

TRANS-ATLANTIC DEBATE

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Debate: Whether venous perforator surgery reduces recurrences

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Superficial venous surgery and perforator vein surgery, specifically, have a long and varied history in the evolution of vascular surgery, especially because venous disease continues to be extremely common. As with other areas of our specialty, perforator vein procedures have progressed from being purely open operations to becoming less invasive procedures. Despite this, there remains much discussion (as well as overt disagreement) about whether perforator vein surgery is actually appropriate and beneficial in the first place. Surgeons have no level I evidence from randomized controlled studies to determine whether perforator vein surgery does or does not reduce the chances of recurrence of superficial venous varicosities, so we must rely on the evidence as it currently is. Perhaps not surprisingly, our two experts have assembled divergent opinions on the role of perforator venous surgery in contemporary practice. (*J Vasc Surg* 2014;60:796-803.)

PART I: VENOUS PERFORATOR SURGERY IS PROVEN AND DOES REDUCE RECURRENCES

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There are few areas of superficial venous surgery in which opinions are as polarized as that regarding the role of perforator veins and incompetent perforator veins (IPVs) in the treatment of varicose veins. On one side, perforating veins are regarded as “normal,” allowing blood refluxing in incompetent superficial venous trunks to re-enter the system, and thus, they should be left alone,¹ regardless of their size or apparent reflux on certain tests. On the other side, IPVs are seen as different from competent perforating veins, allowing significant venous outflow from the deep system into the superficial venous system and causing morphic changes to the local superficial veins (varicosities or telangiectasia) or tissue (edema or fascia cutaneous changes).²

The large number of publications on the subject do not currently provide a definitive answer—hence this debate!

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However, as practicing clinicians, we are not able to postpone the management of patients presenting with varicose veins or other sequelae of superficial venous reflux disease until the case has been proven beyond doubt.

As such, practicing clinicians need to approach this subject in a pragmatic fashion. We need to treat our patients in accordance with our own observations and experience and be guided by what evidence is currently available. The absence of a definitive randomized controlled trial (RCT) does not mean that the science is unproven—merely that the level of evidence is lower than some might like. A great many procedures are performed daily in our hospitals that have the same or even lower levels of evidence to support them. Merely listing the current publications and available research into IPVs and varicose veins is not sufficient to answer this question satisfactorily because we may end up denying our patients the excellent results that have been reported when perforator veins are treated in conjunction with the treatment of truncal venous reflux.³

Before launching into the debate proper, we must acknowledge the difficulty in producing a standard definition of what is a significant IPV.

DIAGNOSIS OF AN IPV

Although most clinicians would accept that a perforating vein is a venous communication between the superficial and deep veins in the leg, “perforating” through the deep investing fascia and, hence, the underlying muscle, the question about what constitutes incompetence and what level of reflux in IPVs is significant, is not exact.

For those who believe that bidirectional flow in perforators is abnormal, many use the diameter of the perforator as a marker of incompetence. However, although >3.9 mm in the subfascial portion indicates reflux, one-

third of IPVs have diameters of <3.9 mm, meaning that we cannot use size alone to diagnose an IPV.⁴ Agreements of pathologic reflux times also vary, with times for reflux in IPVs of >350 ms being proposed rather than the more commonly used >500 ms.⁵

THE ASSOCIATION BETWEEN IPVs AND VARICOSE VEINS + PRIMARY AND RECURRENT VARICOSE VEINS

Although the definition of what constitutes an IPV is not exact, many IPVs are clearly refluxing, and so many associations have been identified between clearly refluxing IPVs and varicose veins. There is a clear association between the presence of IPV and some varicose veins,^{6,7} with increasing numbers and sizes of IPVs in progressively worsening varicose veins⁶ and increased numbers of IPVs found in legs with recurrent varicose veins.⁷ These and other studies show the association between varicose veins and IPVs both above-knee and below-knee. To date, there has not been a clear attempt to separate the above-knee and below-knee IPVs into distinct pathophysiologic entities, and so arguments must not be confused by separating them at this time.

