New Concepts in the Management of Venous Varicosities and Stasis Ulceration

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THE RECENT INTRODUCTION of new devices and techniques to study the venous system of the lower limb is providing new insights into the pathophysiology of varicosities and stasis ulceration.

Conventional Theory and Practice

Trendelenberg's theory of saphenofemoral valve incompetence is widely accepted as a major mechanism of varicose formation. Linton, Cockett, and others[1] have strongly challenged this view, placing primary emphasis on perforator incompetence instead as the primary mechanism. Saphenofemoral valve incompetence when present is viewed by the latter authors as a secondary phenomenon caused by the dilatation of the saphenous vein from perforator incompetence. However, most surgeons in this country and elsewhere tend to practice saphenous vein stripping as the preferred surgical procedure for "primary" varicosities. The Linton procedure for ligating "blowouts" below the knee is usually reserved for stripping failures and recurrences. Before resorting to surgery for varicosities, a venogram is usually performed to rule out deep vein thrombosis and "secondary" varicosities. Neither Trendelenberg nor Linton attempted to explain the failure of a venous valve at an isolated anatomical location.

The etiology of venous stasis ulceration is not clearly understood, as evidenced by the variety of surgical approaches in current use for this commonly prevalent condition. Saphenous vein stripping, perforator ligation or sclerotherapy, and skin grafting are among the numerous techniques currently in vogue. Most commonly, however, a conservative approach is taken with elevation, stockings, or application of Unna Boot. There is a substantial recurrence and failure rate with all of these methods.

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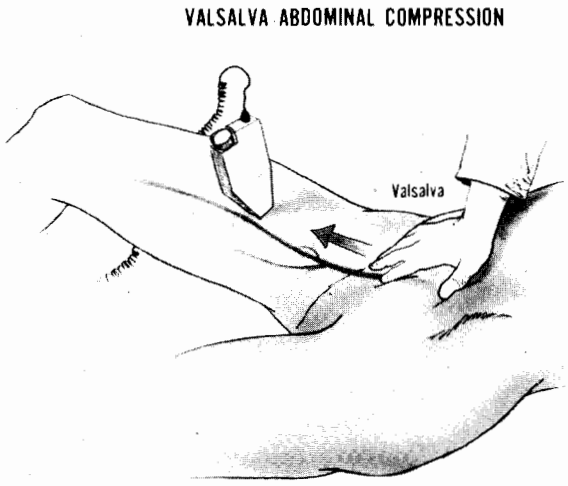

Figure 1. A Doppler probe can detect retrograde venous reflux. Figure shows Valsalva maneuver with manual abdominal compression being used to elicit retrograde flow.

New Techniques

The venous system of the lower limb can now be studied in detail with a variety of noninvasive and invasive techniques (see Figures 1 and 2):

A. Impedance Phlebography[2] detects obstruction of the venous system based on electrical impedance of calf volume.

B. Venous Doppler[3] examination (Figure 1): With a hand held Doppler probe, a variety of information from reflux to obstruction can be elicited. Variations from normal respiratory waves present in the venous system and the response to proximal and distal manual compression, to detect reflux or obstruction can be monitored (Figure 1).

C. Photoplethysmography[4] (Figure 2): Cutaneous venous congestion of the lower leg is measured by

this photosensitive probe. When a tourniquet is used, this test is often utilized to differentiate perforator incompetence from saphenofemoral incompetence.

D. Ambulatory and Resting Venous Pressure Measurement[4]: With a needle in a dorsal foot vein, this technique can often yield valuable information about the venous pressure relationships existing in the superficial and deep venous systems of the lower limb. Specifically, it is often possible to differentiate venous obstruction from reflux and superficial from deep venous insufficiency.

E. Ascending and Descending Contrast and Nucleotide Venography (see Figure 3): The basis of venous reflux can be examined and quantitated by descending venography. Intact leaky valves as well as destroyed valve apparatuses can be visualized and localized.

TABLE 1

Type of Venous Insufficiency in 136 Limbs Tested

Superficial venous insufficiency alone	0%*
Combined superficial and deep venous insufficiency	27%
Isolated deep venous insufficiency	73%

* One patient had isolated saphenofemoral incompetence by Doppler.

