reduction of the GSV diameters at the level of the proximal thigh and of the CFV was detected, as well as an improvement in the clinical results (Table 10.17), the latter comparable to those achieved after surgical lacrossectomy.

The author concludes that it is suitable to apply endoluminal thermal techniques in the context of the CHIVA strategy. (Comment by Paolo Zamboni)

**12) PASSARIELLO F. et Al.: The office based CHIVA**

**Journal of Vascular Diagnostics 26 September 2013 Volume 2013:1 Pages 13—20**

**Abstract:** The cure Conservatrice Hémodynamique de l'Insuffisance Veineuse en Ambulatoire (CHIVA) can be office based (OB). The OB-CHIVA protocol is aimed at transferring CHIVA procedures to specialists rooms. The protocol will check the feasibility of OB-CHIVA, data pertaining to recurrence, and will offer the opportunity to study saphenous femoral junction (SFJ) stump evolution, the role of the washing vessels and the arch recanalization rate, and gather new data about the effect of the length of the treated saphenous vein. A simplified diagnostic procedure will allow an essential ultrasound examination of the venous net while a schematic and easily readable algorithm guides therapeutic choices. The Riobamba draining crossotomy (RDC) tactic is composed of a set of OB procedures. While some of these procedures are, at the moment, only proposals, others are already applied. Devices generally used in ablative procedures such as Light Amplification by Stimulated Emission of Radiation (LASER), radio frequency, steam, and mechanical devices are used in this context to serve to conservative interventions for CHIVA. New techniques have also been proposed for devalvulation and tributary disconnection. Detailed follow-up is necessary in order to determine the effects of therapy and possible disease evolution. Finally, information is added about the informed consent and the ethical considerations of OB-CHIVA research.

**13) GIANESINI S.,MENEGATTI E., ZUOLO M., TESSARI M., ASCANELLI S., OCCHIONORELLI S., ZAMBONI P.: Short endovenous laser ablation of the great saphenous vein in a modified CHIVA strategy, Veins and Lymphatics, 2013, volume 2: e21, https://www.**

**pagepressjournals.org/index.php/vl/article/view/vl.2013.e21.**

**14) GIANESINI S. et Al. : Mini-invasive high-tie by clip apposition**

**versus crossectomy by ligature: Long-term outcomes and review of the available therapeutic options**

**Phlebology OnlineFirst, published on May 9, 2016 as doi:10.1177/0268355516648066**

Abstract

Objective: The aim of the present study is to compare a mini-invasive (smaller than 2-cm incision) sapheno-femoral

high-tie by clip apposition (HT group) with a traditional high-ligation by ligature (HL group).

Methods: One hundred fifty chronic venous disease patients were included in group HT and compared with 150 cases constituting the group HL. The main outcome was the sonographic detection of saphenous trunk recurrences. Procedural pain, esthetic satisfaction, and disease specific quality of life were assessed.

Results: At 4.5\_2.4 years follow-up, 8 cases (5.3%) of Great Saphenous Vein reflux reappearance were reported in group HT vs. 19 cases (12.6%) (odds ratio: 2.6; 95% confidence interval: 1.1–6.1; P.0.04) of group HL. Esthetic satisfaction was scored as high and very high in group HT and HL, respectively (P<.0001).

Conclusions: Proper high-ligation technique provides satisfying outcomes both in terms of recurrence rate and patient

esthetic satisfaction. The different outcomes obtained by the two groups encourage further investigations regarding recurrence pathogenesis.

**15) CAPPELLI M. et Al.: Ligation of the saphenofemoral junction tributaries as risk factor for groin recurrence.**

**J Vasc Surg Venous Lymphat Disord. 2018 Mar;6(2):224-229. doi: 10.1016/j.jvsv.2017.09.005. Epub 2017 Dec 28.**

Abstract

OBJECTIVE:

The aim of this study was to compare the recurrence rate after high ties performed with or without sparing of the saphenofemoral junction tributaries.

METHODS:

There were 867 lower limbs enrolled. All patients underwent a high tie with (group A) or without (group B) ligation of all the junctional tributaries for a great saphenous vein reflux (C2-5EpAsPr). A duplex ultrasound examination detected recurrences.

RESULTS:

Median follow-up was 5 years (interquartile range, 3-8 years). Group A had a higher recurrence rate than group B (odds ratio, 7.52; P < .001). Group A recurrences (7.4%), compared with group B (1.1%), presented with a more frequent direct stump reconnection (3.7% vs 0.2%; P < .001) or newly developed pelvic shunts (3% vs 0.5%; P < .001). No significant difference was reported between the two groups in newly incompetent perforating veins.

CONCLUSIONS:

Ligation of the junctional tributaries is associated with a higher recurrence risk. Further investigations are needed to determine the hemodynamic role of each single junctional tributary.

**16) TISATO V. et Al. : Modulation of Circulating Cytokine-Chemokine Profile in Patients Affected by Chronic Venous Insufficiency Undergoing Surgical Hemodynamic Correction**

**Journal of Immunology Research Volume 2014, Article ID 473765, 10 pages http://dx.doi.org/10.1155/2014/473765**

ABSTRACT

The expression of proinflammatory cytokines/chemokines has been reported in in vitro/ex vivo settings of chronic venous insufficiency (CVI), but the identification of circulating mediators that might be associated with altered hemodynamic forces or might represent innovative biomarkers is still missing. In this study, the circulating levels of 31 cytokines/chemokines

involved in inflammatory/angiogenic processes were analysed in (i) CVI patients at baseline before surgical hemody namic correction, (ii) healthy subjects, and (iii) CVI patients after surgery. In a subgroup of CVI patients, in whom the baseline levels of cytokines/chemokines were analyzed in paired blood samples obtained from varicose vein and forearm vein, EGF, PDGF, and RANTES were increased at the varicose vein site as compared to the general circulation. Moreover, while at baseline, CVI patients showed increased levels of 14 cytokines/chemokines as compared to healthy subjects, 6 months after surgery, 11 cytokines/chemokines levels were significantly reduced in the treated CVI patients as compared to the CVI patients before surgery.

Of note, a patient who exhibited recurrence of the disease 6 months after surgery, showed higher levels of EGF, PDGF, and RANTES

compared to nonrecurrent patients, highlighting the potential role of the EGF/PDGF/RANTES triad as sensitive biomarkers in the

context of CVI.

**17) GIANESINI S., MENEGATTI E., ZUOLO M., TESSARI M., SPATH P., ASCANELLI S., OCCHIONORELLI**

**S., ZAMBONI P., Laser–assisted strategy for reflux abolition in a modified CHIVA approach, Veins and Lymphatics, 2015, 4: 5246 doi:10.4081/vl.2015.524,**

**https://www.pagepressjournals.org/index.php/vl/article/view/5246.**

**18) ZAMBONI P. et Al.:Oscillatory flow suppression improves inflammation in chronic venous disease**

**journal of surgical research \_ september 2016 (205) 238-245**

a b s t r a c t

Background: To assess if suppression of the oscillatory component of reflux may improve the inflammatory phenotype in chronic venous disease (CVD).

Materials and methods: From 193 CVD patients, we selected 54 (13 males, 41 females, CEAP C2-4EpAsPr) for a blinded, case-control prospective investigation. All of them underwent echo-color-Doppler assessment of reflux parameters. In the same patients a blood systemic assessment of 19 inflammatory cytokines was obtained. Follow-up lasted 6 months. The control group (C) was constituted by 21 homogenous CVD patients, unselected and not operated.

Results: Forty-one of 54 patients were excluded from post-operative evaluation in consequence of reported new other inflammatory episodes. Twenty-three (23) completed

the follow up, showing the suppression of the oscillatory component of venous reflux; 4 of the 19 cytokines decreased significantly after the procedure: Tumor Necrosis Factor-a (TNFa), Granulocyte Colony Stimulating Factor (G-CSF), Interferon gamma-induced Protein

10 (IP-10), Interleukin-15 (IL-15). Particularly, TNFa and IP-10 even returned inside a physiological range: 5.3 \_ 2.7 to 4.2 \_ 2.2 pg/mL (P < 0.003) and from 303.7 \_ 168.4 to 254.0 \_ 151.6 pg/mL (P < 0.024), respectively. Both cytokines showed a weak but significant

correlation with parameters of oscillatory flow correction. Finally, three cytokines implicated in repair and remodeling of tissue, Epidermal Growth Factor, Monocyte Chemoattractant Protein-1 and Platelet Derived Growth Factor-BB (PDGF-BB), significantly

increased. Our findings are further reinforced by the significant changes of the same cytokines when compared to C group.

Conclusions: The surgical suppression of the oscillatory component of reflux modulates the inflammatory phenotype, suggesting a pivotal role of flow among factors concurring to inflammation in CVD.

**19) DEL FRATE R.: Thanks to the CHIVA strategy may the histoarchitecture of great saphenous vein-sparing, make it suitable as graft for bypasses?**

**Veins and Lymphatics 2019; volume 8:8227**

Post-CHIVA regression of anatomical-pathological alterations of the incompetent saphenous trunk

**20) ZAMBONI P. et Al.: Alternative saphenous vein sparing surgery for future grafting.**

**Panminerva Med. 1995 Dec;37(4):190-7.**

Abstract

OBJECTIVE:

Evaluation of long saphenous vein sparing surgical procedures alternative to high ligation and distal stab avulsion, in terms of effectiveness and suitability for eventual by-pass surgery.

EXPERIMENTAL DESIGN:

Prospective evaluation of 125 operations for primary varicose veins, 52 external valve-plasties of the sapheno-femoral junction (EV-SFJ) (42 performed using the hand sewing technique and 10 using the Veno-cuff device), mean follow-up 45 months, and 73 hemodynamic correction of varicose veins (French acronyms: CHIVA), mean follow-up 30 months.

SETTING:

Department of General Surgery, University of Ferrara. Institutional practice, one-day surgery.

PATIENTS:

Patients were selected using clinical, Doppler cw, and duplex scanning evaluations. Patients with early varices due to sapheno-femoral reflux with duplex scanning evidence of mobile valve leaflets underwent EV-SFJ. The other patients were operated on using the hemodynamic correction technique. Both groups underwent preoperative ambulatory venous pressure (AVP) and light reflection rheography-refilling time (LRR-RT) measurements.

INTERVENTIONS:

EV-SFJ restores valve function correcting vein wall dilitation by applying an external prosthesis. CHIVA consists of selected ligatures of the superficial veins that allow superficial blood aspiration in the deep veins through the perforators.

MEASURES:

The outcome was evaluated with clinical and ultrasonographic examinations, AVP and LRR-RT measurements.

RESULTS:

Long saphenous vein patency registered after EV-SFJ and CHIVA was 94.2% and 90.4%, respectively. Both treatments preserve the drainage function in the saphenous system. Varicose veins recurrence percentage rate was 9.6% and 10.9%, respectively.

CONCLUSIONS:

Following the proposed selection criteria, these two alternative procedures seem to be more effective in varices treatment than high ligation and have the advantage of preserving saphenous veins suitable for eventual by-pass surgery.

