

Venous Issues Relative to CLI

Do arterial and venous disease overlap in patients with tissue loss?

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Chronic venous disease (CVD) and peripheral arterial disease are both prevalent circulatory disorders of the lower limbs. Both conditions are seen more often in the elderly, are progressive, and can lead to tissue loss. Currently, more than 500,000 patients in the US are documented to have venous stasis ulceration, and another 2 million suffer from critical limb ischemia (CLI). Humphreys et al¹ estimated that 15% to 30% of patients with venous leg ulcers had concomitant arterial disease. It is not known how many patients with ulcers secondary to CLI have concomitant venous disease. However, in our experience, there is little overlap between these two patient populations.

CONCOMITANT CVD AND CLI

There are very few published studies of concomitant CVD and CLI, which is also known as *combined arterial and venous insufficiency* (CAVI). Two decades ago, Nelzen et al² examined 382 patients to determine the etiology of their leg ulcers. Ulcers were present at the ankle in 75% of limbs and were isolated to the feet in 24%. Bidirectional continuous-wave Doppler was used for objective assessment of arterial and venous circulation. An ankle-brachial index (ABI) of < 0.9 was the threshold for ischemia. Deep venous insufficiency was considered to be present when there were insufficient valves in the popliteal vein. Superficial venous insufficiency was considered to be present when there was reflux in the great

TABLE 1. SUMMARY OF ULCER TYPES AND DISTRIBUTION^a

Ulcer Type	All Ulcers (%)	Ulcers Above the Feet (%)	Isolated Foot Ulcers (%)
Venous	184 (40)	182 (52)	2 (2)
Mixed venous and arterial (venous dominant)	66 (14)	65 (18)	1 (1)
Mixed arterial and venous (arterial dominant)			
Ischemic ulcers	4 (1)	3 (1)	1 (1)
Possible arterial influence	16 (3)	12 (3)	4 (4)
Arterial			
Ischemic ulcers	15 (3)	7 (2)	8 (7)
Possible arterial influence	19 (4)	6 (2)	13 (12)
Arterial and diabetes			
Ischemic ulcers	11 (2)	2 (1)	9 (8)
Possible arterial influence	32 (7)	3 (1)	29 (26)

^aAdapted from Nelzen et al. *J Vasc Surg.* 1991;14:557–564.2



Figure 1. Medial malleolar venous stasis ulcer secondary to great saphenous vein (GSV) incompetence.

and/or the small saphenous veins, either at their origins or distal parts, and/or in calf perforating veins.

The investigators concluded that CVD was the dominating causative factor in 54% of the ulcerations and CLI was in 12% of the ulcerations. The details of the location and etiology of the ulcers are depicted in Table 1. In general, the findings were consistent with surgical dogma—clinically, ulcers above the ankle are of venous disease origin, and ulcers confined to the feet result from arterial pathology, diabetes, or both. However, with continuous-wave Doppler as the only tool to quantify which pathology was dominant in this study, the “mixed” cases may be inaccurate.

MIXED ETIOLOGY ULCERS

Treiman et al³ retrospectively studied 59 nonhealing ulcers that had been present for a mean of 6.4 months (range, 1–39 months). The subjects were identified by reviewing the records of individuals undergoing arterial reconstruction for ulceration or nonhealing wounds, and those patients who had clinical signs of venous insufficiency, as confirmed with noninvasive studies, were selected. Patients were treated with leg elevation, topical wound care, and compression and then underwent intervention to improve either venous or arterial circulation. The ulcers were of mixed etiology and were not well defined.

Twenty-five ulcers were on the medial calf, 13 were on the foot, 12 were on the lateral calf, and nine were over the tibia. On duplex scan, 36 patients (61%) had GSV reflux, 21 (36%) had deep venous reflux, 15 (25%) had GSV thrombosis, 13 (22%) had chronic deep vein thrombosis, and 26 (44%) had two or more of these findings. The mean ABI was 0.55 (range, 0–0.86). Arterial reconstruction was usually performed first, followed by stripping of the GSV in patients with superficial venous reflux.