New Insights

Utilizing the newer techniques, 136 limbs in patients with stasis ulceration or suspected venous insufficiency were studied in detail (see Table 1). Even though 14% of these patients had varicosities, it was remarkable that pure "primary" varicosities were not detected even in a single patient (with one arguable exception, as noted). In every instance, when superficial varicosity was present, deep venous incompetence could be detected by one or more of the techniques employed. Even more sur-

Figure 2. A photoplethysmograph device (PPG) can detect cutaneous congestion from venous insufficiency. Tourniquet application differentiates superficial from deep venous reflux.

Figure 3. Descending venography demonstrates reflux through grossly incompetent valves in the femoral region.

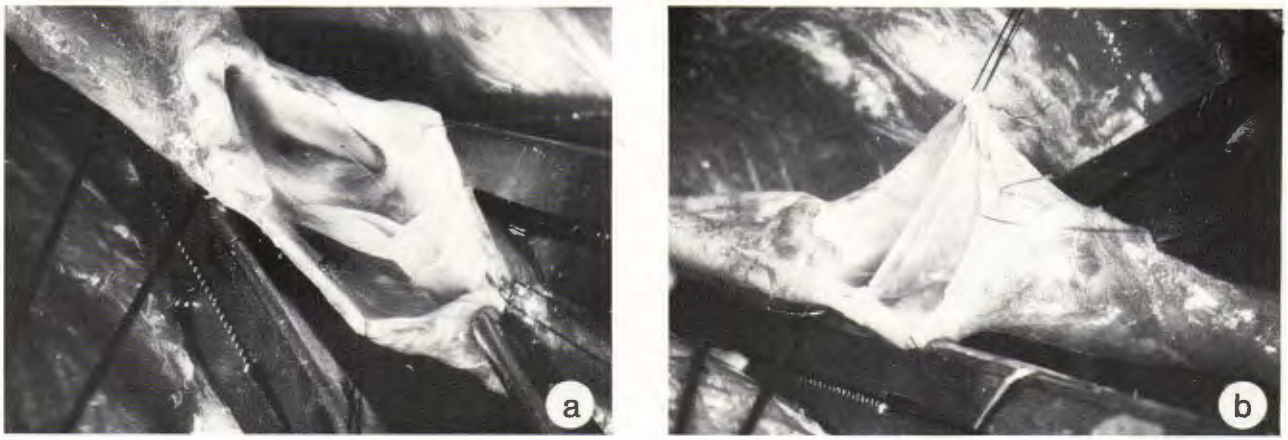

Figure 4. (a) Redundant venous valve of superficial femoral vein just below profunda orifice; (b) tightened valve cusp following valvuloplasty. Patient's head is to the left. The profunda orifice is well visualized in 4a but somewhat hidden by the repaired valve cusps in 4b.

Figure 5. Healing of stasis ulceration following valvuloplasty.

prisingly, the incidence of isolated deep venous insufficiency or reflux was very high in this group of patients. Such a high prevalence has not been suspected heretofore. These findings appeared to indicate that unsuspected deep venous insufficiency was the major pathological mechanism that initiated perforator incompetence as well as saphenous varicosities.[5] Furthermore, several characteristics of this deep venous system reflux appear to cast doubt upon the conventional view that deep venous insufficiency is invariably due to phlebothrombosis of the deep venous system. It appears that venous valve incompetence is a generalized phenomenon[5] present in diverse locations of the body, including the upper limb. A congenital defect in valve tissue is suspected.

Direct Valve Surgery

Based on this evolving concept, 59 patients to date have undergone direct venous valve surgery. Most commonly, a valvuloplasty of the first valve in the superficial femoral vein (see Figure 4) has been employed. Less commonly, a valve-bearing segment from the axillary vein ensheathed in a Dacron sleeve has been transposed to the femoral vein.

With a follow-up ranging from three months to three and one-half years, results of reconstructive valve surgery have been considered excellent in 79% of 38 operated limbs.[5] Results have been impressive among patients with chronic venous pain as well as stasis ulceration (see Figure 5). Some recalcitrant ulcers of long duration resistant to conventional

forms of therapy have healed. Relief of chronic swelling appears to be less certain with this surgical approach, however. The durability of the results obtained with direct valve surgery is currently under careful evaluation in our institution.

Summary

Recently introduced devices and techniques to study venous insufficiency of the lower limb are changing traditional concepts and views in this area. Based on new insights, direct venous valve surgery was performed in 59 patients. Initial results of this direct approach to venous insufficiency appear promising. In some patients, long-standing ulcers recalcitrant to other forms of therapy have healed for the first time with this surgical approach. The durability of relief from venous insufficiency obtained with direct valve surgery is currently under evaluation.

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