**21) E. Mendoza*,* M. Cappelli : Sclerotherapy technique in CHIVA strategy**

**Phlebologie 2017; 46(02): 66-74**

Summary

CHIVA has been developed by Claude France-schi in the 1980-es and was first published in 1988 (1). CHIVA is a strategy to treat venous insufficiency keeping the drainage through the saphenous veins and reentry perforating veins. Venous recirculations are stratified into shunt types depending on the origin of the reflux and the distal reentry to the deep veins (2). Originally the method was described with surgical interventions: Flush ligation of the saphenous veins from the deep veins (crossotomy), flush ligation of the tributaries at the saphenous trunk, disconnection of the refluxive saphenous trunk distal to a reentryperforating vein, disconnection of a refluxive perforating vein, if it is the proximal insufficiency point. Techniques in phlebology have developed: in the field of the vein ablating strategies (originally stripping) new possibilities are currently used, as foaming under ultrasound-guidance of the complete saphenous vein, and endoluminal heat techniques, as well as glue. In the same way, the CHIVA strategy has incorporated new techniques. This article highlights the application of foam sclero-therapy in combination with the CHIVA strategy. Sometimes in CHIVA it is useful to start with one step and complete the treatments months later, if a vein did not reduce its caliper or revert its flow after the first step.

**22) FERRACANI E.: A Change of a Paradigm Under the Scope of a Cardiovascular Surgeon. Remodeling of the Great Saphenous Vein Instead of Ablation for Preservation of the Patient Anatomical Capital**

**Cardiology December 30, 2019 ecronicon.com open access.**

Abstract

The presented work is an ongoing study by using a combined approach of sparing surgical techniques plus LASER 1470 nm for sparing the Great saphenous vein (GSV) at early hemodynamics stages.

Peak reflux Volume lower than 30cc by second, Total Reflux Volume (TRV) between 10 and 100 cc/s using low LASER LEED and no tumescence anesthesia for preservation of patient anatomical capital and the actual recovery value of this conduit for a future arterial bypass.

**23) MENDOZA E. : Does the suture material influence the outcome after high ligation of great saphenous vein?**

**Vasa (2020), 49 (2), 153–155 https://doi.org/10.1024/0301-1526/a000833**

It is a review of the literature concluding that non-resorbable threads give less angiogenetic phenomena.

**ARTICLES CONCERNING THE RESULTS OF CHIVA PROCEDURE IN TERM OF RECURRENCES / CLINIC DATA WITHOUT COMPARISON WITH OTHER METHODS**

**1) MANDOLESI S, Ballo M, Galeandro I, Filippo S, Migaldi D, Spinelli F, Nasso C, Carbone P, Scaramuzzino L, Passariello F.: The 1st national multicenter study of the CHIVA “Conservative Therapy and Hemodynamics in Venous Insufficiency in Outpatient Departments method of treatment of varices. One-year follow-up”**

**Ann Ital Chir. 1990 Jul-Aug;61(4):425-7.**

Abstract

The authors present clinical and instrumental results of N. 543 operations executed by CHIVA system. These cases are the result of trial performed in seven SIOC (Italian Society of CHIVA Operators) centers executed from November '87 to July '89. Functional and aesthetic results had been very good on over 85% of all cases; superficial thrombosis were verified on 10% of all cases but almost completely asymptomatic. The aa. propose to start a deeper trial on 500 patients choose by rigorous criteria of inclusion.

**2) FICHELLE JM, Carbone P, Franceschi C.: Results of ambulatory and hemodynamic treatment of venous insufficiency (CHIVA cure)**

**J Mal Vasc. 1992;17(3):224-8.**

Abstract

From January 1987 to December 1988, 100 conservative and hemodynamic treatments of superficial venous insufficiency in great saphenous vein territory, have been done on 86 patients. They were 32 men, whose mean age was 53.7 years, and 54 women, whose mean age was 44.5 years. Indication for surgery was mainly functional in 28 cases, esthetic in 26 cases, both in 25 cases and trophic problems in 21 cases. Ligation of the sapheno-femoral junction has been done in 91 cases (62 clips, 9 clips and ligations, 11 ligations, 9 sutures). Distal interruption has been done above knee in 24 cases, below knee in 50 cases, and both in 16 cases. Early postoperative complications have been one septic collection of the groin, one hematoma of the groin, one durable contusion of the saphenous nerve, and 21 superficial venous thrombosis. There were six thrombosis of excluded branches, seven subtotal thrombosis of the saphenous and height partial thrombosis of the saphenous vein. Subtotal thrombosis of the saphenous vein were due either to a mistake in position of distal ligation in three cases, either to a too large saphenous vein in four cases. Five out of height partial thrombosis occurred on saphenous veins larger than ten millimeters. Follow up was obtained, in 1990, so that all patients had at least one year of follow-up. Seven patients have been lost for follow-up. Three patients had recurrence because of failure of the clip. An additional procedure was necessary in 30 patients. Functional results were correct in 89% of patients, and esthetical results in 68% of patients.

**3) BAILLY M.: Resultats de la cure Chiva**

**In techniqueset stratégie en chirurgie vasculaire. Jubilé de J.M. Cormier. Edition A.E.R.C.Paris 1992: 255-71.**

**4) HUGENTOBLER J.P., BLANCHMAISON P.: CHIVA cure. Etude de 96 patients opres de juin1988 a juin 1990**

**J. Mal. Vasc., 1992, 17: pp. 218–23.**

**5) QUINTANA F. et Al.:The CHIVA cure of varices of the lower extremities. La Cure Conservatrice et Hemodynamique de l'Insuffisance Veineuse en Ambulatoire**

**Angiologia. 1993 Mar-Apr;45(2):64, 66-7.**

Abstract

Presentation of the characteristics of this technique described by the French physician C. Franceschi, in 1988. Our Department began to apply this method on may 1991 and we are the first team in Spain to carry out and systematize this cure. Up to date, **85 patients have been treated with a residual vein percentage of 18%**. Morbidity is low and slight. There is no mortality. This method is considered interesting as it does not require hospitalization, conserves the vein capital of the patient, and has low labour and health care costs.

**6) ZAMBONI P.: When CHIVA treatment could be video guided.**

**Dermatol Surg. 1995 Jul;21(7):621-5.**

Abstract

BACKGROUND:

Hemodynamic correction (CHIVA) is a conservative, ambulatory, and controversial varicose vein treatment. It consists of selected ligatures of the superficial venous system decided by means of preoperative duplex mapping.

OBJECTIVE:

Prospective evaluation of 80 patients, operated on according to the CHIVA technique described by Claude Franceschi. Mean follow-up length was 30 months.

METHODS:

Fifty-five consecutive patients were operated on after clinical, ultrasonographic, ambulatory venous pressure and light reflection rheography evaluations. After a 3-year follow-up, another 25 consecutive patients were selected applying some exclusion criteria that emerged in the first part of the study. This second series was operated on by means of intraoperative angioscopy. The same preoperative evaluations have been used to study the outcome in all patients.

RESULTS:

CHIVA failed in the short saphenous vein territory varices and when the long saphenous vein and the insufficient perforating veins had a preoperative diameter greater than 10 and 4 mm, respectively. The procedure showed a long saphenous vein patency of 90.4% and registered a total recurrence rate of 18.7%.

CONCLUSIONS:

CHIVA seems to be a more effective varicose vein treatment than high ligation and distal stab avulsion. It also preserves a higher rate of long saphenous veins, suitable for bypass surgery.

Comment in

 Video-guided CHIVA treatment. [Dermatol Surg. 1995]

***WEISS RA : Video-guided CHIVA treatment.***

***Dermatol Surg. 1995 Jul;21(7):626.***

*Comment on: When CHIVA treatment could be video guided. [Dermatol Surg. 1995*

**7) ZAMBONI P. et AL.: Angiovideo-assisted hemodynamic correction of varicose veins.**

**Int Angiol. 1995 Jun;14(2):202-8.**

Abstract

OBJECTIVE:

Evaluation of the feasibility and utility of angioscopy in the hemodynamic correction (French acronyms is CHIVA) of primary varicose veins disease.

EXPERIMENTAL DESIGN:

Prospective evaluation of 25 patients, undergoing hemodynamic correction of primary varicose disease with intraoperative videoangioscopic guide. Patients have been selected according to criteria emerged from a prospective study that we had previously conducted. Follow-up lasted 1 year (range 8-18 months).

SETTING:

Department of Surgery, University of Ferrara, Italy. Institutional practice. One-day surgery.

PATIENTS:

Their selection has been carried out in our Vascular Laboratory. The adopted clinical criteria of selection were: Primary varicose disease of the long saphenous vein territory, no previous thrombophlebitis and/or sclerotherapy. Doppler cw and Duplex criteria followed were: competent deep venous system, long saphenous vein diameter minor than 10 mm and incompetent perforating veins diameter minor than 4 mm.

INTERVENTIONS:

25 hemodynamic corrections according to the CHIVA method described by Franceschi. An angioscope, introduced through a distal collateral of the long saphenous vein, permitted the precise interruption of the venous-venous shunts and of the superficial venous system, just below the perforators chosen as re-entry points in the deep venous system.

MEASURES:

Clinical: varices and symptomatology reduction. Duplex and Doppler cw: detection of the superficial blood flow re-entry, in the deep venous system, through the perforators and identification of recurrences or new refluxes. Pre and postoperative Ambulatory Venous Pressure and Refilling Time have also been measured.

RESULTS:

In 20 patients symptoms and varices relief were recorded (80%), in 5 patients varices reduction was observed only during walking (20%). In 2 of these latter patients there was no re-entry through the perforators, with a recurrent sapheno-femoral reflux in 1 of them. Early complications recorded were: 2 long saphenous vein thrombosis (8%); 7 ecchimosis (28%) when heparine/saline solution had been used for angioscopic clearance.

CONCLUSIONS:

Intraoperative angioscopy is feasible and useful when the hemodynamic situation is complex and the Duplex map is difficult to be interpreted by the surgeon. In this series the second look percentage rate has been minor compared to the percentage rates published so far by other authors.

**8) BAHNINI A, Bailly M, Chiche L, Franceschi C.: Ambulatory conservative hemodynamic correction of venous insufficiency. Technique, results.**

**Ann Chir. 1997;51(7):749-60.**

Abstract

Ambulatory conservative haemodynamic correction of venous insufficiency (CHIVA) is a surgical treatment of superficial venous insufficiency designed to correct the pathological haemodynamic effects of superficial venous insufficiency apparent on standing. Surgical treatment is based on precise preoperative anatomical and haemodynamic mapping performed by duplex ultrasound, providing preoperative ultrasound-guided marking. Surgical treatment consists of dividing the hydrostatic pressure column and disconnecting venovenous shunts by ligation-section of the superficial venous network at precise points determined by the preoperative ultrasound-guided marking. This strategy should achieve a superficial venous circuit draining perfectly into the competent deep venous network. The operation is performed under local anaesthesia as an outpatient procedure and allows immediate resumption of walking, which promotes a good result due to activation of the calf muscle pump. The results of the technique are very good provided a reliable preoperative ultrasound-guided marking and a precise surgical procedure are performed. Failures are due to poor haemodynamic assessment or inappropriate surgical procedure.

