

Do Perforator Veins Always Need to be Treated or Should Treatment be Limited to C5 or C6 Venous Disease and How?

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Conflict of Interest

None

Medial Calf Perforating Veins

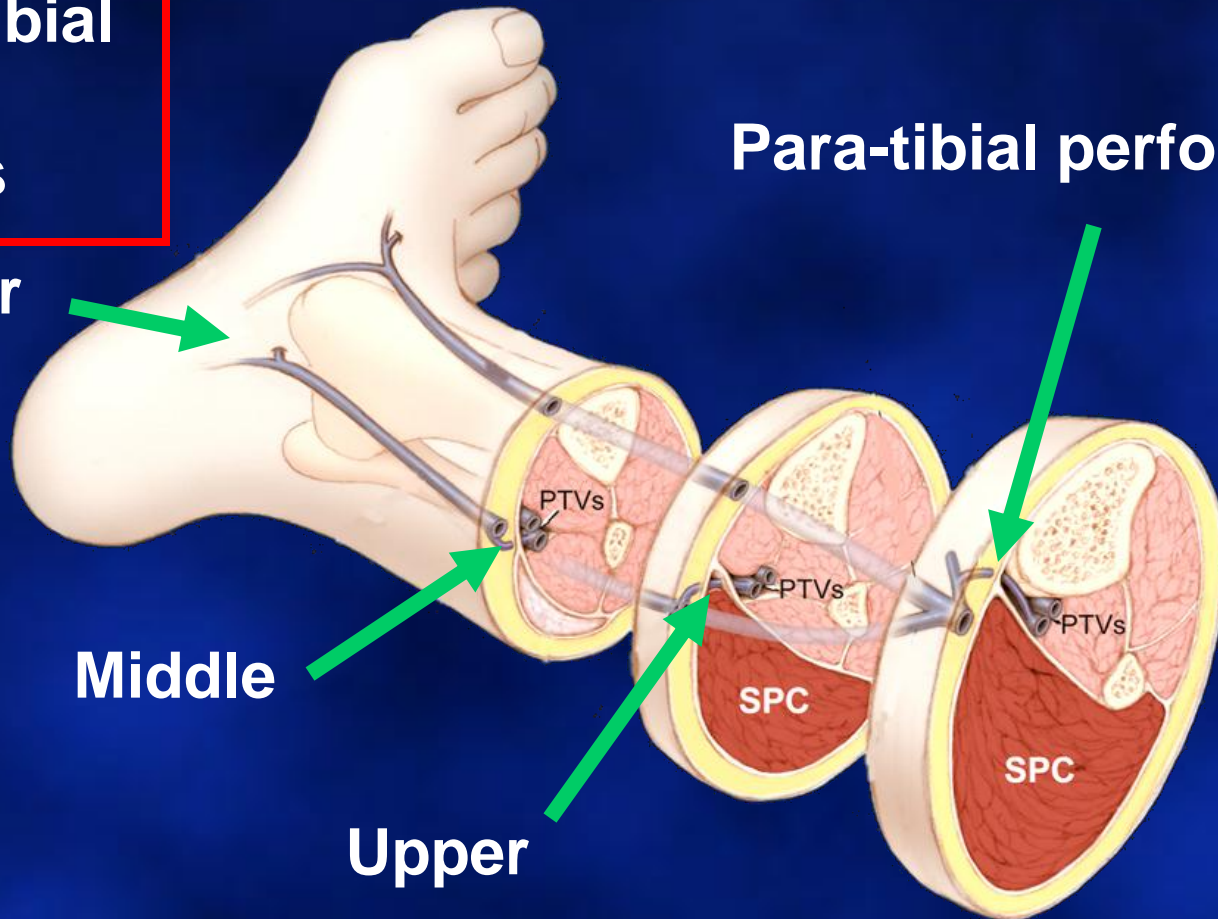
Posterior tibial
(Cockett)
perforators

Para-tibial perforator

Lower

Middle

Upper



Perforators contribute to ambulatory venous hypertension

- Number and diameter of perforators increases in advanced CVI
- 70% of the IPV have hemodynamic significance
- 45% of perforators are not abolished with saphenous ablation

1. Zukowski et al. Brit J Surg 1991;78(5):625-629
2. Delis KT et al. J Vasc Surg. 1998;28:815–825.
3. Labrapoulos et al. Am J Surg 1995;169:572-574.
4. Danielson G et al. Eur J Vasc Endovasc Surg. 2005;30:670–673.
5. Blomgren L et al. J Vasc Surg. 2005;42:315–320.

When to Treat Them ?



Incompetent Perforators



Advanced CVI (C5 – C6)

No deep venous obstruction

Perforating Veins

Competent

(< 500 ms)

Incompetent

(≥ 500 ms)

1. Labropoulos N, Tiongson J, Pryor L, Tassiopoulos AK, Kang SS, Ashraf, Mansour M, et al. **Definition of venous reflux in lower-extremity veins.** JVasc Surg 2003;38:793-8.
2. Coleridge-Smith P, Labropoulos N, Partsch H, Myers K, Nicolaides A, Cavezzi A, et al. **Duplex ultrasound investigation of the veins in chronic venous disease of the lower limbs: UIP consensus document:part I. Basic principles.** Eur J Vasc Endovasc Surg 2006;31:83-92.

