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PREOPERATIVE ASSESSMENT OF PRIMARY VARICOSE VEINS: A DUPLEX STUDY OF VENOUS INCOMPETENCE

Jutley RR, Cadle I, Cross KS

Eur J Vasc Endovasc Surg 2001; 21:370-73

ABSTRACT AND COMMENTARY BY:

Alessandro Frullini, MD, FACP

Incisa Valdarno

Florence, Italy

Clinical evaluation of patients in the standing position using a hand-held Doppler (HHD) has been the preferred method of evaluation for a long time. Color-flow duplex scanning (CFDS) has been used in specialist vascular units or when treating complex disease. This study attempts to evaluate the importance of CFDS in diagnosing significant anatomical variations that would be impossible to do clinically with HHD alone.

This study was retrospective. It was performed identifying those subjects assessed for varicose veins during a 50-month period in the outpatient clinic. All patients studied were also submitted to CFDS performed on a tilt table in supine positions at 20 to 25 degrees to horizontal. A total of 223 limbs were studied and in 30%, the saphenofemoral junction was competent. In this subgroup, 29% of the varicose veins were due to incompetent perforating veins. In 18%, the short saphenous vein was incompetent, and in 14 limbs (21%), no abnormality was detected by duplex scanning. The remaining 14 limbs had a combination of anatomical variations, short saphenous vein reflux and incompetent perforators as the origin of their varicose veins. In the whole group of limbs examined, 53 (24%) were found to have significant anatomical variations that would be difficult or impossible to detect with a clinical or HHD evaluation.

This study demonstrates that in approximately 30% of cases, the saphenofemoral junction is competent in varicose vein patients and that significant anatomical variations of the superficial venous system are present in almost 25% of all cases. Even if some of these could be detected during correctly performed surgery, the majority would be missed at surgery.

Interestingly, in 6% of the limbs with varicose veins, there was no abnormality found on duplex scanning. The authors interpreted this to represent localized varicosities without stem vein involvement. The findings present an argument in favor of duplex scanning in every patient to be submitted to varicose

vein surgery even if this has implications on the cost of the procedure as a whole. The authors also believe that when considering the potential recurrence treatment cost, this figure of additional cost at evaluation is relatively insignificant.

COMMENTARY

Surgeons who currently perform surgery for varicose veins may be divided into two categories: 1) Those who consider clinical evaluation sometimes coupled with a symbolic HHD sufficient to design a good operation and 2) those who strongly believe that duplex or color Doppler are essential to understanding the relevant anatomy. Seven years ago, I was probably part of the first category but when I started to test all my patients with a duplex scan, I rapidly changed my opinion on this subject.

This paper stresses the new concept as it analyzes 223 limbs retrospectively. Even if I completely agree with the conclusions of this study, I wish to analyze some of the methodological aspects of the study.

Performing duplex examination on a tilt table at 20 to 25 degrees is wrong. Venous valves work best in the standing position. Inaccurate results or a poor standardization may come from the tilt position. Next, an important distinction must be made between terminal and preterminal valvular incompetence. It is not possible to judge a saphenofemoral or saphenopopliteal junction as pathological without making this distinction. Although the paper lacks description of the saphenous vein "eye sign," this duplex finding is an important marker for identification of the saphenous vein. We feel that this is crucial in separating a saphenous vein from a collateral vein or tributary. The fact that 23% of saphenous veins in this study appeared to be bifid might be attributed to failure to utilize the saphenous vein eye sign.

This paper clearly states that color-flow Doppler study helps in studying the superficial venous system objectively. It enhances the outcome of venous surgery and helps venous insufficiency disease control. I hope that our colleagues from the first category mentioned above will pass forward into the second category. I assure them that they will never regret it. §



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PRELIMINARY EXPERIENCE WITH A NEW SCLEROSING FOAM IN THE TREATMENT OF VARICOSE VEINS

Tessari L, Cavezzi A, Frullini A

Dermatol Surg 2001; 27: 58-60

ABSTRACT AND COMMENTARY BY:

Dr Albert-Adrien Ramelet

Lausanne, Switzerland

In this pilot study, 77 varicose vein patients were treated with an injection of sodium tetradecyl sulfate (STS) foam, either by direct injection or guided by ultrasound. They then wore elastic stockings for 30 days. Concentration of sclerosant was chosen by considering the diameter of the varicose veins, varying from 0.1% (reticular varices and telangiectases, 23 cases) to 3% (varices of saphenous veins and their tributaries). The results after one month as assessed by duplex were satisfactory with the veins being either obliterated or again being competent. There were the usual side effects of residual pigmentation, small foci of necrosis, a case of phlebitis in a collateral vein, and two cases of transient scotoma.