**9) CAPPELLI M. et Al.: I risultati della cura CHIVA.**

**Osp Ital Chir 1998; 4: 615-8.**

**10) ZAMBONI P., MARCELLINO M.G., CAPPELLI M., FEO C.V., BRESADOLA V., VASQUEZ G., LIBONI A., Saphenous vein sparing surgery: principles, techniques and results, J.**

**J. Cardiovasc. Surg., Torino 1998 Apr, 39(2): pp. 151–62**.

ABSTRACT

Follow–up a 4 anni dopo CHIVA (Zamboni 1998). Sono stati studiati 357 pazienti, operati utilizzando la metodica CHIVA e monitorati per 4 anni, non era incluso alcun gruppo di controllo. Nel 94% dei pazienti, alla fine dello studio la vena grande safena (GSV) presentava un flusso di drenaggio per tutta la sua lunghezza (ovvero non si è rilevata la presenza di trombosi venose

superficiali). L’11%dei pazienti ha presentato una recidiva. La reografia a luce riflessa ha mostrato miglioramenti significativi subito dopo l’operazione e dopo 6 mesi rispetto ai valori preoperatori. (PAOLO ZAMBONI)

**11) CAPPELLI M. et Al. "Ambulatory conservative hemodynamic management of varicose veins: critical analysis of results at 3 years"**

**ANNALS OF VASCULAR SURGERY 2000 Vol 14 n°4 pag 376-384**

**Abstract**

This report describes the results of our 3-year experience using ambulatory conservative hemodynamic management (ACHM) for lower extremity venous insufficiency involving the greater saphenous vein (GSV), with specific analysis of recurrence due to neoformation of vessels. We performed 289 ACHM procedures in 259 consecutive patients with GSV-related varicose veins. Follow-up clinical examination and Doppler ultrasound imaging was carried out at 3, 6, 12, 24, and 36 months in all cases to assess formation of neovessels supplied either by the superficial (A) or deep (B) venous system. Our data showed that ACHM achieved excellent improvement, with complete disappearance of varicose veins in 41.2% of cases, good improvement in 43%, fair improvement in 14.1%, and no improvement in 1.7%. The only predictor of outcome was the quality of drainage from the GSV vein. Poor drainage leads to neoformation of vessels supplied by the superficial (A) venous system. In about 50% of cases, drainage appeared spontaneously within 1 year, with a subsequent reduction in formation of neovessels. Neoformation of vessels supplied by the deep (B) venous system (10%) was independent of the quality drainage. This finding suggests that formation of these neovesseis is unrelated to the surgical method used to treat varicose veins. In patients with poor drainage of the saphenous network, neoformation of vessels supplied by the superficial (A) venous system is predictable with regard to both topography and delay. ACHM is a good tool for treatment of varicose veins, as reliable statistical prediction of mid-term results is possible using available models.

The article focouses on the problem of draining and non-draining systems, and therefore the difference in terms of recurrences and saphenous thrombosis in the two groups

**12) ESCRIBANO J.M., 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., 2003, 25: pp. 159–63.**

José María Escribano and the team of Barcelona Vall d'Hebrón University have published a study on the results of CHIVA in 2 steps in type 3 shunt cases. 58 patients were analyzed during 3 years after performing the first step of "CHIVA 2" in Type 3 shunts with a saphenous tributary below the knee.

The GSV diameter decreased significantly after surgery, although 51 of the patients had the reappearance of reflux after 6 months and 53 after 3 years. In all patients, the presence of a re-entry perforator was found, i.e. the transformation of the type 3 shunt into type 1 shunt.

46 patients underwent a disconnection of the saphenous-femoral junction over the 3 years of the study (crossotomy). The conclusion reported by this study is that the percentage of recurrences after the first half of CHIVA in Type 3 shunts is high. (Comment by Paolo Zamboni)

**13) ZAMBONI P, ESCRIBANO JM.: Regarding 'Reflux Elimination Without any Ablation or Disconnection of the Saphenous Vein. A Haemodynamic Model for Venous Surgery' and '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. 2004 Nov;28(5):567.**

**14) ESTEBAN-GRACIA C. et Al.: Application of the CHIVA strategy. A prospective study at one year**

**Angiologia 2004, 56 (3), pp. 227-235.**

Abstract

Introduction. There is a tendency for surgery to become less and less invasive. The CHIVA strategy could be included within the concept of minimally invasive surgery. Aims. Our aim was to perform a prospective evaluation of the clinical results at one year after applying the CHIVA strategy in the treatment of primary varicose veins. Patients and methods. A one-year follow-up of 225 patients (147 females, 78 males). Clinically, 195 of them were in stage 2 (CEAP). A Doppler ultrasound recording was conducted before surgery. Later, at one month and one year, patients were evaluated clinically and the results were classified in four categories. Patients were again submitted to a new Doppler ultrasound recording at one year. The type of strategy employed was in a single intervention in 97.8% of the cases. Results. At one year, the objective and subjective clinical assessment were good in 87.6 and 90.7% of cases, respectively. The mean diameter of the internal saphenous vein changed from 6.4 to 4.0 mm (t test; p = 0.001). Significant differences were observed between the objective assessment at one month and at one year (p = 0.001), as well as in the subjective assessment (p = 0.001), since a third of the patients with a poor evaluation at one month presented a good one at one year. Conclusions. The CHIVA strategy shows good results at one year in our series. The significant reduction of the diameter of the saphenous vein indicates that the haemodynamic component is important in the pathophysiology of varicose veins.

**15) LINARES-RUIZ, P., Bonell-Pascual, A., Llort-Pont, C., Romera, A., Lapiedra-Mur, O. : Mid-term results of applying the CHIVA strategy to the external saphenous vein.**

**Angiologia 2004 , 56 (5), pp. 481-490.**

Abstract

Introduction. The anatomical complexity and widely varying distribution of the external saphenous vein (ESV) means that surgical treatment is associated to high rates of relapse and residual varicose veins. Aim. To evaluate the mid-term results of using the CHIVA cure strategy on ESV varicose veins. Patients and methods. Between February 1996 and December 2002 we performed 142 CHIVA interventions to treat ESV. A random sample of 80 interventions was taken and data collected about their factors related to chronic venous insufficiency, pre-operative clinical features (CEAP), primary shunt and the surgical strategy applied. Doppler ultrasound was used to assess competence, patency, flow direction, diameter and neoaortic arch of the ESV in the post-operative period, visible relapses and symptoms. In addition, the relationships between the following parameters were also analysed: Doppler ultrasound recordings, surgical strategy, relapses and symptoms. Results. Competence of the deep vein system (DVS) and ESV patency were found to be > 95% (four ESV thromboses). Haemodynamically favourable situations: 66%. Mean diameter of the ESV: 3.5 cm; neoaortic arch: six patients (7.5%). Clinical features of the post-operative period: 59 asymptomatic patients (73.8%), 16 with a clinical improvement (20%) and five patients with no improvement in their symptoms (6%). Visible relapses: 15 cases, 12 of which were not important enough to require reintervention. There were no cases of DVS thromboses or peripheral neuropathy. There was a statistically significant correlation between the presence of anterograde flow and the absence of relapses and symptoms in the post-operative period, as well as between symptoms and relapses with higher absolute ESV diameters and neoaortic arch. There was a correlation, although statistically non-significant, between relapses and symptoms in the postoperative period and surgical strategy. Conclusion. The best results (i.e. less thromboses and relapses): CHIVA 1 + 2 in the case of ESV.

**16) ZAMBONI P., GIANESINI S.,MENEGATTI E., TACCONI G., PALAZZO A., LIBONI A., Great saphenous varicose vein surgery without saphenofemoral junction disconnection, Br. J. Surg., 2010 Jun, 97(6): pp. 820–5.**

This case-control study was designed to determine whether preoperative duplex imaging could predict the outcome of varicose vein surgery without disconnecting the saphenous-femoral junction (SFJ).

The duplex protocol included a reflux elimination test (RET-test) and the evaluation of the competence of the terminal valve of the femoral vein. Patients with negative reflux elimination tests were therefore excluded.

One hundred patients with chronic venous insufficiency who had a positive RET test and an incompetent terminal valve were compared with 100 patients, homogeneous by age, sex, CEAP clinical class, duration of disease, who had a positive RET test but a valve competent terminal. All patients underwent proximal ligation of incompetent tributaries from the saphenous trunk without disconnection of the saphenous-femoral junction. Clinical and duplex follow-up lasted for 3 years and included the Hobbs clinical score.

The evaluation with Duplex after 1 and 3 years respectively is reported in table 10.14.

The recurrence rate after 3 years was significantly different depending on the competence or otherwise of the terminal valve. With the competent terminal valve, the recurrence rate was 3% at the sapheno-femoral junction, compared to 71% in case of incompetent terminal valve after 3 years. (Comment by Paolo Zamboni)

**17) EVA I. et Al.: CHIVA - ECOGRAPHIC ASPECTS AND SURGICAL RESULTS**

**Maxilo-facial surgery volume 18 • issue 1 January / March 2014 • pp. 64-70**

Abstract

Varices (milk leg) represent pathological dilatations of the superficial veins at the level of the inferior members. Up to now, the strictly anatomical aspect of varix formati- ons inspired only traditional, strictly ablative treatments, generally applied without aiming at improving the hae- modynamic condition of veins. Haemodynamic surgery attempts at modifying the reflux pattern, while preserving the most efficient channels of venous drainage. Implemen- tation of such a treatment requires an exact understanding of the physiological principles and of the reflux patterns on which haemodynamic surgery relies. Ecographic eva- luation of the venous system in patients with varicose dila- tations permits drawing of a detailed map of the venous system, and also of its haemodynamic pattern [1]. Con- sequently, CHIVA appears as a viable therapy, applicable in outpatient services, as well. Post-surgery results are excellent and patients’ comfort is appreciated as highly satisfactory. The method is reliable, having produced no incidents, accidents or complications.

**18) Claude FRANCESCHI, Massimo CAPPELLI, Stefano ERMINI, Sergio GIANESINI Erika MENDOZA, Fausto PASSARIELLO, Paolo ZAMBONI**

**CHIVA: hemodynamic concept, strategy and results**

**International Angiology 2016 February;35 (1):8-30**

ABSTRACT

The first part of this review article provides the physiologic background that sustained the CHIVA principles development. Then the venous networks anatomy and ow patterns are described with pertinent sonographic interpretations, leading to the shunt concept description and to the consequent CHIVA strategy application. An in depth explanation into the hemodynamic conservative cure approach follows, together with pertinent review of the relevant literature.

**19) MALDONADO-FERNANDEZ et Al.: Clinical results of a new strategy (modified CHIVA) for surgical treatment of anterior accessory great saphenous varicose veins.**

**Cir Esp. 2016 Mar;94(3):144-50.**

**Abstract**

**INTRODUCTION:**

Traditionally, anterior accessory great saphenous vein insufficiency was managed by crossectomy and resection of varicose veins. The aim of this paper is to show the safety and efficacy of a new therapeutic strategy for anterior accessory great saphenous varicose veins.

**METHODS:**

This non-randomised prospective study included 65 patients with varicose veins from the anterior accessory great saphenous vein. The novelty of the technique is to avoid the great saphenous vein crossectomy and perform just flebectomy of the visible veins. Venous duplex studies were performed preoperatively, a month and a year postoperatively. The clinical assessment was done by the Fligelstone scale.

**RESULTS:**

The baseline CEAP clinical classification was: 58% C2, 26% C3 and 15% C4-6. The new strategy was applied to all cases.

**COMPLICATIONS:**

3 haematomas, 7 cases of asymptomatic partial anterior saphenous thrombosis. Reduction of the initial average diameter was from 6.4 mm anterior saphenous to 3.4 mm by one year (p <0.001). At twelve months a forward flow is maintained in 82% of cases. Recurrence of varicose veins was 8%. All patients improved their clinical status based on the Fligelstone scale. Cases with saphenous diameter bigger than 7.5 mm and obesity were identified as predictors of worse clinical and hemodynamic outcome.

**CONCLUSIONS:**

This modified surgical strategy for anterior saphenous varicose veins results in better clinical outcomes at one year postoperatively.