New Insights into Perforator Vein Incompetence

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Background: there has been much controversy on the role of perforator veins in the development of chronic venous disease (CVD). This study was designed to determine the duration and direction of flow of lower limb perforator veins (PVs) in relation to their location, diameter and competency status of superficial and deep veins, in healthy volunteers and patients with different grades of CVD.

Patients and methods: thirty limbs in 15 symptom-free volunteers and 103 limbs in 75 patients with signs and symptoms of CVD were examined with colour-flow duplex scanning. Superficial, perforator and deep veins were studied in the standing and sitting positions. Flow-velocity characteristics, the number and maximum PV diameter at the deep fascia and subfascially were determined. A PV was considered incompetent when the outward flow lasted >0.5 s.

Results: 581 PVs were found in the patients and 106 in the volunteers. 163 PVs (28%) were incompetent in the first group and none in the latter. The prevalence of PV incompetence increased with the severity of CVD.

The diameter of incompetent PVs tended to be larger than that of competent PVs compared to controls, regardless of the CVD grade.

However, the reverse flow was more frequent in incompetent and incompetent than those found in competent PVs.

in patients than in volunteers. The prevalence of PV incompetence was higher in patients with reflux in both the superficial and deep veins than in those with outward flow was

($p < 0.001$) or in those with reflux in both the superficial and deep veins. **Conclusion:** the prevalence of PV incompetence was higher in patients with reflux in both the superficial and deep veins than in those with outward flow was

indicating that deep

- A perforator vein diameter of 3.9 mm had high specificity (96%) low sensitivity (73%) to predict incompetence
- Almost one-third of the incompetent perforators had a diameter of < 3.9 mm

Diameter-reflux relationship in perforating veins of patients with varicose veins

João Luis Sandri, MD, Fanilda S. Barros, MD, Sandra Pontes, MD, Claudio Jacques, MD, and Sergio X. Salles-Cunha, PhD, *Vitoria, Espirito Santo, Brazil*

Purpose: Treatment of chronic venous valvular insufficiency requires understanding of the hemodynamics of perforating veins. To preserve normal veins or veins that can function normally once primary sources of valvular insufficiency are removed, a better understanding of the diameter-reflux relationship is desirable. We measured reflux and diameters in 500 perforating veins of patients with varicose veins (C₂E_pA_{SP}P_R).

Methods: Color flow duplex ultrasonography scanning was performed with the patient standing. Perforating veins were mapped medially in the thigh and medially, laterally, and posteriorly in the calf. Reflux was defined as reverse flow that lasted longer than 0.5 seconds. Diameters were measured on B-mode transverse projections at the crossing of the fascia. Competent

Student *t* test, one-way

Results: Diameters of c

= 17) and 4.7 ± 1.9 m

179) and 3.7 ± 1.0 m

and 3.5 ± 0.8 mm (n

and 3.3 ± 0.7 mm (n

diameters of 3.5 mm o

than 90% of the cases.

Conclusion: An enlargement in the diameter of the perforating veins of 1 to 1.5 mm in the calf or 2 mm in the thigh of patients with varicose veins could be the difference between normal flow and reflux. Further studies are needed to confirm if elimination of reflux in patients with primary varicosity will transform incompetent perforators to competent ones. (*J Vasc Surg* 1999;30:867-75.)

a perforator diameter of 3.5 mm was associated with reflux in 90%

The Care of Patients with Varicose Veins and Associated Chronic Venous Diseases



Clinical Practice Guidelines of the Society for Vascular Surgery® and the American Venous Forum

The care of patients with varicose veins and associated chronic venous diseases: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum

Peter Gloviczki, MD,^a Anthony J. Comerota, MD,^b Michael C. Dalsing, MD,^c Bo G. Eklof, MD,^d
David L. Gillespie, MD,^e Monika L. Gloviczki, MD, PhD,^f Joann M. Lohr, MD,^g Robert B. McLafferty, MD,^h
Mark H. Meissner, MD,ⁱ M. Hassan Murad, MD, MPH,^j Frank T. Padberg, MD,^k Peter J. Pappas, MD,^l
Marc A. Passman, MD,^m Joseph D. Raffetto, MD,ⁿ Michael A. Vasquez, MD, RVT,^o and
Thomas W. Wakefield, MD,^p Rochester, Minn; Toledo, Ohio; Indianapolis, Ind; Helsingborg, Sweden; Rochester, NY;
Cincinnati, Ohio; Springfield, Ill; Seattle, Wash; Newark, NJ; Birmingham, Ala; West Roxbury, Mass; North Tonawanda,
NY; and Ann Arbor, Mich