The technique is well described, and the authors tried to determine the optimal proportions of the ingredients in the foam that was produced by the Italian "three ways" technique. Their experiments showed that it was necessary to mix one part STS with four parts air, blended at least 20 times. A disposable plastic syringe with a capacity that could be varied from 2 ml to 10 ml was used. The duration of the foam did not exceed two minutes.

COMMENTARY

Invention of the foam by Cabrera¹, Monfreux² and Henriet^{3,4} revolutionized sclerotherapy and gave the treatment new life. Foams obtained by emulsifying with a solution such as polidocanol [Laureth 9] or STS are increasingly called for, and all users are enthusiastic about them. It is easy to see what is happening, particularly guided by ultrasound, when the foam is injected. There is prolonged contact between the sclerosant and the intima (foam injected into telangiectases before phlebectomy can still be found in the blood vessels

over 30 minutes after injection). There is less toxicity, fewer side effects, and excellent results.

This study is interesting in a number of respects. It provides statistical evaluation of results (very short term) from sclerotherapy with STS and of the incidence of complications associated with the method.

The problem is obtaining a high-quality foam. The techniques of Monfreux² and Henriot^{3,4} present a variety of problems: Glass syringes need to be sterilized (though this is the case with all medical equipment); these syringes are finer and more accurate; and the slowness and technical refinement needed to obtain an ideal foam. Techniques such as that of Gachet⁵ require a lot of skill. Tessari and his colleagues have already produced a number of documents and published various studies on the foam.⁶ Their technique is appealing and quick. It can be repeated without loss if the product is not used immediately. Disposable plastic syringes interconnected by a three-way stopcock can be used. The foam is of good quality but has been found not to be stable, which is also my experience. Like my Italian colleagues, I have often splashed myself with sclerosant when preparing the foam. This can easily be avoided, however, by using a syringe and three-way arrangement with a screw-lock mechanism to hold the needle (Luer-Lok type). Unfortunately, these are a bit more expensive.

It seems to me that amaurosis fugax is more common when polidocanol is used than when pure sclerosant is used. In one of my patients, amaurosis occurred during two consecutive sessions (the patient did not complain about it the first time!) In the current study, 2/77 patients developed transitory ophthalmic problems with a recurrence in one case when liquid STS was again injected. In that case, apparently it was not the injected foam and air that were responsible but the sclerosant solution itself.

Ready-for-use foams are currently being investigated. These will certainly become more widespread and likely gradually replace conventional sclerotherapy as soon as prospective studies confirmed the favorable, and even enthusiastic, impression of those who use it.

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A NEW TECHNIQUE FOR VARICOSE VEIN SURGERY: CLOSURE®

Perrin M.

Angéiologie 2000; 52:23-8

ABSTRACT AND COMMENTARY BY:

Denis Creton, MD, EC.AP

Nancy, France

The author has done a comprehensive compilation of different types of saphenous vein surgery separating surgical techniques into two groups: Excisional and conservative (for the main saphenous trunk). Both have been tremendously improved in the last decade by large-scale use of the pre-operative Duplex scan. Although surgery in treating varicose veins has been validated as an effective procedure, the results provided by so-called conservative surgery have not been compared in prospective and randomized studies.

The author includes the new Closure® technique in the excisional surgery group and compares the short-term outcome of Closure® with excisional surgery which is largely responsible for postoperative pain and hematoma and may require two weeks of sick leave. Closure® is a new endovascular procedure using radiofrequency energy to close the pathological vein. The catheter is introduced into the saphenous trunk distal to the refluxing portion with a percutaneous introducer or directly via a phlebectomy. The tip of the catheter is positioned at the saphenofemoral junction with the help of echographic scanning. After applying an Esmarch bandage and with manual compression on the upper portion of the thigh, the electrodes are opened. The catheter is then slowly withdrawn at a speed of 2 to 3 cm per minute. In order to maintain a temperature of 85°C, a thermocouple measures the temperature, and impedance assures the accurate delivery of energy. Heating produces collagenous retraction, fibrosis of the vein wall, and occlusion of the treated vein.

