

**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.