The Society for Vascular Surgery (SVS) and the American Venous Forum (AVF) have developed clinical practice guidelines for the care of patients with varicose veins of the lower limbs and pelvis. The document also includes recommendations on the management of superficial and perforating vein incompetence in patients with associated, more advanced chronic venous diseases (CVDs), including edema, skin changes, or venous ulcers. Recommendations of the Venous Guideline Committee are based on the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) system as strong (GRADE 1) if the benefits clearly outweigh the risks, burden, and costs. The suggestions are weak (GRADE 2) if the benefits are closely balanced with risks and burden. The level of available evidence to support the evaluation or treatment can be of high (A), medium (B), or low or very low (C) quality. The key recommendations of these guidelines are: We recommend that in patients with varicose veins or more severe CVD, a complete history and detailed physical examination are complemented by duplex ultrasound scanning of the deep and superficial veins (GRADE 1A). We recommend that the CEAP classification is used for patients with CVD (GRADE 1A) and that the revised Venous Clinical Severity Score is used to assess treatment outcome (GRADE 1B). We suggest compression therapy for patients with symptomatic varicose veins (GRADE 2C) but recommend against compression therapy as the primary treatment if the patient is a candidate for saphenous vein ablation (GRADE 1B). We recommend compression therapy as the primary treatment to aid healing of venous ulceration (GRADE 1B). To decrease the recurrence of venous ulcers, we recommend ablation of the incompetent superficial veins in addition to compression therapy (GRADE 1A). For treatment of the incompetent great saphenous vein (GSV), we recommend endovenous thermal ablation (radiofrequency or laser) rather than high ligation and inversion stripping of the saphenous vein to the level of the knee (GRADE 1B). We recommend phlebectomy or sclerotherapy to treat varicose tributaries (GRADE 1B) and suggest foam sclerotherapy as an option for the treatment of the incompetent saphenous vein (GRADE 2C). We recommend against selective treatment of perforating vein incompetence in patients with simple varicose veins (CEAP class C₂; GRADE 1B), but we suggest treatment of pathologic perforating veins (outward flow duration ≥ 500 ms, vein diameter ≥ 3.5 mm) located underneath healed or active ulcers (CEAP class C₂-C₆; GRADE 2B). We suggest treatment of pelvic congestion syndrome and pelvic varices with coil embolization, plugs, or transcatheter sclerotherapy, used alone or together (GRADE 2B). (J Vasc Surg 2011;53:2S-48S.)

Perforating Veins

Competent

(< 500 ms)

Incompetent

(≥ 500 ms)

Non-Pathologic

Pathologic

- Small (< 3.5 mm)
- C2-C4
- Not in close proximity of ulcer

- Large (≤ 3.5 mm)
- C 5-6
- Underneath a healed or active ulcer

Guidelines of the SVS/AVF on Duplex Scanning

N of Guideline	Guideline	Grade of recommendation 1 = strong 2 =weak	Grade of Evidence A: High quality B: Moderate quality C: Low or very low Quality
2.4.	We recommend a cutoff value of 500 ms for the perforating veins	1	B

Mid-term results of endoscopic perforator vein interruption for chronic venous insufficiency: Lessons learned from the North American Subfascial Endoscopic Perforator Surgery registry

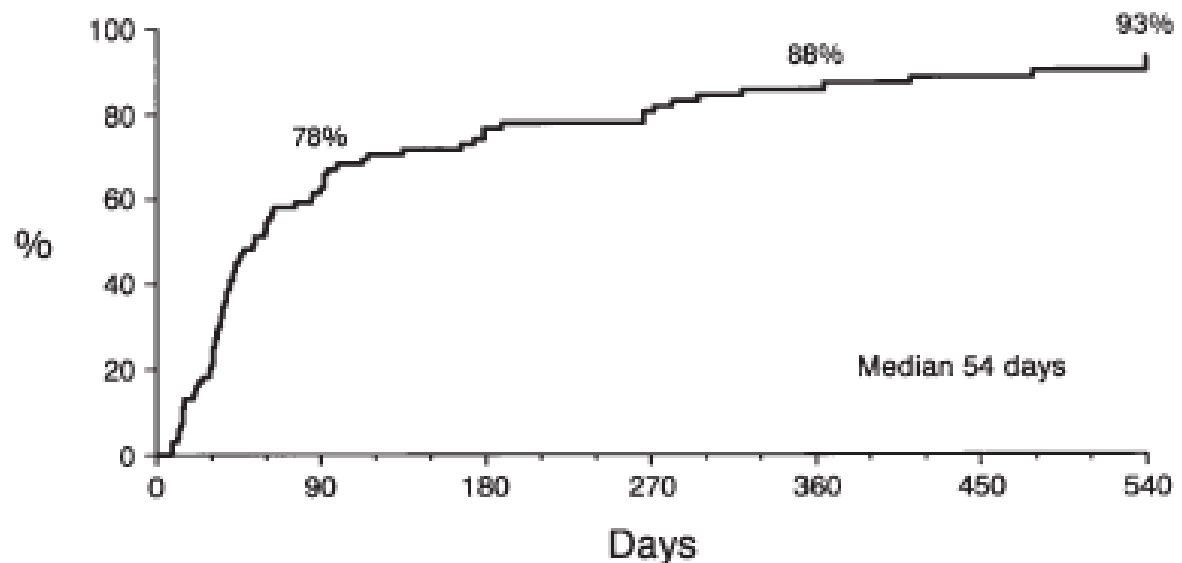
Peter Gloviczki, MD, John J. Bergan, MD, FACS, Jeffrey M. Rhodes, MD, Linda G. Canton, RN, BSN, Scott Harmsen, MS, and Duane M. Ilstrup, MS, and the North American Study Group, Rochester, Minn, and San Diego and La Jolla, Calif

Purpose: The safety, feasibility, and early efficacy of subfascial endoscopic perforator surgery (SEPS) for the treatment of chronic venous insufficiency were established in a preliminary report. The long-term clinical outcome and the late complications after SEPS are as yet undetermined.