The first clinical outcomes were presented at the Inaugural Congress of the European Venous Forum. A total of 252 cases

were enrolled. The average diameter of the great saphenous trunk was 7.4 mm. Complications included superficial venous thrombosis (1.7%), deep venous thrombosis (0.3%), transitory paresthesia (9.8%), and skin burning (2%). In 88% of cases, return of normal activity was obtained in less than seven days. Quality of life score was improved within six weeks and was maintained at 12 months. Color-flow duplex scanning showed occlusion of the saphenous trunk in 90% of cases followed up after one year.

COMMENTARY

All surgical techniques should be separated into 3 types:

- Excisional technique (including Closure®): Must conform accurately to hemodynamic abnormalities and varicose network. The objective is the suppression of varices and abnormal refluxing portion of the trunks and tributaries.
- Conservative techniques which involve ligatures to suppress reflux leads to improvement in symptoms and stabilization of the condition.
- Restorative techniques: Aims to restore competence and patency of the subterminal saphenous valve (external banding and VNUS Restore® hold out a promise of good results).

These different techniques should be frequently combined, especially to include phlebectomies which must always be performed to remove the varicose veins.

Closure® is a good technique if used for the right indications which include proximal valve insufficiency, incompetence of the saphenous trunk between the groin and the knee, isolated incompetent saphenous trunk fed by peroneal veins or thigh perforators, and residual refluxing saphenous trunk in the thigh within the scope of recurrent varicose vein surgery. Closure® is not recommended for the short saphenous trunk or the greater saphenous vein in the calf because of a high risk of paresthesia. When the trunk is close to the skin, it can be separated from the skin by dilute local anesthesia to prevent skin burning. In these cases, a particularly reduced short-term postoperative convalescence and improvement in quality of life after one year of follow-up have been demonstrated.

One interesting question is the future of the residual, previously incompetent saphenofemoral junction after removal of only the trunk. The hemodynamic outcome of a large multicenter series after a two-year followup is encouraging. In the absence of a refluxing tributary in the upper portion of the thigh connected to the saphenofemoral junction, the epigastric and pudendal veins remain drained normally into the femoral vein. This fact may show that the flush ligation is not the most important part of the stripping. Phlebectomy and removal of the saphenous trunk likely play an important role in good results. A response to the question explaining the success of isolated extensive phlebectomies may be found! §

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FREE TISSUE TRANSFER PROVIDES DURABLE TREATMENT FOR LARGE NON-HEALING ULCERS

Kumins NH, Weinzweig N, Schuler JJ

J Vasc Surg 2000; 32:848-54

ABSTRACT AND COMMENTARY BY:

Peter Nèglen, MD
Jackson, Mississippi

This article describes a 10-year experience with 25 free flap procedures performed in 22 patients with undoubtedly recalcitrant ulcers. The ulcers had been present for many years. Bone, tendon or joints were exposed in half of the patients. Previous repeated attempts of split-thickness skin grafting had failed. In four limbs, arterial reconstruction had previously been performed. No surgical interventions appeared to have been performed to correct any venous outflow obstruction or reflux. The circulatory preoperative evaluation was largely scarce and inadequate. In 9/22 patients no data existed at all and in 11 patients only photoplethysmography was performed showing reflux in 10 limbs. The anatomical distribution of reflux is not known since duplex Doppler was only performed to evaluate whether deep vein obstruction was present or not. Distal ankle brachial pressure indices are not presented. Severe tissue loss with exposed bony structures, (an extremely uncommon feature of pure venous ulcers) and history of previous arterial surgery may suggest that at least some of ulcers were of mixed arterial and venous etiology and not necessarily venous. Nevertheless, the free-flap procedure had an excellent result on ulcer healing. One flap failed. Complications in eight limbs required an additional four procedures. Ulcers healed quickly and recurred after 25 to 97 months of followup in only 16% of patients (3/19), and occurred outside the previously covered area.

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COMMENTARY

I believe these authors (along with others) have clearly shown that free-flap procedures are an important and successful treatment alternative in selected patients with large recalcitrant leg ulcers. Although it may be costly at first sight, the substantial savings made long term seem to mitigate the high initial cost. These authors suggest a new classification of leg ulcers but this is probably not necessary since a new classification has recently been published that largely rectifies their criticism.¹

The free-flap transfer is definitely an efficient alternative treatment of leg ulcers. However, I believe this procedure should only be used after alternative treatments have failed. Hopefully, many ulcers can be controlled before they progress to the severe state of extensive tissue destruction described in this article. I think it is imperative that a full venous workup including a meticulous duplex Doppler study, pressure measurements and, at least, a transfemoral venogram be performed to evaluate the state of the venous circulation. Ankle-brachial pressure indices and toe pressures have to be obtained to delineate any underlying arterial disease. Reflux, deep or superficial, or obstruction, especially in the iliac vein segment, should be corrected and underlying ischemia treated if possible before free-flap procedures are considered.

