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Table. Distribution of diagnoses according to therapy chosen

	CONS treatment, %		Pneumatic compression, %	
	No MLD	MLD	SPCD	APCD
Cancer	40.8	74.7	16.5	44.3
Venous disease	25.4	11.0	42.8	30.0
Other diagnosis	33.9	14.3	40.7	25.8
	100	100	100	100

APCD, Advanced pneumatic compression device; *CONS,* conservative; *MLD,* manual lymphatic drainage; *SPCD,* simple pneumatic compression device.

displays the two most common categories of comorbidities (cancer vs venous diseases) coded in LED patients receiving treatment. The Table represents findings from the study.

Conclusions: Many LED patients receive no disease-specific treatment of LED. In general, CONS treatment, which incorporates MLD, and pneumatic compression therapy, which incorporates APCDs, are considered more aggressive than approaches limited to no MLD or SPCDs. These data demonstrate that cancer patients treated for LED are more likely than venous patients to receive the more aggressive MLD and APCDs. These data raise the question as to whether there are disease-specific differences in severity of symptoms or response to therapy that justify what appears to be a less aggressive treatment approach in venous compared with cancer patients or whether treatment decisions are driven by the patient's or physician's preference, insurance constraints, or other factors.

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Limb Salvage for "Hopeless" Lymphedema: Reviving the Charles Procedure

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Objective: The Charles procedure offers radical excision of lymphedematous tissue followed by skin grafting. This procedure is rarely offered because of the potential for complications, but it may provide excellent outcomes in improving quality of life. We describe our experience with a modified technique and a multidisciplinary team approach in treating patients with advanced lymphedema.

Methods: Seven patients with severe lower extremity lymphedema were treated with radical surgical excision. Patients' demographics, operative details, and postoperative follow-up course were recorded. The operation entailed radical excision of the skin and lymphedematous tissues in a modified Charles procedure. The dissection was taken to the level of the fascia from the dorsal forefoot or ankle and continued to the knee or thigh, with wound vacuum-assisted closure for initial dressings. Split-thickness skin grafting was performed 5 to 7 days postoperatively. All patients were managed with a predefined postoperative care protocol.

Results: Seven patients were referred to the clinic for evaluation of massive lower extremity lymphedema. There were four men and three women, with age range of 36 to 64 years. All patients had history of >2 years of lifestyle-limiting swelling and recurrent bouts of cellulitis requiring hospitalization and intravenous antibiotic treatment. Six patients had chronic wounds of the affected legs due to skin breakdown, and three had significant disability in ambulation. Comorbid conditions included obesity (in five patients), hypertension (in four patients), chronic obstructive pulmonary disease or asthma (in three patients), depression (in three patients), and diabetes (in one patient). In the three patients with bilateral disease, intervention targeted the more severely affected limb. One patient in our series had disease confined only to the thigh. Postoperative complications included wound infection, requiring débridement or antibiotics, in four patients; readmission for débridement in one patient; and reintubation postoperatively in one patient. Length of stay was an average of 27 days (range, 14-55 days).Patients were observed for an average of 15 months (range, 3 month-3 years). All patients reported an improvement in quality of life postoperatively and had complete wound healing by final follow-up, without recurrence.

Conclusions: Although it is an underused procedure, the Charles procedure presents a viable means of limb salvage for severe lymphedema. We present a multidisciplinary approach with excellent patient outcomes in a series of six patients.

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Multidisciplinary Approach to Management of Severe Lymphedema with One-Stage Radical Excision and Split-Thickness Skin Grafting

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Objective: Patients with severe lymphedema often experience recurrent cellulitis, ulcerative lesions, and deleterious effects on quality of life. Cumulative damage to extremities may result in limb deformity, creating functional limitations with emotional and psychosocial distress. Physiologic or reductive surgical treatments are reserved for failure of conservative management. The reductive approach aims to remove lymphedematous tissue acquired from prolonged lymphatic stasis. One such reductive approach is the Charles procedure, direct excision followed by skin graft application to the defect. We present two cases of severe lymphedema treated with one-stage direct excision by the modified Charles procedure.

Fig 1. Preoperative image.