The investigators reported 58% ulcer healing and noted that no ulcers healed in ischemic limbs without arterial intervention. Patients with chronic deep vein thrombosis were also unlikely to heal.

Mosti et al⁴ studied 25 patients with mixed etiology leg ulcers and treated them conservatively. The investigators sought to define a range of compression pressures that improve venous flow while not inhibiting arterial hemodynamics. The study concluded that in patients with mixed ulceration, an ankle-brachial pressure index > 0.5, and an absolute ankle pressure of > 60 mm Hg, inelastic compression of up to 40 mm Hg does not impede arterial perfusion but may lead to normalization of the highly reduced venous pumping function. Bandages are therefore recommended in combination with walking exercises as the basic conservative management for patients with mixed leg ulcers.

SAPHENOUS VEIN ABLATION

We retrospectively reviewed charts from our 100% endovascular venous surgical practice and found 34 patients who required great or small saphenous vein ablation to heal CEAP class 6 venous disease (ulcer) in the last 5 years. All ulcers were located on either the medial or lateral malleolus (ie, not of mixed etiology). Only two patients underwent lower extremity arterial duplex studies before venous ablation (because of prior history of coronary artery disease), and these studies showed no evidence of arterial occlusive disease. We rarely perform arterial duplex studies on our patients with venous disease, but interestingly, of the 231 patients with CEAP class 2 to 5 venous disease who received lower extremity arterial duplex studies during the last 5 years (because of advanced age and more than two atherosclerotic risk factors), not one was found to have lower extremity arterial disease (ABI < 0.9).

In our highly selected population, we found a major discrepancy from reported rates of CAVI in the literature—we found no overlap between CVD and CLI patients. Patients with medial or lateral malleolar ulcerations typically do not undergo arterial duplex studies unless they exhibit diminished pedal pulses. This is rare, even with the presence of edema. Our approach to recalcitrant or recurrent ulceration in the ankle is to search for iliac vein outflow obstruction with intravascular ultrasound after the superficial and perforating venous systems have been addressed.

Unlike the widely referenced ESCHAR study,⁵ which compared surgery and compression with compression alone in chronic venous ulceration, we noticed that in properly selected patients, saphenous ablation did increase

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ulcer healing rates. ESCHAR demonstrated that 24-week healing rates were similar in the compression and surgery group and the compression only group (65% vs 65%; hazard ratio, 0.84; 95% confidence interval, 0.77–1.24; $P = .85$), but 12-month ulcer recurrence rates were significantly reduced in the compression and surgery group (12% vs 28%; hazard ratio, -2.76; 95% confidence interval, -1.78 to -4.27; $P < .0001$). The ESCHAR study failed to examine results obtained from saphenectomy alone; a study design flaw in our opinion because compression alone with non-stretch bandages functions as a “medical saphenectomy.” The ESCHAR study was also weakened by 40 patients whom were lost to follow-up and were censored.

CONCLUSION

Ulceration caused by CAVI may be underestimated; however, clinically, our experience has been consistent with conventional wisdom. Medial and lateral malleolar ulcers (Figure 1) result from venous disease (reflux and/or obstruction), and plantar ulcers, gangrenous digits, and rest pain are the result of advanced arterial occlusive disease (CLI). Venous ulcer patients rarely have CLI. Many CLI patients present with CEAP class 1 (cosmetic spider telangiectasia), but most do not present with significant venous pathology. Treatment algorithms in the modern era of percutaneous catheter-based correction of lower extremity circulatory lesions mitigate the major concerns surgeons have historically faced, namely lengthy operations and wound complications. Saphenous vein stripping has largely been replaced with percutaneous thermal ablation and stab phlebectomy, and arterial bypass surgery is rapidly supplanted by percutaneous atherectomy, angioplasty, and stenting. ■

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