**20) ZMUDZINSKI M, MALO P, HALL C, HAYASHI A., CHIVA – A prospective study of a vein sparing technique for the management of varicose vein disease, Am. J. Surg., 2017, 213: pp. 967–969.**

ABSTRACT

CHIVA. Una tecnica di risparmio del patrimonio venoso nell’insufficienza venosa cronica (Zmudzinski 2017)

Studio prospettico che ha valutato la percentuale di recidiva dovute a reflusso venoso con tecnica CHIVA. Gli autori hanno valutato 150 procedure sia con esami ecografici che clinici pre e post operatori. I pazienti sono stati seguiti a 3 mesi e a 1 anno dopo l’intervento.

La valutazione duplex post–operatoria del reflusso è stata eseguita in posizione supina, l’intervento al sito di giunzione safeno–femorale consisteva in una doppia legatura con 2–0 di seta a 2 cm della giunzione safeno–femorale (distalmente alla confluenza delle vene epigastriche ). La recidiva è stata definita come presenza di reflusso nella GSV alla coscia durante l’esame duplex.

Non sono state rilevate recidive al follow–up iniziale, in seguito, 58 gambe hanno completato il follow–up a lungo termine ed il reflusso è stato rilevato all’esame Doppler in 5 gambe con un tasso di recidiva dell’8,6%; CI del 95% (2,4%, 19%).

Nessuno di questi pazienti ha presentato complicazioni cliniche. Gli autori hanno concluso che la percentuale di recidiva utilizzando il metodo CHIVA compete favorevolmente con le tecniche di ablazione venosa. L’elevata soddisfazione del paziente, la bassa percentuale di complicanze ed il basso costo incoraggia a proseguire gli studi con questa tecnica (tabella10.16). (PAOLO ZAMBONI)

**21) FRANCESCHI C, Bahnini A, Cappelli M, Cuaranta RL, Dadon M, Delfrate R, Ermini S, Gianesini S, Mendoza E, Passariello F, Puskas A. : Commentary on the article "A prospective study of a vein sparing technique for the management of varicose vein disease" by M Zmudzinski et al.**

**Am J Surg. 2018 Nov;216(5):1035.**

**22) Felipe Puricelli Faccini, Stefano Ermini, Claude Franceschi : CHIVA to treat saphenous vein insufficiency in chronic venous disease: characteristics and results**

 **J Vasc Bras. 2019;18:e20180099. https://doi.org/10.1590/1677-5449.009918**

**Abstract**

There is considerable debate in the literature with relation to the best method to treat patients with chronic venous disease (CVD). CHIVA is an office-based treatment for varicose veins performed under local anesthesia. The aim of the technique is to lower transmural pressure in the superficial venous system and avoid destruction of veins. Recurrence of varicosities, nerve damage, bruising and suboptimal aesthetic results are common to all treatments for the disease. This paper evaluates and discusses the characteristics and results of the CHIVA technique. We conclude that CHIVA is a viable alternative to common procedures that is associated with less bruising, nerve damage, and recurrence than stripping saphenectomy. The main advantages are preservation of the saphenous vein, local anesthesia, low recurrence rates, low cost, low pain, and no nerve damage. The major disadvantages are the learning curve and the need to train the team in venous hemodynamics.

**ARTICLES COMPARING CHIVA RECURRENCES / CLINICAL DATA WITH OTHER PROCEDURES EMPLOING NOT RANDOMIZED STUDIES**

**1) GORNY PH., BLANCHEMAISON PH., CHAHINED.,HUTINEL B., CHANVALLON C., PAYEN**

**B., REINHAREZ D., Chirurgie Conservatrice et Ambulatiore: étude comparative entre CHIVA et Crosseectomie chez 321 patients opérés de la saphène interne. Discussion,**

**Phlébologie, 1995, 48, 2: pp. 255–259.**

**2) CAPPELLI M.,MOLINO LOVA R., ERMINI S., TURCHI A., BONO G., BAHANINI A., FRANCESCHI**

**C.I., La Cure CHIVA dans le traitement de la Maladie Variqueuse: analyse critique des résultats après trois ans, Ann. Chir. Vasc., 1996.**

Cappelli et al. they examined 148 patients treated with an average 3-year follow-up CHIVA. The authors compared their own results with the large series of stripping present in the literature (Hobbs 1974, Taulaniemi 1963). The "Hobbs criteria" were chosen as the evaluation method, so that the groups were comparable. Hobbs' criteria were established in 1974

in the first randomized controlled trial in the history of phlebology, which compared surgery to sclerotherapy (Hobbs 1974). (Comment by Paolo Zamboni)

**3) MAESO J., JUAN J., ESCRIBANO J., ALLEGUEN.M.,DIMATTEO A.,GONZALEZ E.,MATAS M.: Comparison of clinical outcome of stripping and CHIVA for treatment of varicose veins in the lower extremities**

**Ann. Vasc. Surg., 2001, 15: pp. 661–5.**

Maeso et al., of the university clinic in Barcelona, instead monitored 90 patients operated on with the CHIVA strategy, in a prospective 3-year follow-up study and compared them: with 85 of their historical patients operated on stripping, with data from interventions stripping already present in the literature (see above) and with patients in the Cappelli group. In the Vall d’Hebron university clinic in Barcelona, stripping was completely abandoned in favor of the CHIVA method in

1995, therefore a prospective comparison of the two methods was not possible.

In both the Cappelli and Meso studies, the CHIVA method produced significantly better outcomes than the three stripping groups (p <0.001). The comparison between the two groups CHIVA - Cappelli and Maeso - did not produce significant differences. The results are shown in tables 10.2, 10.3, 10.4, 10.5. (Comment by Paolo Zamboni)

**4) NOPPENEY, T., Noppeney, J., Kurth, I.: Results of standard varicose vein surgery**

**(2002) Zentralblatt fur Chirurgie, 127 (9), pp. 748-751.**

Abstract

The principles of modern varicose vein surgery are based on the interruption of the cranial and distal points of venous insufficiency. Especially due to the rise of alternate surgery procedures, we have scrutinized our results of varicose vein surgery. In a retrospective analysis, the results of those patients (pat.) who underwent venous surgery in our institution in 1995 were analysed. In 1995 we performed 1575 varicose vein operations (n = 1019 pat., 16.8 % male, 83.2 % female). 63.5 % were on an out-patient basis. During a follow-up period of 4 to 66 months (av. 38 months) the patients were re-examined, 481 (47.2 %) by Duplex sonography, 94 (9.2%) by clinical examination alone, from 103 (10.1 %) information was obtained through a written inquiry. 341 pat. (33.5%) had just perioperative follow-ups. We didn't find any signs of varicosis in 301 pat. (33.3 %). Minor side branches could be detected in 515 pat. (56.8 %). In 90 pat. (9.9 %) a clearly visible varicosis could be seen. Based on the results of the Duplex examinations, 86 % of the pat. showed no recurrence after ligation of the sapheno-femoral junction and stripping of the LSV, the results after stripping of the short saphenous vein were similar. Analysis of the inquiry forms concluded that 62.3 % of the pat. were satisfied with surgery and the results. The results of the standard varicose vein surgery are satisfactory regarding recurrence rate and patient satisfaction. **Our results are comparable to those published in prospective randomised studies. Alternate procedures, for example the CHIVA method, have still to proof their efficiency, especially in view of long-term results**.

**5) MARIA S. et Al. : Varicose disease of lower limbs: What kind of treatment? Personal experience**

**Chirurgia 2008, 21 (4), pp. 195-198.**

Abstract

Aim. We report the experience over 422 patients admitted and treated for varicose disease on lower limbs, in the U.O. Clinicizzata di Chirurgia D'urgenza of Vittorio Emanuele Hospital of Catania from 01/01/2001 to 12/31/2005. The surgical treatment was modulated by the intensity of the disease. Methods. The 422 patients were treated according to the following surgical techniques: **14 (3,3%) patients with CHIVA method**; 4 (0,9%) patients with reconstruction of saphenofemoral valve (as described by Belcaro); 10 (2,3%) patients with multiple phlebectomies (as described by Muller); 8 (1,9%) patients with crossectomy and multiple phlebectomies; 252 (59,7%) patients with stripping of the great saphenous vein from the groin to the knee (short stripping); 134 (31,7%) patients with stripping of the great saphenous vein from the groin to the ankle (long stripping). Results. **On the 14 (3,3%) patients treated with CHIVA method were noticed the following complications: 6 (42,9%) cases of saphenous vein thrombosis; 8 (57,1%) cases of varicose recurrences during the follow-up (15 months - 3 years) Pochi casi e la maggioranza non drenanti**. On all 4 cases (0,9%) treated with reconstruction of saphenofemoral valve (as described by Belcaro) were noticed saphenous vein thrombosis before the 48-hours following the procedure. On 252 (59,7%) patients treated with the short stripping were noticed: 8 (3,17%) cases of postoperative complications; 3 (1,2%) cases of varicose recurrences. On 134 (31,7%) patients treated with the long stripping were noticed: 9 (6,7%) cases of postoperative complications; no case of varicose recurrences. Conclusion. Finally, according to obtained results, we agree that the gold standard of surgical treatment of the varicose disease of the lower limbs, is represented by the stripping of the saphenous vein, with a low percent of postoperative complicances and/or varicose recurrences.

**6) Solís, J.V., Ribé, L., Portero, J.L., Rio, J.: Stripping saphenectomy, CHIVA and laser ablation for the treatment of the saphenous vein insufficiency**

**(2009) Ambulatory Surgery, 15 (1), .**

Abstract

Aim: To analyze the results of three different techniques for the treatment of the great saphenous vein insufficiency as the main cause of varicose veins.

Methods: We analyze three groups (Stripping, CHIVA 1 and Endovenous Laser ablation) with 40 patients each. Follow up was done at 1, 3, 9 and 12 months. Results: **The CHIVA and laser ablation had the best aesthetic result and fewer discomfort, but laser ablation had higher economic cost. There was no recurrence after 1 year in any of the groups**. Conclusions: The three techniques proved very good results for the saphenous insufficiency treatment.

**7) FRANCESCHI C.: “Stripping versus the CHIVA Method"**

**Angéiologie, 2010**

**8) MILONE M., SALVATORE G.,MAIETTA P., SOSA FERNANDEZ L.M.,MILONE F., Recurrent varicose veins of the lower limbs after surgery. Role of surgical technique (stripping vs. CHIVA) and surgeon’s experience, G. Chir., 2011, p. 32.**

This is a retrospective analysis that compared the result after stripping with those of CHIVA method (5-year follow-up) in two different periods: the first group concerned the patients treated in the years immediately following the learning of the CHIVA 1995-2000 method, the second group included patients treated between 2001 and 2005 after the team had completed a sufficient learning curve relative to the surgical strategy used.

The results were evaluated according to the Hobbs criteria. In the first period 223 patients underwent stripping and 88 under CHIVA. Complete success of the treatment was found in 30.9% after stripping and in 12.6% after CHIVA (p <0.05), while treatment failure instead was found in 47.5% stripping and 67 % of CHIVA patients (p <0.05). In the second period 186 patients were treated with Stripping and 208 with CHIVA. The success rate in the Stripping group remained constant at 29.5% while it significantly increased in the CHIVA group at 44.2% (p <0.05). 46.7% of stripped patients were classified as inefficient treatment while in the CHIVA group there was a significant reduction of failed treatments to 30.2% (p <0.05). The authors conclude that training and adequate experience in vascular surgery and ultrasound ultrasound are required to successfully perform the CHIVA method. (Comment by Paolo Zamboni)

**9) CHAN CY et Al.: Retrospective comparison of clinical outcomes between endovenous laser and saphenous vein-sparing surgery for treatment of varicose veins.**

**World J Surg. 2011 Jul;35(7):1679-86. doi: 10.1007/s00268-011-1093-8.**

**Abstract**

**BACKGROUND:**

The purpose of the present study was to compare management of varicose veins by endovenous laser ablation (EVL) and a vein-sparing procedure (CHIVA: Conservatrice et Hémodynamique de l'Insuffisance Veineuse en Ambulatoire) for management of varicose veins.