Methods: The North American Subfascial Endoscopic Perforator Surgery registry collected information on 148 SEPS procedures that were performed in 17 centers in the United States and Canada between August 1, 1993, and February 15, 1996. The data analysis in this study focused on mid-term outcome in 146 patients.

Results: One hundred forty-six patients (87 years) underwent SEPS. One hundred twenty-one (14%) had healed ulcers (class 5) after 100 days. There were no deaths or pulmonary embolisms. The mean follow-up period averaged 24 months. The ulcer healing rate was 88% (median time to healing, 54 days). The rate of deep venous obstruction predicted by duplex ultrasonography was 3.98 at the last follow-up ($P < .001$). The ulcer recurrence rate was 28% (standard error, 4.5%). The ulcer recurrence rate was 28% (standard error, 4.5%) and the ulcer recurrence rate was 46% (standard error, 4.5%) than did the control group. Twenty-eight of the 122 patients (23%) had an active ulcer at the last follow-up examination.

Conclusions: The interruption of perforator veins results in decreasing the symptoms of chronic venous insufficiency, decreasing new ulcer development, however, the long-term results require reevaluation of the indications for SEPS. Previous deep vein thrombosis are successful. Operations for deep vein thrombosis are less successful. (*Operat Vasc Surg* 1999;29:489-502.)



Limbs at risk: 101 52 34 25 21 15 9 7 5

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Methods: The North American Subfascial Endoscopic Perforator Surgery registry collected information on 148 SEPS procedures performed in the United States and Canada between August 1, 1990, and August 1, 1995.

Results: One hundred forty-six patients (87 years) underwent SEPS. Of these, 21 (14%) had healed ulcers (class II or III) at the last follow-up.

Of the 125 patients who had no ulcers at the last follow-up, 28 (22%) had active ulcers at the last follow-up.

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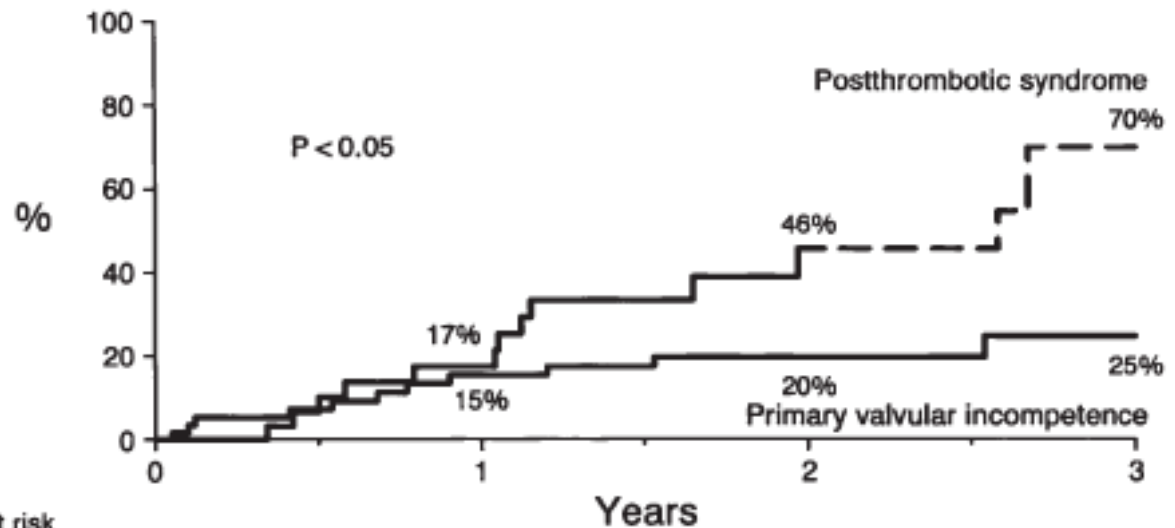
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Limbs at risk	0	1	2	3
Primary valvular incompetence	66	50	41	36
Postthrombotic syndrome	40	26	22	17

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Results: One hundred forty-six patients (79 men and 67 women; mean age, 56 years; range, 27 to 87 years) underwent SEPS. One hundred and

21 (14%) had healed ulcers (class 5). One hundred and

eighty-one (55%) underwent high ligation of the saphenous vein

with or without perforator vein interruption. There were no deaths or pulmonary embolisms. One deep vein thrombosis occurred.

One deep vein obstruction occurred. One deep vein obstruction predicted ulcer healing.