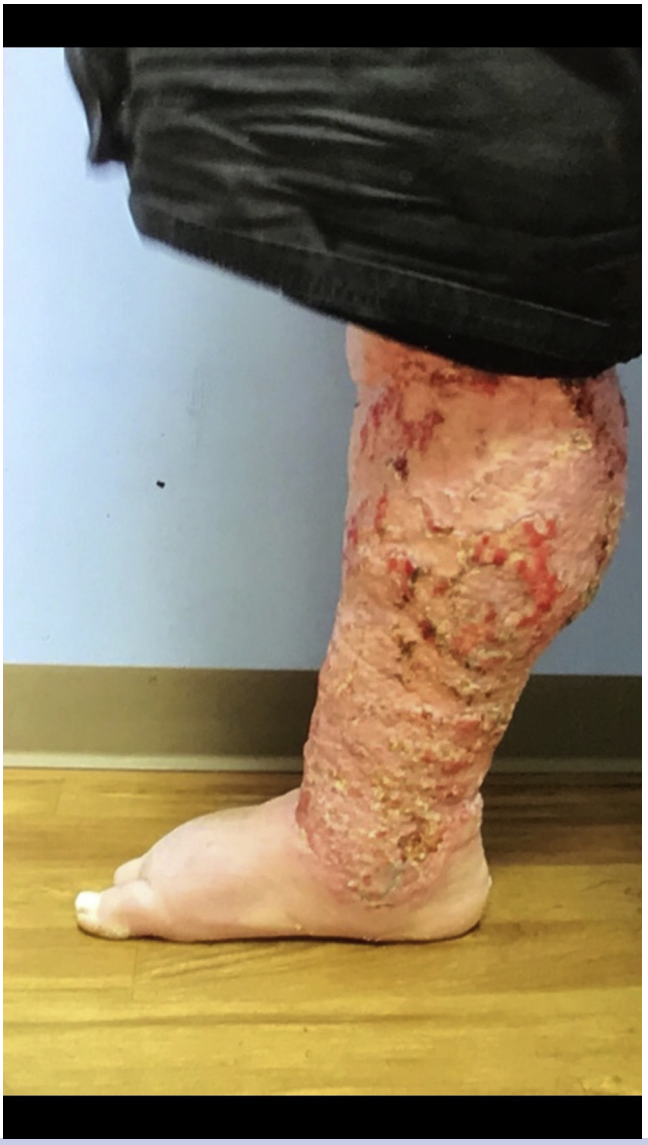

Fig 2. Image 6 weeks after Charles procedure.

Methods: Two patients (mean age, 42.5 years) were selected to undergo surgical reduction of severe lower extremity lymphedema. A skin incision was made exposing subcutaneous tissues. A Harmonic scalpel (Ethicon, Somerville, NJ), was used to cut and to coagulate tissues down to the level of the fascia while maintaining hemostasis. The dissection was then carried circumferentially around the extremity to resect all skin and lymphedematous tissue. The specimen was removed and weighed. Split-thickness skin grafts were constructed using the resected specimen and applied to the operative defect. Finally, a negative pressure vacuum system was applied to facilitate wound healing. The patients were observed in the hospital until medically appropriate for discharge and subsequently followed up in the outpatient clinic.

Results: Mean operative time was 8 hours 55 minutes, and blood loss was 2450 mL. Patients were observed for wound healing and quality of life improvement. At 2 months postoperatively, patient 1 had significant wound epithelialization. He found employment and was able to walk >1 mile daily. At 4 months postoperatively, the main complaint was focal wound tenderness. Fig 1 is a preoperative image and Fig 2 is a 4-month postoperative image. He continues to express satisfaction and improved functionality leading to overall improved quality of life. Patient 2 required readmission 1 week postoperatively for inadequate home wound care assistance. The patient has experienced improved mobility thus far. No significant wound complications have been encountered for either patient.

Conclusions: Direct surgical excision with reconstruction is an invasive treatment option with potentially severe complications. Initial results in our patients suggest that the modified Charles procedure is an effective management option for severe lymphedema refractory to conservative therapy. En bloc removal of lymphedematous tissue increases functionality and improves quality of life. Further longitudinal follow-up is needed to assess progression of wound healing and percentage skin graft take. A multidisciplinary approach to minimize operative time and blood loss and to optimize skin grafting results appears to benefit this population of difficult patients.

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Primary Chronic Venous Insufficiency Is Distinguished by Attenuated Circulating Inflammatory Mediators and Healing Networks

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Objective: Inflammation promotes venous leg ulcers (VLUs) in post-thrombotic syndrome. However, it is not clear how inflammation affects VLU in primary venous reflux. Computational modeling has demonstrated differences in cytokine and chemokine networks in other wound healing paradigms. We hypothesize that serum inflammatory mediators are differentially expressed and disorganized in primary chronic venous insufficiency (CVI), which may be a mechanism for future VLU.

Methods: Participants were recruited prospectively with Institutional Review Board approval. Blood was obtained during sclerotherapy or endovenous thermal ablation for primary CVI without ulcer (Clinical, Etiology, Anatomy, and Pathophysiology [CEAP] class C2-C4). Control patients without CVI underwent phlebotomy from great saphenous and antecubital veins. Demographics, Venous Clinical Severity Score, and body mass index (BMI) were collected. Twenty-five mediators previously shown to be important in wound healing were measured in serum with Luminex. Values were compared using Mann-Whitney *U* test. Pearson correlations among mediators (nodes; Fig, ●) that were above a specific threshold prompted connection between nodes (edges; Fig, —). Correlations were mapped as networks (MATLAB; MathWorks, Natick, Mass). "Complexity" was determined from number of connections for each mediator and total number of mediators. A

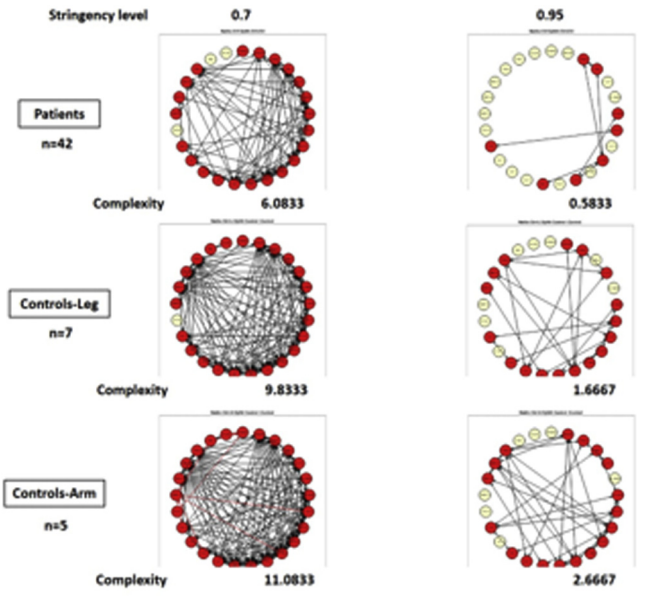

Fig. Inflammatory mediator networks in chronic venous insufficiency (CVI) patients and controls.