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**VASCULAR REMODELING IN
VARICOSE VEINS**

Kockx MM, Knaapen MWM, Bortier HE, Cromheeke KM,
Bouterin-Falson O, Finet M.

Angiology 1998; 49:871-77

ABSTRACT AND COMMENTARY BY:

Dr. Newton DeBarros, Jr.
Sao Paulo, Brazil

In this interesting article, the authors analyze the histopathologic differences that occur in circular layers of the venous wall in non-varicose and varicose veins of individuals from similar age groups (n = 17; mean age 51 ± 12 years, and n = 29; mean age 52, 12 years, respectively). Specimens were examined by light microscopy and transmission electron microscopy. A grading system was used to assess smooth muscle cell (SMC) hypertrophy and the changes that occurred in the elastin pattern. They also measured volume densities of SMC and collagen and they evaluated the diameter of the SMC and counted the nuclei per fixed area.

The authors found that the varicose vein wall differed from the normal saphenous vein by the presence of hypertrophic SMC as well as disorganization of elastin patterns. The diameter of the SMC in varicose veins (d = 9.45 ± 1.22 μm) differed from that in normal saphenous veins (d = 6.22 ± 1.47 μm) (p < 0.0001) and that the nuclei of SMC per fixed area differed significantly between the varicose (87 ± 18) and non-varicose (117 ± 24) veins (p < 0.0001). Ultrastructurally, the SMC showed microherniations and vesicles budding from the cell. The vesicles contained microfilaments and microtubules. The microherniations were strongly associated with the presence of disorganized elastin. The vesicles contained contractile material budding from the SMC.

The authors conclude that hypertrophy of the SMC and microherniations could be the basis for disruption of elastin fibers connected to the SMC in varicose veins. Such disrupted connections between SMC and elastin fibers could induce weakness of the venous wall that has been observed in varicose veins. The authors questioned whether the hypertrophic SMC was the primary factor or if the loss of elastin was the major factor in varicose vein disease.

Some evidence has shown that during pregnancy, varicose veins are affected by hormonal and systemic factors. The human saphenous vein from both sexes expresses progesterone receptors. Therefore, the authors suggest that the occurrence of hypertrophic SMC due to hormonal stimuli, stress factors, and continuous increase of pressure in the lower extremities is a primary factor in the development of varicose vein disease.

RECOMMENDED READING

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TREATMENT OF VARICOSE VEINS: PROXIMAL SAPHENOFEMORAL LIGATION COMPARING ADJUNCTIVE VARICOSE PHLEBECTOMY WITH SCLEROTHERAPY AT A MILITARY MEDICAL CENTER

Brethauer SA, Murray JD, Hatter DG et al.

Vasc Surg 2001; 35:51-58

ABSTRACT AND COMMENTARY BY:

C. Vaughan Ruckley, MB, ChM, FRCSE
University of Edinburgh
Edinburgh, Scotland

The authors seek a system of managing varicose veins which facilitates a rapid return to activity duty for military personnel. They report a consecutive series of 103 patients treated for saphenofemoral ligation combined with point perforator ligation and stab avulsion (AP group) for primary varicose veins. They had previously reported a series of 104 patients who underwent saphenofemoral ligation followed by staged sclerotherapy (SC group). The current paper compares the two series.

The authors do not indicate whether the operating surgeons and the surgical techniques were the same in the two series. Surgical complications did not differ between the two series. Intraoperative pain was the most common complaint in the AP group but the figure for the SC group is not mentioned. Most patients in the AP group returned to work in three days but the corresponding figure for the SC group is not given. In the AP group, there was a 74% followup (mean duration 418 days, range 123 to 755). Followup in the SC group was a mean of 387 days (range 150 to 715) but the percentage of followup was not given. Recurrence rates were 11% and 12%, respectively with nine patients crossing over from AP to SC. In the AP group, therapy was completed in a mean of 2½ days compared with 70 days in the SC group. There was no difference in patient satisfaction. For practical reasons, the authors have adopted ambulatory phlebectomy (AP) rather than adjunctive sclerotherapy (SC) as their procedure of choice.