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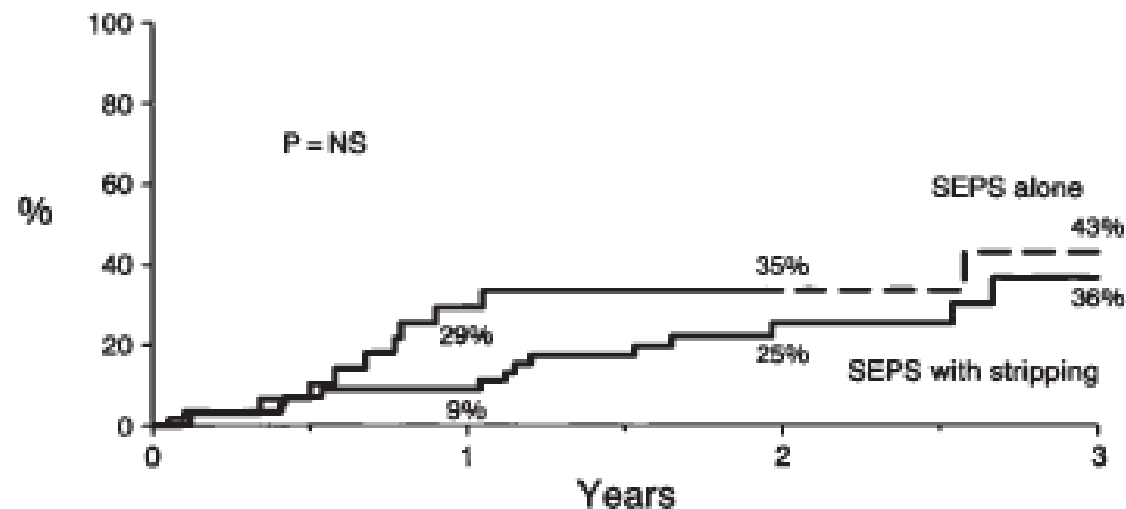
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ELSEVIER



REVIEW

The Role of Superficial Venous Surgery in the Management of Venous Ulcers: A Systematic Review

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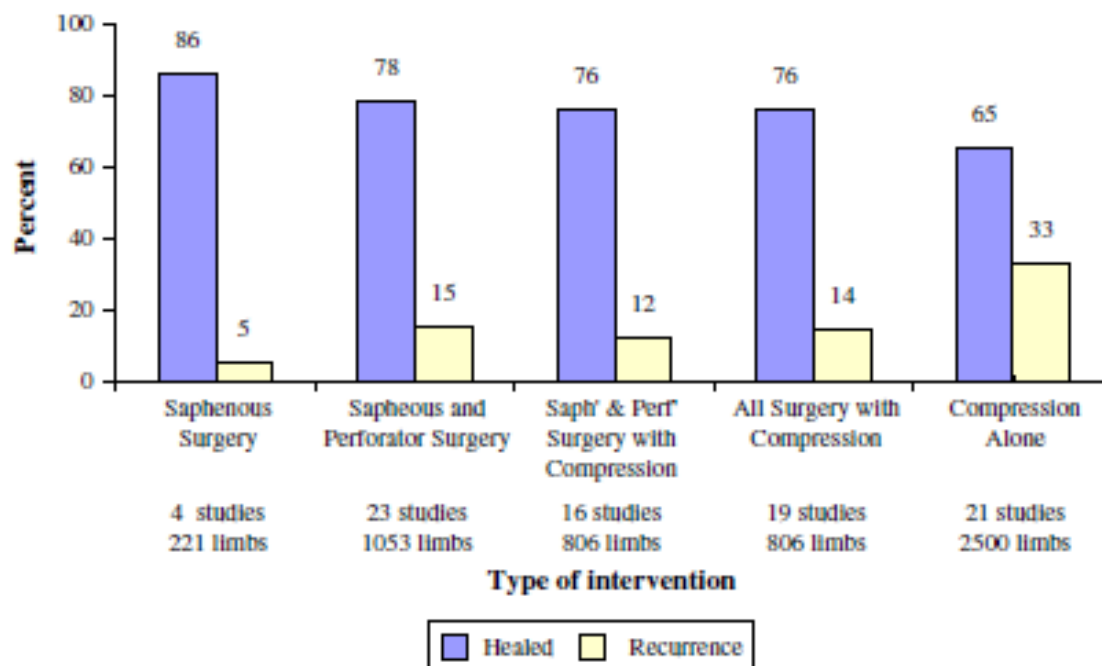
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KEYWORDS

Venous ulcers;
Healing;
Recurrence;
Superficial venous surgery;
Saphenous surgery;
Compression therapy;
Venous incompetence

Abstract Background: The complex development and improvement of compression therapy or surgical correction are currently the main methods employed to manage venous ulcers. This review compares and summarizes the healing and recurrence rates over the last thirty years. Methods: Sixty-one articles investigating the role of superficial venous surgery were obtained from a systematic search of The Cochrane Library, and Google Scholar. Demographics, CEAP classification, length of follow up, healing and recurrence data in seven reports led to the identification of 1053 limbs. Results: Five RCTs since 2000 demonstrate that saphenous vein ligation and/or 'small' vein resection combined with compression treatments, had a significant effect on the healing and recurrence rates of long-term data from the ESC. This review highlights the impressive reduction in ulcer recurrence and the benefit from surgery due to the highlighting that a significant proportion of ulcers heal with surgery.



