

# Surgery for lymphedema treatment

## Modern procedures have found greater precision in treating lymphedema

By Dr. Jay Granzow

Surgery for lymphedema has become increasingly sophisticated and effective. However, surgical recommendations can vary widely between surgeons and treatment centers. The outcome of lymphedema surgeries also highly depends on the training, experience, and relevant expertise of the surgeon and lymphedema therapist. No single type of surgery is optimal for all presentations. Rather, careful patient selection after a complete course of conservative lymphedema therapy is critical to the success of any lymphedema surgery.

Modern lymphedema surgeries are much more precise and less invasive than previous radical attempts at a surgical cure. Older procedures, such as the Charles Procedure, involved aggressive removal of the skin and deeper tissues down to the level of the muscle fascia, with skin grafts placed over the raw areas. Fortunately, such invasive procedures are now reserved only for a very small

number of extreme cases involving thickened, pendulous and inflamed skin and tissues.

Current lymphedema surgeries have been shown to produce significant and lasting reductions both in the size of the affected arm or leg and also the amount of therapy and compression garment use required for treatment.

Individualized lymphedema therapy integrated into the treatment plan before and after surgery also is essential in achieving excellent results.

Non-surgical management continues to remain the first line standard of care for lymphedema. This is an essential first treatment step for all of our patients, and patients must have been seen and treated

with non-surgical lymphedema therapy before they are considered for any type of lymphedema surgery.

### Patient Selection

Our treatment approach focuses on the appropriate treatment of both the fluid

and solid components of lymphedema swelling. Proper evaluation and patient selection are critical in achieving effective and lasting results.

At first, lymphedema swelling is composed mostly of lymphatic fluid. In this early stage, the swelling is more amenable to conservative non-surgical

treatment. Over time, the lymphatic fluid can bring about permanent deposits of solids in the tissues that are more difficult to treat. Lymphedema swelling also greatly increases the risk of dangerous infections, called cellulitis, which are often much more severe in patients with lymphedema. Lymphedema swelling in the arm or leg can often progress to cause functional impairments that interfere with work and activities of daily living.



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The fluid predominant portion of lymphedema may be treated effectively with physiologic surgeries that involve transplantation of lymphatic tissue, called vascularized lymph node transfer (VLNT), or involve direct connections from the lymphatic system to the veins, called lymphaticovenous anastomoses (LVA). VLNT and LVA are microsurgical surgeries that can improve the patient's own physiologic drainage of the lymphatic fluid, and we have seen the complete elimination for the need of compression garments in some of our patients. These procedures tend to have better results when performed when a patient's lymphatic system has less damage. Therefore, patients with early stage lymphedema tend to have more impressive results with these procedures.

Some studies have shown variable results when VLNT or LVA are used to reduce volume. For example, in a study by Damstra, LVAs performed for patients with solid predominant lymphedema found little additional improvement in reduction of excess volume. We find better results using conservative therapy and compression first to reduce the excess fluid volume, and then using VLNT or LVA to reduce the amount of compression and therapy needed to maintain the volume reduction. Patients with more chronic presentations in which the excess volume is mainly solid will require removal of the solids with suction assisted protein lipectomy (SAPL) first.

The best candidates for lymphedema surgery are patients who have tried and failed a properly planned and administered lymphedema therapy regimen that usually includes manual lymphatic drainage (MLD), fitted compression garment use and bandaging. One or more courses of complete decongestive therapy (CDT) usually have been performed. Good candidates are willing to continue with lymphedema therapy before and after any surgical procedure, although it is often possible to reduce the therapy and compression garment requirements after a successful surgery. Poor candidates for lymphedema surgery are patients that have not or are unwilling to have lymphedema therapy, are looking for a "quick fix" type of procedure, or who are greatly overweight. Obesity and morbid obesity

usually produce poor surgical outcomes not only with lymphedema surgeries but also with surgeries in general. Meaningful weight loss through a coordinated program, which could include appropriate weight loss surgery, should be concluded prior to consideration for a lymphedema procedure.

### Vascularized Lymph Node Transfer (VLNT)

VLNT surgery involves the microsurgical transfer of a small number of lymph nodes and surrounding tissue from another part of the body, called a donor site, to the area affected by lymphedema. Multiple donor sites have been reported and include the

groin, torso, supraclavicular area (near the neck above the collar bone), submental areas (underneath the chin), and even lymphatic tissue around the stomach and bowel.