None of these studies have been able to show a causative relationship between IPVs and varicose veins, because when the IPVs reflux blood from the deep system, there is almost always a corruption of valves in a local superficial venous trunk. Hence, when reflux is found in an IPV and also in an associated section of truncal vein, there is no clear way of telling which was cause and which was effect.⁶

However, these studies, coupled with clinical observations of the occasional patients who present with varicose veins arising only from IPVs and improve when these have been treated successfully, have led many clinicians, such as myself, to treat IPV when they are identified. So to return to the question posed, is this venous perforator surgery unproven?

IS VENOUS PERFORATOR VEIN SURGERY UNPROVEN?

If we accept that it is the venous reflux in the IPV that signifies venous pathology and distinguishes an IPV from a normal perforating vein, then the success of perforator vein surgery can be measured by the successful closure or prevention of reflux in these veins. To use more global definitions of success, such as patient-reported outcomes, which has become fashionable in venous surgery, hides the effects of treating or failing to treat an IPV by including confounding variables, such as the treatment of truncal reflux or phlebectomy, which may or may not be associated with the IPV in question.

Studies in the past have suggested that treating truncal reflux in the great saphenous vein (GSV) will allow an IPV to shrink and become competent again.^{8,9} Our own study, however, showed this was not the case when the IPVs were followed up over a long enough period, suggesting the previous observations had mistaken acute changes for permanent restoration of function.¹⁰ Such acute changes might

be explained by temporary occlusion of the IPV by postoperative thrombophlebitis.

Hence, to permanently stop venous reflux in IPVs in patients with varicose veins, the IPV itself needs to be treated. Before 1985, the only way to do this was ligation by open surgery, as in the Linton operation¹¹ or the Dodd and Cockett procedure,¹² or by blind disruption such as that proposed by Edwards.¹³ In 1985, however, Hauer¹⁴ invented subfascial endoscopic perforating vein surgery (SEPS), allowing an endoscope to be placed in the subfascial space and the IPV to be visualized and clipped, with or without subsequent division.¹⁵ Studies on the efficacy of SEPS to stop reflux in IPVs have shown a midterm technical success rate of 78%.¹⁶

With the advent of catheter-based endovenous procedures, we invented the transluminal occlusion of perforator (TRLOP) technique in 2001, presented it in 2002,¹⁷ and published it in 2004.¹⁸ TRLOP describes the method of percutaneous cannulation of an IPV under ultrasound guidance through a single needle hole, so that any treatment catheter can be passed into it for thermal or nonthermal ablation. The success of TRLOP at 1 and 5 years was the same or better than that reported for SEPS^{19,20} and encouraged other authors to “reinvent” and to attempt to rename the TRLOP technique. Since the original descriptions of TRLOP in 2002 and 2004, terms, such as percutaneous ablation of perforators,²¹ ultrasound-guided percutaneous ablation,²² and other descriptive terms or device names have appeared,²³ although none have added anything to the original description of the TRLOP technique as presented in 2002 and 2004.

Nevertheless, whatever a clinician might erroneously call his or her version of the TRLOP technique, the ability to close the IPV to prevent venous reflux in >80% in the long-term has now been proved. As such, we can clearly conclude that to state that “perforator vein surgery is unproven” is clearly wrong. Now we can turn our attention to the second part of the question—that of reduction of recurrences.

PERFORATOR VEIN SURGERY ... DOES NOT REDUCE RECURRENCES?

That perforator vein surgery reduces the recurrence of venous leg ulcers is well proven by individual studies²⁴⁻²⁶ and also by a meta-analysis of the available literature.²⁷ Indeed, O'Donnell himself has been involved in such work, “These findings emphasize the importance of ligating all incompetent perforating veins, as *ulcer* healing was never achieved when residual perforating veins were found at follow-up.”²⁸ Although some might try to argue that it is deep vein reflux in such patients rather than the IPVs that is important, O'Donnell et al²⁹ were able to reassure us that “deep system reflux as measured with duplex scan valve closure times did not correlate with the rate of *ulcer* healing or recurrence,” whereas the treatment of IPVs was of clear benefit. Hence, the treatment of IPVs in venous ulceration is proved to reduce ulcer recurrence.

However, when the same venous reflux is found in the same IPV but in a leg with varicose veins rather than leg

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