**METHODS:**

Data from 82 consecutive patients with great saphenous vein (GSV) reflux and primary varicose veins presenting to the vascular clinic at the Far Eastern Memorial Hospital between June and December 2005 were reviewed. Of these, 74 who met the inclusion criteria were included in this study. CHIVA was performed by a double division of the refluxing saphenous vein (i.e., proximal and distal ligation), and EVL was performed using 10-14 W beginning approximately 4 cm below the saphenofemoral junction to the level of the knee. Phlebectomy for significant branch varicose veins on the leg was routinely performed in all patients. **Outcome measures included postoperative thrombophlebitis, bruising, pain, assessment of ultrasonographic and clinical symptoms (measured by the Venous Clinical Severity Score [VCSS]) and comparison of quality of life survey scores obtained preoperatively and postoperatively (measured by the Aberdeen Varicose Veins Score [AVVQ] and RAND-36). Patients were examined one week post-procedurally and again at 1, 3, 6, and 12 months.**

**RESULTS:**

Endovenous laser ablation and CHIVA were performed on 54 and 20 patients, respectively. The EVL patients had significantly higher pain scores and bruising than the CHIVA group (p<0.001). The VCSS of varicose, edema, pigmentation, and inflammation were significantly reduced after both EVL and CHIVA; however, patients treated by EVL had significantly more pain postoperatively than those treated by CHIVA (p=0.003). Twenty-two of 54 (40.7%) and 3 of 17 (17.6%) patients in the EVL and CHIVA groups, respectively, required sclerotherapy for residual varicosities (p=0.026). Both groups benefited significantly from surgery in disease-specific perceptions.

**CONCLUSIONS:**

The CHIVA patients had less pain postoperatively and a significantly higher sclerotherapy-free period compared to patients in the EVL group. Further follow-up studies to compare long-term results of various approaches to surgically managing varicose veins are needed.

**10) DE FRANCISCIS S. et Al. : Hemodynamic surgery versus conventional surgery in chronic venous disease: a multicenter retrospective study. ACTA PHLEBOL. 2013; 14; 109-114**

From 1994 to 2012, 11.026 patients were treated surgically, of which 6044 in CHIVA and 4982 in stripping. The average follow up was 9 years.

Compared to stripping, CHIVA seems to improve both clinical and hemodynamic results and reduce the number of recurrences.

**11) ONIDA SARAH and ALUN H DAVIES**

**CHIVA, ASVAL and related techniques – Concepts and evidence**

**Phlebology 2015, Vol. 30(2S) 42–45**

Abstract

Chronic venous disease (CVD) is a highly prevalent condition with significant effects on patients’ quality of life. Despite this, the underlying pathophysiology of venous disease still remains unclear. Two schools of

thought exist, explaining the development and propagation of venous disease as an ‘‘ascending’’ and ‘‘descending’’ process, respectively. The descending theory, stating that CVD is secondary to proximal disease (e.g. saphenofemoral/saphenous incompetence), is the most widely accepted when planning treatment aiming to remove or destroy the junction or truncal veins. The ascending theory, describing the disease process as developing in the lower most part of the leg and propagating cranially, aims to re-route the venous circulation via minimally invasive interventions. Classically, superficial venous insufficiency has been treated with the removal of the incompetent trunk, via open surgery or, increasingly, with endovenous interventions.Minimally invasive treatment modalities aiming to preserve the saphenous trunk, such as CHIVA and ASVAL, may alsoplay an important role in the treatment of the patient with varicose veins.

Keywords

ASVAL, chronic venous disease, chronic venous insufficiency, duplex ultrasound, haemodynamic surgery.

**12) WANG H., CHEN Q., FEI Z., ZHENG E., YANG Z., HUANG X., HEMODYNAMIC CLASSICATION AND CHIVA TREATMENT OF VARICOSE VEINS IN LOWER EXTREMITIES(VVLE)**

**Int. J. Clin. Exp. Med., 2016, 9(2): pp. 2465–2471.**

Abstract:

Objective: To develop a new method of classifying hemodynamics in varicose veins of lower extremities (VVLE) and make a comparative analysis to determine the efficacy of ambulatory conservative hemodynamic correction of venous insufficiency (CHIVA) treatment. Methods: 150 cases with VVLE in our hospital were selected. Firstly, color doppler ultrasound examination was performed for each patient. Secondly, the hemodynamics of the patients were systematically divided into 6 types: I, II, III, IV, V, and VI. Lastly, complications and recurrence rate were detected to investigate the clinical efficacy, the patients were evenly divided into 3 groups which receiving different treatments: traditional surgery group, endovenous laser treatment group and CHIVA group. Results: Compared with the other two groups, patients in CHIVA group showed significant better performances on clinical efficacy, cure rate, complications and recurrence rate (P<0.05 and P<0.01). Conclusion: CHIVA treatment has significant better curative effect than traditional surgery and endovenous therapy in the treatment of varicose veins. CHIVA treatment induced less damage, quicker health recovery, high safety factor and lower complications**. Thus, CHIVA treatment can be widely used in clinical restoration than general minimally invasive operations.**

**ARTICLES COMPARING CHIVA RECURRENCES / CLINICAL DATA WITH OTHER PROCEDURES EMPLOING RANDOMIZED STUDIES (RCT)**

**1) ZAMBONI P., CISNO C., MARCHETTI F., MAZZA P., FOGATO L., CARANDINA S., DE PALMA M., LIBONI A., Minimally invasive surgical management of primary venous ulcers vs. compression treatment: a randomized clinical trial, Eur. J. Vasc. Endovasc.**

**Surg., 2003 Apr, 25(4): pp. 313–8.**

This prospective randomized study compared CHIVA strategy associated with compression with the use of compression alone in the treatment of venous ulcers associated with chronic superficial venous insufficiency of the lower limbs (C6 in the CEAP classification). 24 patients were treated with compression, advanced wound dressings (and treatment antibiotic if necessary) the dressings were changed every 3 to 5 days during the first month and every 7 days thereafter.

The CHIVA group included 21 patients, 16 limbs had a hemodynamic presentation similar to type I shunts and were treated with crossectomy and further tributary ligatures, 7 limbs had a type III shunt and were treated with type CHIVA 2 procedure.

The study assessed:

- the healing process expressed in 2 mm per day;

- the functionality of the venous system based on air plethysmography data before treatment, 6 months and 3 years after treatment;

- quality of life through SF-36 questionnaire before treatment

and 6 months after treatment. In addition to the clinical evaluation, an eco-Doppler examination was performed

every 6 months for a total of 3 years. The results are presented in table 10.7. (Comment by Paolo Zamboni)

**2) S CARANDINA, C Mari, M De Palma, MG Marcellino, A Legnaro, A Liboni : Stripping vs haemodynamic correction (CHIVA): a long term randomised trial**

**Phlebology / venous forum of the royal society of medicine, 2006, 21(3), 151 | added to CENTRAL: 31 October 2007 | 2007 Issue 4 (Cochrane Library)**

**3) CARANDINA S., MARI C., DE PALMA M., MARCELLINO M.G., CISNO C., LEGNARO A., LIBONI A., ZAMBONI P., Varicose vein stripping vs haemodynamic correction (CHIVA): a long term randomised trial, Eur. J. Vasc. Endovasc. Surg., 2008 Feb, 35(2): pp. 230–7.**

This randomized comparative study aimed to compare the long-term results of stripping with respect to CHIVA in the treatment of chronic superficial venous insufficiency.

180 consecutive patients underwent clinical evaluation, including CEAP classification, and duplex examination performed by expert operators. 30 patients were excluded second because they did not meet the study inclusion criteria, while 150 patients were randomized to

two groups, 75 were treated with stripping and 75 with CHIVA. All operated limbs were examined by three independent assessors who had not been involved in previous surgical procedures. The results were evaluated according to the Hobbs criteria and are presented in tables 10.8 and 10.9.

The relative risk of recurrence in the Stripping group doubled to 10 years compared to the CHIVA group (OR 2.2; 95% CI 1–5, p <0.04).

No significant difference was found between the two 3-year techniques. During the 3 to 10 year period the different recurrence rates in the two groups become evident and significant, so it is concluded that at 10 years the risk of recurrence is double in the ablative group (Figure 10.1). (Comment by Paolo Zamboni)

*J Mal Vasc. 2009 Feb; 34 (1): 65. doi: 10.1016 / j.jmv.2008.10.002. Epub 2008 Dec 4.*

*[Correspondence: letter by P. Zamboni about the analysis of the article "Varicose vein stripping versus haemodynamic correction (CHIVA): a long term randomized trial"].*

*[Article in French]*

*Zamboni P.*

**4) E IBORRA : Comparative clinical study: CHIVA vs phlebectomy**

**Anales de cirugía cardíaca y vascular, 2006, 12(2), 109 | added to CENTRAL: 31 March 2020 | 2020 Issue 03 (Archivio Cocrhane Library)**

**5) IBORRA–ORTEGA E., BARJAU–URREA E., VILA–COLL R., BALLÓN–CARAZASH., CAIROLS–CASTELLOTE M.A., Estudio comparativo de dos técnicas quirúrgicas en el tratamientode las varices de las extremidades inferiores: resultados tras cinco años de seguimiento,**

**ANGIOLOGÍA, 2006, 58(6): pp. 459–468.**

Iborra and his team published a prospective randomized study in Spanish in 2006 that included **100 legs treated with CHIVA or Stripping with a 9-year follow-up.** 62 women and 38 men with an average age of 49 years were selected following the Spanish guidelines for the treatment of varicose veins. The patients included did not have a history of venous surgery, thrombosis, were not overweight or older than 70 years. 49 patients were randomized to the Stripping group and 51 to the CHIVA group. There were no differences in age, gender, weight and CEAP

between the 2 groups. All patients underwent Doppler examination and after the surgery, they received the same dose of prophylactic heparin. The follow-up with questionnaires and ultrasonography was performed 1 week after the intervention and then after 1, 3, 6 months and every year for 5 years. All patients in the stripping group were hospitalized (44 spinal and 5 under general anesthesia)

While of the CHIVA group 9 patients remained in hospital for one night, the rest were treated on an outpatient basis (6 spinal, 3 general, 42 local anesthesia), table 10.10.

The average working disability in the stripping group was 19 days while in the CHIVA group 8 days (p <0.001). Neither group experienced serious complications, 11 patients in the stripping group reported ankle paresthesia, while in the CHIVA group 4 patients reported symptomatic superficial venous thrombosis (table 10.11).

Despite the best recovery after CHIVA, the 5-year results for the

outcomes considered were not significantly different (table 10.12).

(Comment by Paolo Zamboni)

**6) PARÉS J.O., JUAN J., TELLEZ R., MATA A., MORENO C., QUER F.X., SUAREZ D., CODONY I., ROCA J., Varicose vein surgery: stripping versus the CHIVA method: a randomized controlled trial,**

**Ann. Surg., 2010 Apr, 251(4): pp. 624–31.**

The aim of this study was to compare the effectiveness of the CHIVA method for the treatment of varicose veins compared to the standard stripping treatment. The study design was randomized and controlled monocentric, and 501 patients with primary varices were included. Patients were randomly assigned to the CHIVA procedure (experimental group n = 167) or stripping without duplex mapping (control group 1, n = 167) or stripping with duplex mapping (control group 2, n = 167). The outcome measure was 5-year clinical recurrence, examined by independent evaluators previously trained in the procedures. Duplex ultrasonography has also been used to evaluate the causes of relapses. The results are summarized in table 10.13.