Dutch SEPS Trial

- RCT on best medical treatment vs. SEPS and saphenous ablation
- No difference at 29 months
- SEPS beneficial
 - in recurrent and in medial ulcers
 - in centers of excellence

Letter regarding: 'The role of perforators in chronic venous insufficiency' by TF O'Donnell. *Phlebology* 2010;25:3-10

I read with interest the article regarding: 'The role of perforators in chronic venous insufficiency' by T F O'Donnell in *Phlebology* 2010;25:3-10.

Unfortunately, the paper was spoiled by an error in his nomenclature using PAPS to describe the technique of percutaneous perforator closure with thermoablation in the section entitled 'Endovenous ablation' instead of the acronym, TRLOP, which was the name given to the procedure by its inventors in 1999. This was particularly surprising as he had previously successfully referenced the appropriate papers that included the acronym in their name in their titles.

The technique for closing incompetent perforators was invented by myself (Mark Whiteley) and my colleague Judy Holdstock in 1999, and we named it TRLOP (TRansLuminal Occlusion of Perforators). It was first presented at a UK national vascular meeting in 2001.^{1,2} The TRLOP technique was presented by myself in America on two occasions in 2003^{3,4} and a European meeting in the same year.⁵ The technique was published with illustrations of the TRLOP technique in a book that was published in 2004,⁶ following a presentation of the TRLOP technique in April 2004.⁷

The evolution of how TRLOP started to be called PAPS in the USA had its history at a vein meeting in Miami in 2005 where I was invited to present my work on 'Radiofrequency treatment of veins'.⁸ As part of my presentation I presented four-year results of the TRLOP procedure. One of the chairmen quizzed me about the technique after the talk. The following year, I was asked to speak again⁹ and was amazed to see this same chairman presenting his 'one year experience' of closing incompetent perforating veins with thermoablation with a technique identical to TRLOP, but claiming it as a novel technique and naming it PAPS (Perforator Ablation Procedure). I questioned him from the floor to be told that it was the same procedure but using laser, not radiofrequency. I pointed out the TRLOP technique is the ultrasound-guided access of the perforator by any thermoablation device and so he had merely re-invented and re-named a procedure five years after it was invented.

In conclusion, the ultrasound-directed closure of incompetent perforating veins with catheter-based

thermoablation was invented in 1999 and is called TRLOP – TRansLuminal Occlusion of Perforating Veins. The only reason to use the acronym PAPS for a procedure that had already been developed, presented to learned societies internationally, published in journals and a book and named by its inventors as TRLOP would be to try to make up a fictitious priority for the description of a 'novel procedure' which in fact is merely a copy of a pre-existing technique.

M S Whiteley

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DOI: 10.1258/phleb.2010.010013

References

- 1 Kianifard B, Browning L, Holdstock JM, Whiteley MS. Surgical technique and preliminary results of perforator vein closure – TRLOP (Transluminal Occlusion of Perforators). Presentation to Vascular Surgical Society of Great Britain and Ireland, Brighton, November 2001
- 2 Kianifard B, Browning L, Holdstock JM, Whiteley MS. Surgical technique and preliminary results of perforator vein closure – TRLOPS (Transluminal Occlusion of Perforators). *Br J Surg* 2002;**89**:507-26
- 3 Whiteley MS, Holdstock J, Price B, Galligher T, Scott M. Radiofrequency ablation of refluxing great saphenous systems, Giacomini veins and incompetent perforating veins using VNUS closure and TRLOP technique. Presentation to International Congress XVI Endovascular Interventions, Phoenix, AZ, February 2003
- 4 Whiteley MS, Holdstock J, Price B, Galligher T, Scott M. Radiofrequency ablation of refluxing superficial and perforating veins using VNUS closure and the TRLOP technique. Presentation to UIP World Congress Chapter Meeting, San Diego, August 2003
- 5 Whiteley MS, Holdstock J, Price B, Galligher T, Scott M. Prize session radiofrequency ablation of refluxing superficial and perforating veins using VNUS closure and the TRLOP technique. Presentation to European Society for Vascular Surgery, Dublin, September 2003
- 6 Whiteley MS, Holdstock J. Percutaneous radiofrequency ablations of varicose veins (VNUS closure). In: Greenhalgh RM, ed. *Vascular and Endovascular Challenges*. London: Biba Publishing, 2004:361-81
- 7 Whiteley M. Percutaneous radiofrequency ablation of varicose veins (VNUS). Presentation to 26th Charing Cross International Symposium, London, April 2004.
- 8 Whiteley M. Results in over 1000 RFA-treated limbs. Presentation to Third International Veins Congress: In-Office Techniques, Miami, FL, April 2005
- 9 Whiteley M. RFAblation in the UK: moving from the hospital to the office. Presentation to Fourth International Veins Congress: In-Office Techniques, Miami, FL, April 2006

One-year outcomes of radiofrequency ablation of incompetent perforator veins using the radiofrequency stylet device

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Abstract

Objectives: Early success treating incompetent perforator veins (IPVs) with radiofrequency ablation (RFA) and the trend to move varicose vein surgery into a walk-in walk-out service led to the design of a specific device enabling RFA of IPVs using local anaesthesia (ClosureRFS™ stylet). Our aim was to assess one-year outcomes of a clinical series of patients undergoing treatment with this device. Truncal reflux, where present, was treated initially, and RFA of IPVs was performed as a secondary procedure.

