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# Correcting Venous Insufficiency Improves Healing of Venous Ulcers

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## Introduction

It might seem self-evident that correction of the primary pathology underlying a venous ulcer would improve ulcer healing. A large body of modern clinical experience in venous disease would seem to support this notion. However, the thesis is yet to be *proven* in a controlled setting to satisfy scientific skeptics. Thus, convincing high-quality (level 1) evidence is sparse, but the concept is nonetheless supported by significant evidence from other sources. Conceptual and methodological impediments that have frustrated design of a properly controlled trial are described first.

## What Causes Venous Ulceration?

Although macrovascular mechanisms, such as venous obstruction or reflux, are often associated with ulceration, it is clear that the terminal pathway involves platelet aggregation, white cell activation, and cytokine release that induces an inflammatory response at the microcirculatory level. The current view is that this response eventually leads to a perfusion defect, resulting in ulcer formation. However, a positive cause-and-effect association between macrovascular pathology and microcirculatory damage has not been established and there is no proof that correction of the former leads to resolution of the latter. One could speculate that, at least in some cases, advanced microvascular and skin damage is irreversible, leading to recalcitrant ulcers. What type of venous insufficiency (obstruction, reflux or both) causes ulcers has become even more clouded than before, but we need not address this question here as venous pathology is broadly defined in this article.

## The Role of Compression Stockings

Compression, at least in the short term, has a well-documented role in ulcer healing. Many patients with chronic venous disease wear them, but

consistent use is difficult to monitor. Mechanical monitors are available but seldom used. Many clinicians routinely prescribe new hosiery at the time of corrective surgery and encourage their use in the postoperative period. Critics have correctly pointed out that specificity is lost in such a setting: healing of venous ulcers may be unrelated to correction of the underlying venous pathology and may simply be due to enhanced compression and other measures that normally accompany surgical intervention on the limb. Although implausible, this is a fundamental weakness in existing data supporting the efficacy of various corrective procedures in chronic venous insufficiency.

## **The Problem of Follow-Up Duration**

Many venous ulcers spontaneously heal, at least initially, with cycles of healing and recurrence. Intervals of remission may sometimes last months or even years before ulcers become chronic. This poses a logistical problem in devising a controlled study. A follow-up duration extending to 5 years, preferably longer, is optimal. However, confounding issues, such as variable use of compression, interval deep vein thrombosis, and progression of venous disease are common over such long intervals and must be accounted for. Ironically, although there are more long-term surgical studies than compression trials, the burden of proof rests with surgeons rather than the compressionists.

## **The Effect of Surgery and Compression on Healing and Recurrence Study**

The effect of surgery and compression on healing and recurrence (ESCHAR) trial<sup>1</sup> randomized 500 limbs to high ligation and stripping of the saphenous veins (saphenectomy) plus compression versus compression alone. Initial ulcer healing was similar in the 2 groups (93% and 89%, respectively) but ulcer recurrence at 4 years (24% vs 52%) was significantly better in the saphenectomy group. The authors concluded that correction of saphenous reflux might be necessary for durable ulcer healing. This trial supports the role of correcting specific venous pathology in maintaining remission after ulcer healing, if not a direct role in ulcer healing. Although this has been interpreted as a negative finding with respect to ulcer healing, the lack of positive results is likely due to flawed trial design, which did not include a group undergoing saphenectomy alone. This design exclusion is a commentary on existing treatment biases, where doubts about the value of surgery in ulcer healing are widespread.

Recent work<sup>2</sup> suggests that compression stockings mechanically compress the saphenous and deep veins (with higher pressures), thereby

abolishing reflux. This can be considered a form of medical saphenectomy, which may explain the efficacy of compression stockings. It is therefore not surprising that the ESCHAR trial found saphenectomy plus compression to be no more effective than compression alone in the initial ulcer healing. One suspects that saphenectomy alone would have achieved the same result. A survey of the literature reveals numerous case series, but no level 1 evidence, supporting this point. The advent of minimally invasive saphenous ablation techniques increases the urgent need for a definitive study. Patients can be spared months of compression bandaging, which is itself a quality-of-life issue for many patients.<sup>3</sup>

## **Other Techniques for Correction of Venous Insufficiency**

A variety of techniques to correct venous insufficiency have been reported to be successful in healing venous ulcers. Most patients included in these studies have failed prior compression therapy. However postoperative compression had been variably used. Long-term compression use was monitored in some reports, but not controlled. Although these deficiencies weaken the quality of evidence, the sheer number of patients included in these studies and the length of follow-up support a strong relationship between surgical correction of venous insufficiency and ulcer healing. Furthermore, the medical alternative is not attractive to many patients and a substantial number become noncompliant with stockings even under medical supervision.<sup>4,5</sup>

A meta-analysis<sup>6</sup> including 1140 limbs (20 studies) undergoing subfascial endoscopic perforator surgery, often combined with saphenous ablation, demonstrated ulcer healing in 88% of limbs with a recurrence rate of 13% at 21 months. The subfascial endoscopic perforator surgery registry reported >80% long-term (5 years) ulcer healing in primary chronic venous disease, although rates were <44% in postthrombotic limbs, many of which had uncorrected deep reflux or obstruction.<sup>7</sup>

Favorable results have also been reported for deep venous valve reconstruction. Among 582 deep venous valve reconstructions<sup>8</sup> in 347 limbs, 93% of the ulcers healed within 90 days. Cumulative ulcer healing rates at 5-10 years have ranged from 53% to 73% in other series.<sup>9-13</sup> Most patients in these series had failed prior compression therapy and valve reconstruction was a salvage measure. A decline in stocking use after valve reconstruction was noted in some studies, but was rarely rigidly controlled, rendering the evidence highly suggestive but not definitive.

Finally, correction of any underlying iliac venous obstruction also has a role in ulcer healing. Among 982 limbs undergoing iliac vein stenting,

cumulative ulcer healing was 58% at 5 years.<sup>14,15</sup> The authors noted that new compression stockings were not issued at the time of the outpatient procedure; patients were allowed to maintain their preoperative regimen if they so wished but were encouraged to abandon them after the initial postoperative period. More than half of their patients were noncompliant with compression and it was ineffective in others who remained compliant.<sup>3</sup>

## Conclusions

Available evidence strongly suggests that correction of venous insufficiency, either valvular incompetence (reflux) or obstruction, results in rapid and sustained healing of venous ulcers. Unfortunately, this approach is largely supported by case series reporting very favorable results in large numbers of patients followed for long intervals. Definitive, high-quality evidence from randomized clinical trials is lacking but desperately needed.

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