The odds ratio for the presence of 5-year relapses between the stripping group with clinical marking and the CHIVA group was 2.64, (95% confidence interval [CI]: 1.76–3.97, P <0.001). The odds ratio for relapses after 5 years of follow-up, between stripping with duplex mapping and CHIVA group, was 2.01 (95% CI: 1.34-3.00, P <0.001).

The conclusion was that the CHIVA surgical treatment had

fewer side effects and less recurrence after 5 years compared to both stripping groups. No statistical differences were found between the two stripping groups (with and without duplex mapping). (Comment by Paolo Zamboni)

7) JO PARES, J Juan, R Tellez, A Mata, C Moreno, FX Quer, D Suarez, I Codony, J Roca : Varicose vein surgery: stripping versus the CHIVA method: a randomized controlled trial

Vasomed, 2011, 23(2), 98 | added to CENTRAL: 31 December 2014 | 2014 Issue 12 (Cochrane Library)

8) **GONZALEZ CANAS E. et AL.: A randomized controlled noninferiority trial comparing radiofrequency with stripping and CHIVA technique for insufficiency of the great saphenous vein.**

**J Vasc Surg Venous Lymphat Disord.** 2020 Apr 27. pii: S2213-333X(20)30233-X. doi: 10.1016/j.jvsv.2020.04.019. [Epub ahead of print]

ABSTRACT

**OBJECTIVE:**

The quality of available evidence regarding new minimally invasive techniques to abolish great saphenous vein reflux is moderate. This study aimed to assess whether radiofrequency ablation (RFA) was noninferior to each of the stripping (HL/S) and CHIVA methods on clinical and ultrasound recurrence at 2 years in patients with primary varicose veins (VV) due to great saphenous vein (GSV) insufficiency.

**METHODS:**

A randomized, single-centre, open-label, controlled, noninferiority trial comparing RFA with two surgical techniques for the treatment of primary VV due to GSV insufficiency. The noninferiority margin was set at 15% for absolute differences. Patients aged over 18 years with primary VV and GSV incompetence, with or without clinical symptoms, C2 - C6 clinical class of CEAP and GSV diameter >4 mm were randomized with a 1:1:1 ratio to RFA, HL/S or CHIVA. Rate of clinical recurrence at 24 months was the primary endpoint and was analyzed using a delta noninferiority margin of 15%. Ultrasound recurrence, safety and quality of life were considered as secondary endpoints for descriptive purposes.

**RESULTS:**

From December 2012 to June 2015, 225 limbs were randomized to RFA, HL/S or CHIVA (74/75/76). Clinical follow-up and Doppler Ultrasound (DUS) were performed after surgery at 1 week, 1, 6, 12 and 24 months. No differences in postoperative complications or pain were observed between groups. RFA was found to be noninferior to HL/S on clinical recurrence at 24 months, with an estimated difference in recurrence (95% CI) of 3% (-4.8%, 10.7%), noninferiority P= 0.002, and noninferior to CHIVA (95% CI) of -7% ( -17%, 3%) P<0.001. For ultrasound recurrence, RFA was found to be noninferior to CHIVA with an estimated difference (95% CI) of -34% (-47, -20) noninferiority P<0.001 at 24 months, but noninferiority could not be demonstrated compared to HL/S (5.9% 95% CI -4.1, 15.9) P=0.073. There were no differences in quality of life between groups.

**CONCLUSIONS:**

RFA is noninferior in terms of clinical recurrence to HL/S and CHIVA in the treatment of VV due to the insufficiency of GSV.

**REVISIONI COCHRANE e METANALISI**

**1) BELLMUNT–MONTOYA S., ESCRIBANO J.M., DILME J., MARTINEZ–ZAPATA M.J., CHIVA method for the treatment of chronic venous insufficiency, Cochrane Database Syst. Rev., 2013 Jul 3, (7): CD009648.**

**2) BELLMUNT–MONTOYA S., ESCRIBANO J.M., DILME J., MARTINEZ–ZAPATA M.J., CHIVA method for the treatment of chronic venous insufficiency, Cochrane Database Syst. Rev., 2015 Jun 29, (6): CD009648.**

The first review was published in 2013 and aimed to compare the effectiveness and safety of the CHIVA method with alternative therapeutic techniques for the treatment of chronic superficial venous insufficiency. Randomized controlled trials (RCTs) have been included to compare the CHIVA method compared to any other treatment. The primary endpoint was clinical recurrence, the studies included in the review had a follow-up of 3 to 10 years, and showed more favorable results for the CHIVA method compared to stripping (721 people, RR 0.63, 95% CI 0.51 to 0.78).

**Only one of the studies included in the review reported data related to**

**quality of life (presented graphically) and these results also significantly favored the CHIVA method**.

The stripping group had a higher risk of side effects than the CHIVA group; in particular, for the presence of hematomas (RR 0.63 95% CI from 0.53 to 0.76;) for nerve damage (RR 0.05 95% CI from 0.01 to 0.38).

No statistically significant differences were reported between the groups regarding the incidence of infection and superficial venous thrombosis. (Comment by Paolo Zamboni)

**3) Guo L. et Al.: Long-term efficacy of different procedures for treatment of varicose veins A network meta-analysis**

**Medicine (2019) 98:7**

Abstract

Background: Various procedures for the treatment of varicose veins have been shown to have long-term effectiveness, but research has yet to identify the most effective procedure. The aim of this study was to investigate the long-term efficacy of different procedures based on Bayesian network meta-analysis and to rank therapeutic options for clinical decision-making.

Methods: Globally recognized databases, namely, MEDLINE, Embase, and Cochrane Central, were searched for randomized controlled trials (RCTs). Quantitative pooled estimation of successful treatment rate (STR) and recurrence rate (RR) was performed to

assess the long-term efficacy of each procedure with more than a 1-year follow-up. The surface under the cumulative ranking (SUCRA) probabilities of the P values regarding STR and RR were calculated to rank various procedures. Grades of Recommendations Assessment, Development and Evaluation (GRADE) criteria were utilized for the recommendation of evidence from pairwise direct comparisons.

Results: A total of 39 RCTs encompassing a total of 6917 limbs were eligible and provided relative raw data. After quantitative

analysis, the CHIVA procedure was determined to have the best long-term efficacy, as it had the highest STR (SUCRA, 0.37).

Additionally, the results revealed that CHIVA possessed the highest probability of achieving the lowest long-term RR (SUCRA, 0.61).

Moreover, the sensitivity analysis with inconsistency approach clarified the reliability of the main results, and the evidence of most

direct comparisons was ranked as high or moderate.

Conclusion: **CHIVA seemed to have superior clinical benefits on long-term efficacy for treating varicose veins. However, the**

**conclusion still needs additional trials for supporting evidence.**

Abbreviations: CHIVA = Ambulatory Conservative Hemodynamic Management of Varicose Veins, Development and Evaluation,

GRADE = Grades of Recommendations Assessment, PRISMA = Preferred Reporting Items for Systematic Reviews and Metaanalyses,

RCT = randomized controlled trial, RR = recurrence rate, STR = successful treatment rate, SUCRA = surface under the

cumulative ranking.

**ARTICLES OF GENERAL REVIEW**

**1) Mendoza, E.: CHIVA 1988-2008: Review of studies on the CHIVA method and its development in different countries**

**(2008) *Gefasschirurgie*, 13 (4), pp. 249-256. Cited 1 time.**

ABSTRACT

CHIVA was introduced by Claude Franceschi in 1988. This technique is based on analysis of the venous circulation; a small number of ligatures follow, which cause a volume discharge of the superficial (and deep) veins. The aim is to reduce the circulating volume in these veins, sparing the saphenous trunks and their drainage through perforators. Prospective studies that include 695 patients with 3-year follow-up have been published. In the past 2 years, three prospective randomized studies of CHIVA versus stripping, with follow-ups of 5-10 years, have been done (750 legs) and have been partially published (250 legs). They are summarized and discussed in this article. Treatment costs were lower for CHIVA. Subjective and objective results were either significantly better or equal to stripping, and a lower rate of recurrence was found. In the 10-year follow-up, the recurrence rate was double in the stripping group. CHIVA has become widespread particularly in Spain, where half of the interventions on veins are done using this technique. In France and Italy, CHIVA is covered by health insurance.

**2) D. KELLEHER, T R A Lane, I J Franklin and A H Davies : Treatment options, clinical outcome (quality of life) and cost benefit (quality-adjusted life year) in varicose vein treatment**

**Phlebology 2012;27 Suppl 1:16–22.**

*Conventional surgery*

Standard surgery for varicose veins was firstdescribed over 100 years ago, and is still considered the gold standard against which other treatment modalities are tested. The results of surgery are good and patients are generally satisfied. Surgery is associated with an improvement in QOL in most patients. However, there is a significant rate of minor complications. Rates of morbidity vary from series to series.

New techniques that have arisen interrupt the reflux haemodynamics while preserving the long saphenous vein and include the ASVAL and CHIVA techniques. These provide minimally invasive treatments performed under tumescent local anaesthesia, and have produced good results. One single-centre series has shown that while CHIVA offers improved recurrence rates compared with open stripping in experienced hands, it has a steep learning curve and can lead to worse

*Conclusion*

Varicose veins have a multitude of treatment options, all of which provide excellent improvements in QOL at a cost-effective level. Overall costs have fallen dramatically despite material requirements, and no patient should be without a treatment option. The treatment of varicose veins is one of the few treatments that offer low morbidity for large improvements in QOL. Importantly, despite the higher incidence of varicose veins in older patients, a high percentage of patients are of working age when health improvements are most cost-effective.

**3) MENDOZA E.: Primum non nocere**

**Veins and Lymphatics, 2017, 6(2)**

**https://doi.org/10.4081/vl.2017.6646.**

**4) AGUS G.B.: Thirty years of new venous hemodynamic concept and teaching**

**Acta Phlebologica 2019 mese;20(0):000–000**

**DOI: 10.23736/S1593-232X.20.00458-0**

Conclusion

Finally, thanks to hundreds of studies, some RCTs and a Cochrane review by various authors over Europe, CHIVA is today validated as more successful than destructive method and the more recent international meta-analysis concluded that CHIVA seemed to have superior clinical benefits on long-term efficacy comparing different therapeutic procedures for treating varicose veins.11-13 The efficacy of this approach was based on a better physiological process, and this revolutionary approach should be widely applied in clinics. However, the conclusion still needs additional trials for supporting evidence.