Method: Duplex ultrasound examinations were performed and the presence of IPVs documented. Results were compared with preoperative scans. IPVs were classified as closed, not closed/reopened or *de novo*.

Results: Of the 75 patients invited for follow-up, 53 attended at a median time of 14 months (range 11–25). Sixty-one limbs were analysed (M:F 1:2.1, median age 62, range 25–81). Of the 124 treated IPVs, 109 were closed (88%). Clinical, aetiological, anatomical and pathological clinical score was improved in 88% limbs. IPV closure was reduced in patients with recurrent varicose veins compared with primary varicose veins (72.3% versus 87%, $P = 0.056$).

Conclusion: This study demonstrates the radiofrequency stylet device to be an effective treatment for IPVs.

Keywords: incompetent perforator vein; radiofrequency ablation; varicose veins; venous insufficiency

Introduction

The importance of incompetent perforator veins (IPVs) in the aetiology of venous insufficiency has been highlighted by Linton¹ and the controversy surrounding their association with reflux in the lower limb with recu

- 1 year closure rate after RF was 88%
- RF stylet is an effective treatment of incompetent perforating veins

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This study was presented at the 10th International Venous Forum at the Royal Society of Medicine and subsequently published in abstract format.¹

Accepted 14 April 2009

Our aim was to assess the one-year outcomes of patients undergoing treatment using this new device. We believe this is the first published study of treatment outcomes.

DOI: 10.1258/phleb.2009.008084. *Phlebology* 2010;25:79–84

Endovenous ablation of incompetent perforating veins is effective treatment for recalcitrant venous ulcers

Peter F. Lawrence, MD, Ali Alktaifi, MD, David Rigberg, MD, Brian DeRubertis, MD, Hugh Gelabert, MD, and Juan Carlos Jimenez, MD, *Los Angeles, Calif*

Objectives: Endovenous closure of incompetent saphenous veins has been reported to facilitate venous ulcer healing; however, there is little information about the effectiveness of perforator ablation (PA) in healing recalcitrant venous ulcers. We report our experience with PA with venous ulcers unresponsive to prolonged compression therapy.

Methods: Patients with nonhealing venous ulcers of >3 months' duration underwent duplex ultrasound to assess their lower extremity venous system for incompetence of superficial, perforating, and deep veins. Patients who had either no saphenous incompetence or persistent ulcers after saphenous ablation underwent PA of incompetent perforating veins >3 mm that demonstrated reflux; initial treatment was performed on the perforator vein adjacent to the ulcer with additional incompetent veins treated if ulcer healing failed.

Results: Seventy-five ulcers with 86 associated incompetent perforating veins were treated with PA in 45 patients with CEAP 6 recalcitrant venous ulcers. Treated incompetent perforator veins were located in the medial ankle (61%), calf (37%), and lateral ankle (2%). Success of PA, assessed by postprocedure duplex ultrasound, was 58%; repeat ablation was performed in 12 patients.

infection, due to in their ulcers for healing perforator

Conclusion: venous ulcers

- 75 recalcitrant ulcers treated with RF ablation
- 90% of ulcers healed when at least 1 perforator was closed
- No ulcer healed without at least 1 perforator being closed

The impact of ablation of incompetent superficial and perforator veins on ulcer healing rates

Michael Harlander-Locke,^a Peter F. Lawrence, MD,^b Ali Alktaifi, MD,^b Juan Carlos Jimenez, MD,^b David Rigberg, MD,^b and Brian DeRubertis, MD,^b *San Diego and Los Angeles, Calif*

Objective: We assessed the impact of endovenous ablation of incompetent superficial (SSV) and perforator (posterior tibial [PTPV]) veins in patients with venous ulcers who failed conventional compression therapy.

Methods: Patients with CEAP 6 ulcers were treated with endovenous ablation. Ulcer size and depth were tracked prospectively. Those ulcers that failed to heal with compression therapy underwent ablation of at least one incompetent vein.

Results: We performed 140 consecutive endovenous ablation procedures. Ulcers had been present for 71 ± 6 months. After a minimum of 6 months of successful ablation, the healing rate for healed ulcers improved significantly ($P > .05$). Ulcer healing rate for healed ulcers, based on GSV = $2.9 \text{ cm}^2/\text{month}$, and PTPV = $2.9 \text{ cm}^2/\text{month}$. After a minimum of 6 months of successful ablation, 76.3% of patients healed in 142 ± 14 days. Two patients with unrelated illnesses, six patients are still actively healing, and four patients with six ulcers (7.1%) recurred; two have recurred.

Conclusion: There is measurable and significant reduction in ulcer size after ablation of incompetent superficial and perforator veins in patients with venous ulcers. (J Vasc Med Biol 2012;55:458-64.)

