

Combined Approach to Surgical Treatment of Lymphedema

David W. Chang, MD

Abstract

Physiologic surgical interventions, including lymphovenous bypass (LVB) and vascularized lymph node transplant (VLNT), are increasingly being used to treat lymphedema. LVB has been shown to be effective in improving the severity of lymphedema, particularly for patients with still-functional superficial lymphatic vessels that can be identified for bypass. However, in many patients, there is a paucity of functional lymphatic vessels for bypass and, thus, they are not ideal candidates for LVB alone. Unlike LVB, VLNT does not depend on the presence of functioning lymphatic vessels, but the effects of VLNT are delayed, as the proposed mechanisms of action require more time for optimal function. The author has offered a combined approach to microsurgical treatment of lymphedema for both the upper and lower extremities. Simultaneous VLNT and LVB are safe and effective for patients with both early and advanced stages of primary and secondary lymphedema. Our experience shows that a majority of patients can expect some long-term improvement, in both overall limb volume and quality of life, after surgical intervention with LVB and/or VLNT.

Keywords: lymphedema, lymphovenous bypass, lymph node transplant

NONSURGICAL MANAGEMENT HAS LONG BEEN the gold standard for lymphedema treatment. However, surgical interventions are becoming increasingly popular in the treatment of lymphedema, especially for those patients who fail or have suboptimal results from nonsurgical management.¹⁻⁴ Surgical options are divided into ablative and physiologic treatments. Ablative surgeries aim to decrease the volume of the affected limb by removing edematous and fibrotic tissue, without correcting underlying damage to the lymphatic channels. Microsurgical physiologic treatments, in contrast, aim to augment damaged lymphatic channels and drainage systems in affected individuals. These surgical interventions include vascularized lymph node transplant (VLNT) and lymphovenous bypass (LVB).⁵⁻¹⁵

Physiologic surgical interventions, including LVB and VLNT, either alone or in combination, are increasingly being used to treat lymphedema. LVB has been shown to be effective in improving the severity of lymphedema, particularly for patients with still-functional superficial lymphatic vessels that can be identified for bypass.⁵⁻⁹ The benefits of LVB can be appreciated by patients almost immediately as excess lymphatic fluid is diverted to the venous system. However, in many patients, there is a paucity of functional lymphatic vessels for bypass and, thus, they are not ideal candidates for LVB alone. Unlike LVB, VLNT does not depend on the presence of functioning lymphatic vessels, but the effects of VLNT are delayed, as the proposed mechanisms of action require more time for optimal function.¹⁰⁻¹⁵

Since 2013, the author has offered a combined approach to microsurgical treatment of lymphedema for both the upper

and lower extremities. The options of LVB and/or VLNT are discussed with all patients preoperatively. The final decision regarding surgical approach is made based on preoperative discussions as well as intraoperative indocyanine green (ICG) findings. LVB alone is often performed in patients who have clinically early-stage lymphedema or who do not want VLNT. VLNT alone may be performed in patients who do not demonstrate functioning lymphatic vessels on intraoperative ICG imaging. For those patients with upper extremity lymphedema (UEL) who desire simultaneous abdominal-based free flap breast reconstruction with VLNT, the LVB procedure is staggered, in an attempt to minimize operative time and the risks associated with this. During the initial surgery, ICG lymphography is performed to evaluate the lymphatic system. Postoperatively, some of these patients may be satisfied with the results from their VLNT and do not feel a need for subsequent LVB. When patients opt for staggered LVB, this is usually performed during a flap revision surgery. The rationale for our combined approach is to give patients the benefits of both LVB and VLNT: LVB allows for immediate improvement whereas VLNT provides more long-term benefits.

Our experience with 274 patients treated with this combined approach for upper or lower extremity secondary lymphedema was recently published.¹⁶ Overall, >87%/60% of UEL/lower extremity lymphedema (LEL) patients had a reduction in volume differential of their affected limb postoperatively. Overall, >86%/75% of UEL/LEL patients had improvement in quality of life Lymphedema Life Impact Scale scores.

Many surgeons have asserted that patients with primary lymphedema are not viable candidates for physiologic procedures. However, our experience supports combined approach with VLNT and LVB as a beneficial treatment option for patients even with primary lymphedema.¹⁷

It is now well known that lymphedema is composed of fluid, fat, and tissue fibrosis. Initially, lymphedema starts with build-up of lymphatic fluid, which subsequently leads to deposition of fat and fibrosis of tissue as the lymphedema progresses. It is the author's observation, and agreed by others, that physiologic procedures such as VLNT and LVB mainly help reduce the fluid component of the lymphedema. Thus, the volume reduction that we are expecting to see from these procedures is limited to reduction of the fluid component of lymphedema, usually in the 30%–40% range at most. The fat deposition and tissue fibrosis that have occurred over time are minimally reversed by these physiologic procedures. However, these procedures, by reducing the excess lymphatic fluid in the tissue, may help stop the vicious cycle of inflammation that causes further progression of the disease. However, not all patients are ideal candidates for microsurgery procedures. We have found that liposuction and debulking procedures are a useful adjunct for patients who have a significant fatty/fibrotic component to their lymphedema.¹⁸

Surgical approaches such as prophylactic lymphatic reconstruction for the prevention of breast cancer-related lymphedema are gaining popularity as a means of improving patients' quality of life. There is an expanding body of literature demonstrating the effectiveness of these surgical procedures in terms of reduction in arm circumference, decreased cellulitis incidence, and overall quality of life as well as emerging evidence of their cost effectiveness.^{19,20}

Conclusions

Simultaneous VLNT and LVB are safe and effective for patients with both early and advanced stages of primary and secondary lymphedema. Our experience shows that a majority of patients can expect some long-term improvement, in both overall limb volume and quality of life, after surgical intervention with LVB and/or VLNT.

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Address correspondence to:

David W. Chang, MD
 Section of Plastic and Reconstructive Surgery
 Department of Surgery
 The University of Chicago Medicine
 and Biological Sciences
 5841 South Maryland Avenue
 Room J641, MC 6035
 Chicago, IL 60637
 USA

E-mail: dchang@surgery.bsd.uchicago.edu