**5) FRANCESCHI C.: CHIVA 30 years later. Scientific and ethical considerations**

**Veins and Lymphatics, 2019 - pagepressjournals.org**

**6) CAMPBELL B. , Ian J Franklin3 and Manj Gohel4**

**Editorial: The choice of treatments for varicose veins: A study in trade-offs**

**Phlebology 0(0) 1–3 2020**

**CHIVA AND PELVIC LEAK POINTS**

**FRANCESCHI C. and BAHININI A.: Points de fuite pelviens viscéraux et varices des membres inférieurs**

**Phlébologie 2004; 57: 37-42**

**FRANCESCHI C. and BAHININI A.: Treatement of lower extremity venous insufficiency due to pelvic leak points in women**

**Annals of Vascular Surgery April 2005; 19: 284-288**

**FRANCESCHI C. Anatomie fonctionnelle et diagnostic des points de fuite bulboclitoridiens chez la femme (point C).**

**J Mal Vasc. 2008; 33:42.**

**DELFRATE R., BRICCHI M., FRANCESCHI C.: Minimally-invasive procedure for pelvic leak points in women.**

**Veins and Lymphatics 2019; vol 8: 7789**

**Abstrac**

Pelvic leak points (PLP) may be responsible for vulvar, perineal and lower limb varicose veins, in women during and/or after pregnancy. The accurate anatomical and hemodynamic assessment of these points, the perineal (PP), inguinal (IP) and clitoral points (CP) and their surgical treatment under local anesthetics as defined by Claude Franceschi is a new therapeutic option. The aim of this study was to assess the reliability and durability of the PLP reflux ablation using a minimally-invasive surgical disconnection at the PLP level in women with varicose veins of the lower limbs fed by the PLP. In this open-label trial 273 pelvic leak points free of pelvic congestion syndrome, with at least a 12-month follow- up, were assessed. 273 PLP treated: PP (n=177), IP (n =91) and CP (n=5). Followup: Period =12 to 92 months (mean =30.51 months). Age from 29 to 77 years (mean=45). The only 3 patients over 70 years (71, 74, 77) showed a high-speed reflux from a I point that fed symptomatic varicose veins of the lower limb. Exclusion criteria: pelvic congestion syndrome, BMI>24, venous malformations, a post thrombotic varicose vein. Diagnosis was performed using echo duplex and PLPs selected for treatment when refluxing at Valsalva + Paraná + squeezing maneuvers. A surgical skin marking of the PLP had been performed using echo duplex before surgery. Surgery consisted of minimally invasive dissection and selective division and ligation with non-absorbable suture of the refluxing veins and fascias at the PP, IP and CP pelvic escape points, under local anesthesia in a single center. The follow-up consisted of an echo duplex ultrasound, searching for reflux at the PLP treated thanks to the Valsalva maneuver, within 2 weeks, after 6 and 12 months and then yearly. The main endpoint of the study was the immediate elimination of the reflux at the PLP treated. The second endpoint was the long-term durability of the reflux ablation at the PLP treated. 267 (97.8%) without PLP reflux redo. 6 (2.2%) PLP reflux recurrences (PP=4, IP=1, CP 1). 3 patients with PLP reflux recurrence undergo a redo surgery (1.1%) where PP=2 (0.7%) and IP=1 (0.3%). This study shows the feasibility and durability of reflux ablation at the PLP level thanks to a minimally-invasive surgical treatment of the PLP and it demonstrates that there is no need for pelvic varicose embolization in patients without clinical signs of pelvic congestion syndrome. The accurate ultrasound assessment of each specific pelvic leak as well as a special surgical technique (vein division, non-absorbable suture of veins and fascias) seems to be the key for satisfactory outcomes.

**ARTICLES ABOUT SPARING INCOMPETENT SAPHENOUS TRUNK AND USE FOR ARTERIAL**

**BY-PASS**

**LOFGREN EP. In Bergan JJ, Yao JST (eds). Surgery of the veins 1985: 285-99**

2-3% of patients treated for varicose veins will need an arterial by-pass

**SCARANO: MINERVA ANGIOLOGICA 1993; 18 (Suppl 1 al N° 4) : 93 - 5**

A venous pathology assumed ad relevant was present in 32% of patients undergoing a generic arterial by pass, this highlights the importance of the phenomenon.

**WIENERT V. : Chez un malade variquex quel est le risque de développer un oblitératione artérielle périphérique ?**

**Phlébologie 1998, 51, 269-271**

Abstract:

Aftere having shown the significant general frequency of varices taking both sexes together, the author demonstrates that on the other hand the frequency of peripheral arterial diseases is much lower up to the age of 50 years but then rises to attain more than 10% among the senior citizen population. He deplores the non-existence of arterial varices-affected concomitant epidemiological studies but by confronting the statistical data concludes that, in the different age groups of a given population, at the most 10% of varicose patients suffer peripheral arterial disease. **This 10% represents an average**.

**SESSA C. et Al. : La saphène patologique, un greffon potentiel dans la chirurgie de sauvetage de membre**

**Phlébologie 1998, 51, N°3, : 313-319**

ABSTRAC

The greater saphenous vein is the optimal conduit for distal lower extremity arterial revascularisation. Unfortunately, saphenous vein of sufficient length. or size is not always available or is inadequate in about 10 to 40 % of the cases. The outcome of venous grafts is mainly based on the diameter and the quality of the vein. These can be determined by preoperative duplex scanning, by intraoperative gross appearance of the vein, by angioscopy and biopsy. Postphlebitic diseases often preclude use of the vein, while diffused or segmental venous dilatations can be treated with resection or external wrapping achieving good results. Bypasses performed with postphlebitic recanalized, calcified and thick-walled veins fare poorly with a patency rate of 32 % at 30 months and a early failure rate of 20%. Because diseased saphenous vein carry a high risk of failure alternate conduit should be used. Alternate conduits include other autogenous veins, composite graft or prosthetic graft with adjunctive technique (patch or cuff). Venous or arterial allografts provide a suitable alternative while waiting for the development of new graft and the improvement of endothelial seeding of prosthetic grafts. The decision to use a diseased saphenous vein is based upon the surgeon's convictions and the availability of other arterial substitutes.

**SESSA C. et Al. : Quel devenir des greffons venineux issus d'une veine variqueuse (Revu de la littérature)**

**Phlébologie 1998, 51, N°3, : 343-347**

ABSTRAC

The varicose long saphenous vein (LSV) has often been discarted as an arterial conduit for peripheral revascularisations because deemed to carry a high risk of rupture and long term deteriorations. About 80 % ofthe patients presenting with varicosities have a fairly normal or slightly dilated LSV and nearly 3 % or these patients will need an arterial revascularisation: Segmental venous dilatations can be resected, while diffuse varicosities can be wrapped with a mesh-tube prosthesis allowing use of vein up to 8 mm in size. Experimental studies have shown that perivenous meshes preserve histological and endothelial functions of varicose vein, decrease myo-intimal hyperplasia and atherosclerosis in the vein grafts. The fewer publications in the literature have reported that varicose veins wrapped with prosthetic graft achieve good results in lower limb revascularisations without complications and long term deteriorations. Thus the potential use of varicose veins should lead to preserve all LSV suitable for arterial bypass in patients with varicosities that present risk factors of atherosclerosis. The decision of using a diseased saphenous vein is based upon the surgeon's convictions and the availability of other arterial substitutes.

**MELLIERE D,Cales B,Martin-Jonathan C,Schadeck M**

**Necessity of reconciling the objectives of the treatment of varices and arterial surgery. Practical consequences**

**Journal des Maladies Vasculaires**, **01 Jan 1991, 16(2):171-178**

Abstract

It is unwise to treat patients with varicose veins without thinking about the possibility of atherosclerotic disease occurring later on. The various procedures of stripping, as well as cryosurgery and sclerosis injections in the saphenous veins destroy veins which are at present the best material for femoro-tibial, femoro-popliteal and coronary bypass. Every year, a great deal of limb salvages cannot be achieved because saphenous veins have been previously removed. As arterial disease occurs one or several decades after the venous complaint, every patient with varicose problems may be concerned. Further more, contrary to a frequent opinion, great saphenous veins of varicose patients are often suitable for arterial bypass. As Doppler combined to duplex scan allow to draw a precise map of the superficial venous channels with their endings, amount of flow back, and caliber of the saphenous veins, it is now possible to propose to most patients conservative procedures: ambulatory phlebectomy or sclerosis injections of peripheral veins in case of minor reflux, crossectomy or CHIVA (Ambulatory Hemodynamic Cure of Venous Insufficiency) in case of major reflux, or association of the various technics. Thus, destructing treatments of saphenous veins should be only proposed to patients whose veins are obviously unsuitable for arterial bypass.

**LOUIS FLIGELSTONE, Grace Carolan, MA,**

**Neil Pugh, Minst P, Muned Shandall, Ian Lane: An assessment of the long potential use as a vascular varicose vein surgery saphenous vein conduit after**

**J Vasc Surg 1993;18:836-40.**

**ABSTRAC**

**Purpose:** There is controversy in the surgical management of varicose veins between stripping of the long saphenous vein (LSV) and high ligation. Moreover, preservation of the LSV is desirable for future coronary or peripheral artery bypass. We have studied 75 limbs in 44 patients after high saphenous figation with multiple stab

phlebectomy.

**Methods:** Subjective assessment of the outcome of surgery was made with a linear analog scale, and objective cosmetic outcome was assessed by an independent observer (IF) who had not been involved in the surgical treatment of these patients with our

modification from the criteria first described by Jakobsen. Patency, length, and diameter of the LSV was measured 6 to 14 months (mean 12 months) after operation with a duplex scanner and a color-flow scanner. Valvular incompetence in the LSV and perforators was also assessed.

**Results:** Results show a good subjective and objective outcome in 95% and 97% of limbs, respectively. The LSVs were patent from ankle to groin in 68% and from ankle to knee in 82%, with a mean diameter of 4.0 ± 0.1 nun (mean ± SEM). There was no statistically significant difference in symptomatic outcome and presence of reflux in the LSV (X 2 = 0,465; p = 0.4954; NS) or objective cosmetic outcome and the presence of reflux in the LSV (X 2 = 2.916; p = 0.0877; NS).

**Conclusions:** It is concluded that high saphenofemoral ligation combined with multiple "stab avulsions" preserves an LSV with characteristics suggesting suitability for future use as a vascular prosthesis with good early symptomatic and cosmetic results.

**MIKATI A.:Personal experience of GSV conservation for 10 years**

**Phlébologie 2002, 55, N °2 pag 190**

Summary

In 1991 91 patients underwent to GSV sparing surgery after cartographic analysis

In 29 patients non-draining system was performed, In all the others, the saphenous trunk was drained.

Frome the SFJ to ankle diameters compared before surgery and after surgery at 10 follow-up were measured.

The conservation of the saphenous trunk was believed to be a success:

1) when the post-operative dimensions were between 3.5 and 8 mm.

2) when the useful length was equal to or greater than 40 cm

3) when there were no dysplasias.

In the non-draining system the conservation of the total saphenous vein was reached in 68% (CI 50-85%)

In the draining ones in 75% (CI 62-84%).

2 PATIENTS AT 6 AND 8 YEARS OF F-UP ARTERIOPATHY HAVE BEEN TREATED WITH A FEMORO-DISTAL SCAFFOLDING USING THE SAFENA PRESERVED.

2 patients at 6y and 8y of F-up, because of PAD underwent to a femoro-distal by-pass using the preserved saphenous trunk.

**JOSEPH D. Cohn, MD, FACS, and Keith F. Korver, MD, FACS: Selection of Saphenous Vein Conduit in Varicose Vein Disease**

**Ann Thorac Surg 2006;81:1269 –74**

**Background**. Limbs with varicose veins are difficult to assess as a source of saphenous vein conduit. Anatomic, histologic, and ultrasound studies demonstrate two types of longitudinal veins in the lower extremities. The great saphenous vein is deep to the saphenous fascia. Accessory saphenous veins are superficial to this layer and have thin walls with diminished muscle cells and elastic

fiber. Accessory saphenous veins dilate and form varicosities.

Segments of great saphenous veins are often suitable as coronary conduits. No studies have assessed the suitability of saphenous veins as coronary artery conduits in patients with varicose vein disease.

**Methods**. Intraoperative high-resolution ultrasound studies were performed in coronary artery bypass graft procedures to assess lower extremity venous morphology in limbs of 77 patients without known venous disease, in 19 limbs with venous telangiectases, and in 23 limbs with varicose veins.