COMMENTARY

Lack of clinical trial format, omission of comparative data, and relatively short mean followup limit the value of this study. Nevertheless, the authors have audited their outcomes carefully. The rapid completion of therapy and return to active duty has clear practical appeal and, on those grounds, the authors' conclusions seem well justified.

The authors do not strip the saphenous vein, rehearsing the arguments for preserving the vein for future bypass grafting. We remain in the dark as to how many vascular or cardiac surgeons habitually use residual segments of saphenous vein in patients who have had previous varicose vein surgery and what the outcome may be. In terms of venous outcome, I believe clinical trials favor stripping. A more complete and prolonged followup would be welcome.

We are a long way from defining the optimal therapeutic regimens for varicose veins. Given the variation in anatomic and physiologic patterns of venous abnormality, the different pathologic categories (primary, recurrent, postthrombotic) and different ways of applying surgery and sclerotherapy, the permutations remain endless.

We can make two conclusions: 1) If we wish our phlebological practice to have a respectable scientific base, all therapeutic regimens should be subjected to the discipline of clinical trials. It is encouraging that a number of trials involving venous surgery and/or sclerotherapy are in progress or being planned. 2) Clinical series and trials are impossible to interpret and compare without patient classification into internationally recognized categories such as the CEAP. §

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HEALING OF AN MRSA-COLONIZED HYDROXYUREA-INDUCED LEG ULCER WITH HONEY

Natarajan S, Williamson D, Gray J. et al.

J Dermat Tx 2001; 12:33-36

ABSTRACT AND COMMENTARY BY:

Mitchel P. Goldman, MD

La Jolla, California, USA

There is no doubt that treatment of leg ulceration is quite variable with regard to topical unguents and ointments. A review of published reports shows that nearly every substance from antibiotics to precious metals have been used to stimulate healing. Since treatments proceed with and without proper diagnosis regarding the etiology of the ulcer, literature review makes it extremely difficult to determine which products are better at promoting healing. In addition, many reports present case studies without any long-term, placebo-controlled, Level I evidence. Nonetheless, important points can be gleaned from review of some single case reports. One such study is by the Wound Healing Research Institute at the University of Wales College of Medicine in Cardiff.

In this study, the authors describe a two-month history of a painful ulceration over the right lateral malleolus in a 47-year-old male. The patient had a history of fulminant hepatic failure due to hepatitis B three years earlier treated with liver transplantation. Postoperatively, cyclosporin and intermittent intravenous hepatitis B immunoglobulin were prescribed. The patient was then diagnosed with essential thrombocytopenia which was treated with hydroxyurea 1.5 gm per day. Two months after initiating hydroxyurea, he developed the area of ulceration on the ankle. The authors do not describe the diagnostic workup but they do mention that there were no signs of venous or arterial disease.

The patient was treated for three months with silver sulfadiazine cream and alginate dressings with minimal compression (the degree of compression and the method were not specified). Because of excruciating pain and frustration with the lack of progress, active, previously gamma-irradiated manuka honey was applied to the leg ulcer and covered with Granuflex. Compression was discontinued. The honey and Granuflex were changed daily after showering. Methicillin-resistant *Staphylococcus aureus* (MRSA) was isolated from the ulcer before honey treatment. A subsequent culture at 14 days showed no evidence of MRSA. The ulcer healed within 21 days of commencing topical treatment despite continuation of hydroxyurea and cyclosporin therapy. The authors believe that the antibacterial activity of honey, even against MRSA, explains the efficacy of this treatment.

Mechanisms by which honey inhibits micro-organisms are thought to be due to high osmolality of undiluted honey which reduces the amount of water available to promote microbial

growth. Additional antimicrobial activity is due to activation of B-derived glucose oxidase which catalyzes slow release of hydrogen peroxide from the glucose contained within honey. In addition, antimicrobial activity of manuka honey is linked to plant-derived substances. In fact, the antimicrobial potency of honey varies with its geographical, seasonal, and botanical source as well as harvesting, processing and storage conditions. It is easy to understand the confusion in the literature as there is no universal standardized honey for treating wound ulcers, and obviously, other reports of the effects of honey on the treatment of ulcers have not all used the same batch of honey.

The therapeutic properties of honey in relation to wound healing have been comprehensively reviewed by Molan, and the reader is referred to his articles for further information.¹⁻³

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