Table IV. The ulcer healing rates associated with the last incompetent vein ablated

<i>Variable</i>	<i>Preablation healing rate (cm²/mo) ± SEM</i>	<i>Postablation healing rate (cm²/mo) ± SEM</i>	<i>P value</i>
Healed ulcers			
All veins	+ 1.0 ± .1	- 4.4 ± .1	<.05
Axial			
GSV	+ 1.2 ± .2	- 6.4 ± .3	<.05
SSV	+ 1.1 ± .1	- 4.8 ± .1	<.05
Perforators			
PTPV	+ .9 ± .1	- 2.9 ± .1	<.05
Unhealed ulcers			
All veins	+ 1.0 ± .2	- 4.6 ± .1	<.05
GSV	+ 1.1 ± .1	- 6.3 ± .2	<.05
SSV	+ 1.0 ± .1	- 4.8 ± .1	<.05
PTPV	+ .8 ± .1	- 2.8 ± .1	<.05

GSV, Great saphenous vein; PTPV, posterior tibial perforator vein; SSV, small saphenous vein.

Positive rates indicate an increasing ulcer size; while negative rates indicate a decreasing ulcer size. Significance was determined using the Wilcoxon two-sample paired sign rank test.

Perforator Interruption in Simple Varicose Veins (C2)

Kianifard B, Holdstock J, Allen C, Smith C, Price B, Whiteley MS.
Randomized clinical trial of the effect of adding subfascial endoscopic perforator surgery to standard great saphenous vein stripping.
Br J Surg 2007;94:1075-80.

- RCT: 38 limbs with HLS + SEPS, 34 with HLS
- No difference in pain, mobility, varicose vein recurrence and QOL scores At 1 year
- SEPS added no benefit in C2 disease

The Management of Chronic Venous Insufficiency With Ulceration: The Role of Minimally Invasive Perforator Interruption

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Background: The purpose of this study was to analyze the long-term outcomes associated with interruption of incompetent perforator veins (IPV) using minimally invasive techniques as adjunctive therapies in the management of patients with chronic venous insufficiency (CVI).

Methods: This is a retrospective review of a prospectively maintained venous database collected over 6 years (2005–2011). The study cohort included 64 patients with CVI stage C5 or C6 who underwent minimally invasive perforator interruption with subfascial endoscopic perforator surgery (SEPS) or radiofrequency ablation of IPV (RFA-IPV) as part of the management of their CVI. All patients were referred for evaluation after having failed conservative treatment with compression dressings. Relevant patient characteristics and comorbidities were recorded along with symptom resolution, venous ulcer healing, recurrence, and surgical complications. In addition to clinic follow-up examination by a surgical provider, chart notes from other subspecialties were also reviewed. We also conducted telephone assessments in patients who had been lost to clinic follow-up in order to provide complete outcome data.

Results: In this subset ($n = 64$) of patients with CVI who had adjunctive IPV treatment, 41 (64%) underwent SEPS and 23 (36%) patients underwent RFA-IPV along with ablation of the greater saphenous vein for C5 or C6 disease. The mean patient follow-up was 37 months. There were no differences in demographics or risk factors. Twenty-three (88%) SEPS and 12 (100%) RFA-IPV patients with venous ulcers went on to completely heal their venous ulcers after the procedure. The mean time to ulcer healing was 5.2 (SEPS) and 4.4 (RFA-IPV) months (95% CI 3.8–6.6 and 3.2–5.6, respectively). One patient who had previously developed a recurrent ulcer after SEPS underwent RFA-IPV and healed. There were no ulcers in the SEPS group that healed after RFA-IPV. There was 1 deep vein thrombosis in the SEPS group and 1 in the RFA-IPV group. There were no other complications.

Conclusion: Minimally invasive perforator interruption with SEPS or RFA-IPV as adjunctive therapy may improve ulcer healing and reduce recurrence in patients with C5 or C6 disease. There may be a role for minimally invasive perforator interruption in the management of ulceration in patients with C5 or C6 disease. Further studies are needed to support and validate these findings. This study was supported by a grant from the National Institutes of Health when the authors were at the University of Texas at Dallas.

- 64 ulcers
- 100% healed after RF, 88% after SEPS
- Recurrence was 17% after SEPS, 25 % after RF
- Supports perforator + GSV ablation in C6 disease

SEPS vs. Other Methods?

	SEPS	Duplex Guided			
		Phlebectomy	RF	Laser	Sclero therapy
Proven efficacy	++	+	++	+	+
Long term data	++++	+	++	+	+
Invasive procedure	++++	+++	++	++	+
Treats all IPV's	++	+++	+++	+++	++++
Return to work	++	+++	++++	++++	++++
Repeatable	+	++	+++	+++	++++

Guidelines of the SVS/AVF on Treatment of Perforating Veins

N of Guideline	Guideline	Grade of recommendation 1 = strong 2 =weak	Grade of Evidence A: High quality B: Moderate quality C: Low or very low Quality
13.1	We recommend against selective treatment of incompetent perforating veins in patients with simple varicose veins (CEAP class C2).	1	B

Do Perforator Veins Always Need to be Treated or Should Treatment be Limited to C5 or C6 Venous Disease and How?

Treat incompetent perforating veins selectively

- in patients with large perforators (≥ 3.5 mm)
- in C5-C6 disease
- when they are located underneath of healed or active ulcers
- Use percutaneous techniques preferentially
- SEPS is reserved for rare and refractory cases with severe skin changes

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