**Results**. Dilated great saphenous vein segments were identified in 6% of normal limb venous segments compared with 21% of segments in limbs with telangiectases (p \_ 0.027) and 22% of segments in limbs with varicosities (p \_ 0.012). The incidence of absent or hypoplastic great saphenous vein segments is increased in limbs with varicosities (35%) compared with normal limbs (21%; p \_

0.032). In the calf, at least one great saphenous vein segment suitable for coronary artery bypass grafting is present in 70% of limbs with varicosities and in 89% of limbs with telangiectases.

**Conclusions**. Ultrasound studies document that varicose veins are limited to accessory saphenous veins.

Great saphenous vein conduits, identified by ultrasonography,

are available in limbs with varicose vein disease.

**HARTRANFT CA, Noland S, Kulwicki A, Holden CR, Hartranft T.**

**Cryopreserved saphenous vein graft in infrainguinal bypass.J Vasc Surg. 2014 Nov;60(5):1291-1296. doi: 10.1016/j.jvs.2014.05.092. Epub 2014 Jul 3.**

**Abstract**

**OBJECTIVE:**

Autogenous saphenous vein is the ideal conduit for lower extremity revascularization. Unfortunately, autogenous vein is unavailable in up to 20% of patients. Synthetic grafts provide an alternative; however, their use in distal revascularization has shown varying results. In addition, infected surgical sites preclude their use. Currently, there are limited outcome data for cryopreservedsaphenous vein use in regard to long-term patency and limb salvage rates.

**METHODS:**

Cryopreserved saphenous vein allograft use in infrainguinal bypass was studied retrospectively in a community setting. End points included primary patency, limb salvage, and early complications. Records of patients receiving cryopreserved allografts by nine vascular surgeons within one hospital system from 2006 to 2012 were reviewed.

**RESULTS:**

Fifty-three patients, mean age 69 years (standard deviation, 12.3; range, 28-90 years), underwent 60 operations. Indications for surgery included limb-threatening ischemia (48%), tissue loss (30%), previous graft or site infection (10%), claudication (7%), or other (5%). The mean follow-up period was 23.9 months (standard deviation, 21.0; range, 0-64 months). Primary patency was maintained in 53% of patients at 1 year and in 22% at 3 years. Limb salvage was achieved in 74% of patients at 1 year and in 70% at 2 years. Thirteen early complications included 8 thromboses, 2 deaths, 2 amputations, and 1 anastomotic disruption. Fifteen patients (28%) underwent additional ipsilateral operations with use of synthetic conduits after initial cryopreserved allografts failed.

**CONCLUSIONS:**

Cryopreserved vein allografts displayed poor short-term and long-term patency, whereas limb salvage rates at 1 and 2 years remained acceptable. However, >25% of patients required additional ipsilateral operations with use of synthetic conduits after previous failed cryopreserved allograft use. Our data indicate that cryopreserved vein graft is a suboptimal choice of conduit in a noninfected field.

**SAMANO N, Geijer H, Liden M, Fremes S, Bodin L, Souza D.**

**The no-touch saphenous vein for coronary artery bypass grafting maintains a patency, after 16 years, comparable to the left internal thoracic artery: A randomized trial.**

**J Thorac Cardiovasc Surg. 2015 Oct;150(4):880-8. doi: 10.1016/j.jtcvs.2015.07.027. Epub 2015 Jul 15.**

Abstract

**OBJECTIVES**:This study investigates whether the no-touch (NT) vein graft, at a mean time of 16 years, maintains a significantly higher patency rate than conventional (C) vein grafts and still has patency comparable to that of the left internal thoracic artery (LITA).

**METHODS**:A total of 156 patients accepted for coronary artery bypass grafting were randomly allocated to 1 of 3 groups. In the C group, the saphenous vein (SV) was stripped and distended. In the intermediate group, the SV was stripped but not distended. In the NT group, the SV was neither stripped nor distended, but rather harvested with a fat pedicle. This study is an angiographic follow-up of the C and NT groups, at a mean time of 16 years postoperatively.

**RESULTS**:Fifty-four patients were included (C group = 27; NT group = 27). In all, 72 and 75 vein grafts were completed in groups C and NT, respectively. Crude SV graft patency was 64% in the C group versus 83% in the NT group (P = .03), which was similar to the patency of the LITA (88%). The harvesting technique had a major impact on the patency with a hazard ratio for occlusion of 1.83 for the C group (P = .04).

**CONCLUSIONS**:Harvesting the SV with the NT technique conferred, at a mean time of 16 years, a significantly higher patency than the conventional technique that was still comparable to that of the LITA.

**VASCULAR AND ENDOVASCULAR TECHNIQUES**

**Peter F. Lawrence, MD, SECTION EDITOR**

**MAHER FATTOUM, Stefan Kennel, MD,Peter Knez, MD,Thomas Schmitz-Rixen, MD, PhD, Hazem Khout, MD, and Matthias H. Tenholt, Mannheim, Darmstadt, and Frankfurt, Germany; and Leicester,**

**United Kingdom: "Lower extremity arterial revascularization using conditioned small-diameter great saphenous vein"**

**J Vasc Surg 2016;64:819-23.**

ABSTRACT

**Objective**: This study was conducted to determine whether it was feasible to increase the diameter of smaller great

saphenous veins (GSVs) in preparation for possible bypass and whether such a conditioned conduit could be used with

reasonable patency.

**Methods**: Twenty-five patients (26 cases: 24 peripheral arterial occlusive disease, 2 popliteal aneurysms) with GSV diameters

between 2 and 3 mm underwent in situ GSV valvulotomy and were observed for 3 months. After GSV dilation to

>3 mm for below-knee revascularization and >3.5 mm for above-knee revascularization, arterial bypass surgery was

performed with the valvulotomized GSV.

**Results**: Adequate GSV diameter was reached in 20 cases (77%). Arterial bypass surgery using valvulotomized GSV was

performed an average 131 days (range, 64-373 days) after valvulotomy in 16 patients (61.5%). No deaths, amputations, or

aneurysms occurred 2 years after surgery. At 1 and 2 years, primary patency was 81% 6 9.8% and 69% 6 11.8%, respectively,

and secondary patency was 87% 6 8.3% and 75% 6 11%, respectively.

**Conclusions**: Valvulotomy can be used to expand small-diameter GSV for lower extremity arterial bypass.

*116 ARTICLES ON CHIVA TREATMENT*

**BOOKS and CHAPTERS OF OTHER BOOKS**

**1) FRANCESCHI C.**

**(1988) Théorie et Pratique de la Cure Conservatrice et Hémodynamique de l'Insuffisance Veineuse Ambulatoire,**

**Précy-sous-Thil: L'Armançon**

**Edizione: Francese, Italiana, Inglese**

**2) ZAMBONI P.**

**(1996) La chirurgie conservativa del sistema venoso superficiale. (1° EDIZIONE)**

**Gruppo Editoriale Faenza Editrice**

**3) CAPPELLI M. ERMINI S. MOLINO LOVA R.**

**(2001) Chapter: La correzione emodinamica o cura CHIVA pag 431-456 book: Trattato di Flebologia e Linfologia Vol 1 Sergio Mancini (1° Edizione)**

**Masson Editor**

**4) MENDOZA, E.**

**(2002) Chiva Handbuch,**

**Arrien, Wunstorf**

**5) CAPPELLI M. MOLINO LOVA R. ERMINI S.**

**(2003) Chapter: Chirurgia conservativa emodinamica pag 177-187 book: Chirurgia delle vene e dei linfatici Giuseppe Genovese**

**Masson Editor**

**6) ESCRIBANO J.M.**

**(2006) Cirugia Hemodinamica en el tratamiento de la insuficiencia venosa superficial**

**Tesis Doctoral**

**Universitat Autonoma de Barcelona**

**7) FRANCESCHI C., ZAMBONI P.**

**(2009) Principles of venous hemodynamics**

**Hauppauge, NY: Nova Science Publishers**

***MENDOZA E. CHRISTOPHER R. LATTIMER NICK MORRISON N.***

***(2014) Duplex Ultrasound of Superficial Leg Veins***

***Springer Editor***

**8) ROBERTO DEL FRATE**

**(2014) A new diagnostic approach to varicose veins: haemodynamic evaluation and treatment**

**Lorena Dioni publisher**

**9) ZAMBONI P., MENDOZA E., GIANESINI S.**

**(2018)Saphenous vein-sparing strategies in chronic venous disease**

**Springer Editor**

**10) ZAMBONI P.**

**(2019) La chirurgie conservativa del sistema venoso superficiale. (2° EDIZIONE)**

**Aracne editrice**

**11) JORDI JUAN SAMSO’**

**(2019) La cura CHIVA en el tratamiento de las varices primarias de las extremidades inferiorores**

**Aran editor**

**12) RUTHERFORD’S
Vascular surgery and Endovascular therapy
Elsevier 2018
2030 section 33: “Saphenous sparing operation” CHIVA**

***Conclusion: Better results than stripping***

9 BOOKS PUBLISHED ON CHIVA TREATMENT

3 CHAPTES IN OTHER BOOKS

**CONCLUSION**

The following elements rise up from the analysis of the articles:

1. The results of different CHIVA studies about clinical data, recurrence rates and quality of life, comparing them with other methods of treatment without randomization, are superimposable on each other. So they are not sporadic cases, referring to individual studies.
2. All randomized studies as well as the two cochrane reviews and the meta-analysis demonstrate the superiority of CHIVA compared to other treatments in terms of recurrence and quality of life at 5 and 10 years.
3. The biochemical analysis of the pre- and post-chiva inflammatory markers, together with the demonstration of a regression of the saphenous wall alterations after treatment, confirm exetremely the possible use of a post-CHIVA saphens trunk for arterial by-pass. Anyway the incompetent great saphenous vein has been always used for by-pass, especially in case of infra-inguinal arteriopathies.
4. The low spread of CHIVA treatement and the learning curve cannot be criteria influencing the levels of evidence. Indeed, they must be a stimulus to optimize the own work.
5. Incompetent great saphenous vein can be used for arterial by-pass. It is exremely rare to find a varicous saphenous trunk.
In case of infrainguinal PAD the variables the vascular surgeon is interested in, are:
 1) The minimum caliber measured along the axis
 2) The length of the saphenous segment usable. (The fragmantation of the saphenous trunk during CHIVA procedure is performed less then 2% and always in the leg)
 3) In case of aplasia / hypoplasia, the presence of a straight collaterality bypassing the aplastic/hypoplastic segment
The dilations of the saphenous trunk do not create problems as they are treated in various ways.
In coronary artery disease the variables for the eligibility of the saphenous trunk are:
 1) The caliber. The leg tract is prefered as the small caliber and therefore more appropriate to the coronary arteries
 2) the absence of ectasias
The way of harvesting the saphenous trunk, using not-touch technique, give better results.
The presence of reflux is not important, as often undetectable since the saphenous trunk is examened in lying position especially in case of urgency.
Futhermore some vascular surgeons, in case of a small saphenous caliber, prefer to performe a devalvulation first for obteining a reflux with caliber dilation and wall modifications such as an incompetent saphenous trunk and perform the by-pass in situ later.

Therefore CHIVA represents the treatment of superficial venous insufficiency which gives the best results over time compared to all the other methods applied: stripping and endovascular procedures; with the big advantage of being able to preserve a saphenous trunk for a possible use as an arterial by-pass. About this aspect, I would like to underline , two concepts:

* The age of population increases, therefore the probability of finding phlebopathic patients with arteriopathies increases
* Patients, awareness of venous problems, approch earlier their own phlebological problems so the probability of finding saphenous veins not involved or less alterated is high.