

# Is it Possible to Perform Lymphaticovenular Anastomosis after Liposuction for Lymphedema?

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## Introduction

Lymphedema is a condition in which the lymphatic transport is impaired due to either primary deficiencies and/or acquired injury to the lymphatic system [1]. The disease initially presents as edema in the affected anatomic region but over time causes skin and soft tissue changes including hyperkeratosis, fat deposition, and subcutaneous fibrosis [2]. Recent advancements in microsurgery and super microsurgery made treatment of the early fluid-predominant phase of the disease possible with vascularized lymph node transfer (VLNT) and lymphaticovenular anastomosis (LVA) [3]. However, the late solid-predominant phase of the disease remains only treatable with direct surgical debulking [2]. Although it has not been formally investigated, many surgeons believe that LVA is no longer feasible following debulking procedure such as liposuction and direct surgical excision, because the subcutaneous lymphatic vessels are assumed to have been destroyed. Is that really the case? We describe a case of unexpected finding of postoperative lymph angiogenesis following sequential direct surgical excision and liposuction, and the subsequent successful performance of LVA using these newly regenerated lymphatic vessels.

## Case Presentation

61-year-old female presented with a 20-year history of acquired lower extremity lymphedema which developed after total hysterectomy and pelvic lymph node dissection for uterine cancer. She was previously treated with decongestive therapy and serial excision at another institution 12 years ago. Since the patient had already developed solid-predominant disease (Figure 1) and no healthy lymphatic vessels were seen on the preoperative mapping indocyanine green (ICG) lymphography (Figure 2A), liposuction was performed for debulking. Postoperatively, patient's condition was tracked both clinically and lymphographically. Six months after the liposuction, her leg volume remained stable, and healthy, previously non-existent, lymphatic vessels were now identified on the ICG lymphography (Figure 2B). LVA was successfully performed based on these vessels. A total of eight anastomoses were constructed (Figure 3). Following the LVA, the patient experienced further symptomatic relief including decreasing pain, numbness, and tightness. She was also able to decrease her compression garment use to only few hours a day. Her result remained stable at six months following the LVA.

## Discussion

The current strategy in lymphedema treatment is to selectively treat patients with fluid-predominant disease with a drainage procedure such as LVA and VLNT, and those with solid-predominant disease with a debulking procedure such as liposuction and the Charles procedure [4]. In practice, however, few patients can be unequivocally categorized into either disease category. Most demonstrate a mixture of both fluid and solid disease components. Mandatory disease categorization and treating the patients with either drainage or debulking procedure results



**Figure 1A:** Campisi stage V lymphedema of left lower extremity.

This patient demonstrated the classic appearance of solid-predominant disease with extensive fat deposit, lymphostatic subcutaneous fibrosis, and hyperkeratotic skin changes. The elephantiac skin changes were especially evident in the left toes and foot. The scar from prior serial excision can be seen on the medial aspect of the leg.

**Figure 1B:** Early result following liposuction.

At 3 weeks following the liposuction, the left lower extremity demonstrated satisfactory debulking. Patient experienced relief of pain, numbness, and tightness. However, she required consistent compression to prevent the limb from becoming edematous.

in inadequate treatment of the other disease component. Indeed, when lymphedema liposuction is offered, one key prerequisite is that patients commitment to lifelong use of pressure garment [2,5] in order to manage the fluid disease component. Hybrid techniques of following liposuction with VLNT [4] and simultaneous Charles procedure and VLNT [6] have been reported, but to our knowledge, successful performance of LVA following liposuction has never been described. Our case demonstrated that:

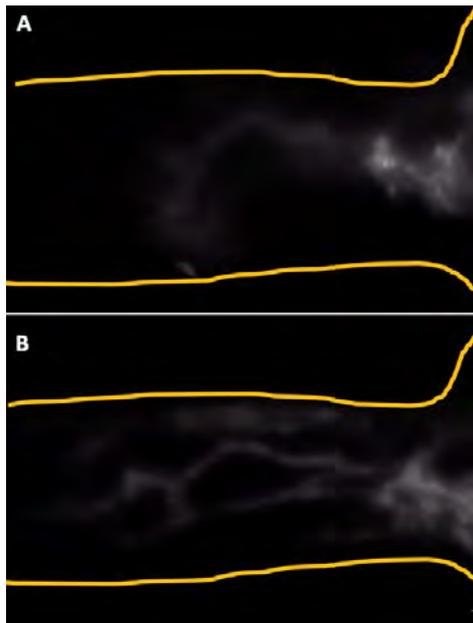
1) LVA is feasible following liposuction 2) when performing sequentially, the therapeutic effects of liposuction and LVA are cumulative, and 3) in addition to not causing further lymphatic injury [2], liposuction may actually promote lymph angiogenesis. Further

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**Figure 2A:** Mapping ICG lymphography of the distal leg prior to liposuction. Fuzzy pathologic lymphographic patterns were seen just above the ankle with a poorly defined lymphatic vessel visualized just to its left.

**Figure 2B:** Mapping ICG lymphography of the distal leg 6 months following the liposuction.

While the pathologic pattern persisted, evidence of lymph angiogenesis was clearly observed.

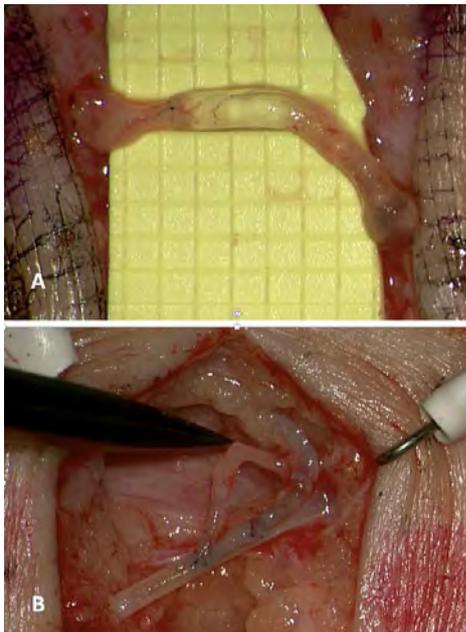
investigation is clearly necessary to elucidate the consistency of lymph angiogenesis following liposuction and the cause-and-effect relationship between the two.

#### Conflict of Interests

Authors have no conflict of interests to declare.

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**Figure 3A:** Healthy 1.2 mm lymphatic vessel anastomosed in end-to-end configuration.

The healthy status of the lymphatic vessel was demonstrated by its transparency, indicating that it was free of smooth muscle fibrosis, and its engorged appearance, suggestive of a favourable lymph-to-vein pressure gradient that drives antegrade flow of the LVA. The finding of such healthy lymphatic vessels was unexpected given the severity of this patient's disease.

**Figure 3B:** Relatively healthy 0.6 and 0.7 mm lymphatic vessels anastomosed to a 1 mm vein in double end-to-side configuration.

The two lymphatic vessels showed signs of mild injury but continued to demonstrate rigorous flow through them. One of the two vessels stained blue due to it picking up the blue dye that was injected intradermal 2 cm distal to the incision. Both were anastomosed to the same vein due to unavailability of a second recipient vein.