This surgery has been shown in well-established medical literature for the last 15 years to be effective in reducing the swelling, symptoms and associated problems with lymphedema. The need for ongoing lymphedema therapy and compression garment use can be decreased significantly, and can result in the elimination of the need for routine compression garment use in some patients. The incidence of cellulitis and infection in the affected extremity has also been shown to decrease.

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A lymphedema surgeon must work closely with a lymphedema therapist to insure the best lymphedema therapy course is given both before and after any surgical procedure.

FIGURE 1



Patient with compressible, fluid-predominant right arm lymphedema following treatment for breast cancer with bilateral mastectomy, right lymph node dissection and radiation therapy. A) Arms prior to surgery B) 4½ -year stable result following VLNT performed together with a DIEP flap for breast reconstruction. She requires no daily compression garment or therapy.

Safety and surgical expertise are critical to minimize the rare risk of lymphedema occurring at the donor site. Reverse lymphatic mapping can minimize this risk by mapping the lymph nodes draining the arm or leg closest to the lymph node flap donor site using a radioactive tracer similar to the technique used in lymphoscintigraphy, or specialized blue dye taken up by the peripheral lymphatics. During the dissection of the lymph node-containing flap in reverse mapping, the lymph nodes draining the arm or leg are thus identified and preserved and only a small number of peripheral lymph nodes are harvested.

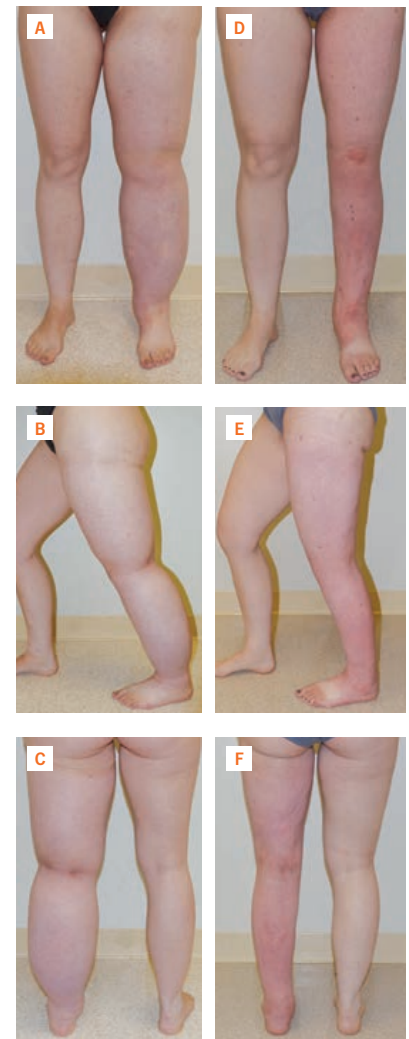
### Lymphaticovenous Anastomosis (LVA)

LVA surgery is the direct connection of lymphatic vessels to nearby veins. These connections are very small, usually much less than 1mm in diameter, and require supermicrosurgical expertise. The procedure was first described in 1969 by Yamada and subsequently by O'Brien in the 1970s. Significant advances in supermicrosurgical technique for LVA were further described by Koshima. Connections usually are made into veins with competent valves to allow the one-way movement of excess lymph back into the venous system. In the peripheral parts of the arm or leg, closer to the hands or feet, single or multiple superficial lymphatics are connected to veins. In the proximal areas, closer to the armpit or groin, the lymphatics are larger and fewer, larger connections typically are performed. The location and types of connections can vary considerably in patients and are dependent on the patient anatomy, surgeon experience, and the progression of the lymphedema disease itself. Since no donor site is required and only a fraction of the lymphatic vessels in the affected arm or leg are connected, LVA surgery tend to be the least invasive and have the lowest overall surgical risk and recovery among any of the lymphedema surgeries. This also makes LVA surgery ideal for use in the prevention of future lymphedema.

### Suction Assisted Protein Lipectomy (SAPL)

The solid-predominant swelling often found in later stages of lymphedema can be treated

FIGURE 2



34-year-old woman with a history of congenital, non-compressible, solid-predominant lymphedema of the left leg for 17 years. A-C) Both legs prior to surgery. D-F) Both legs 4 months following SAPL procedure for left leg.

effectively with a surgery called suction-assisted protein lipectomy (SAPL). SAPL surgeries allow removal of lymphatic solids and fatty deposits that are otherwise poorly treated by conservative lymphedema therapy, VLNT or LVA surgeries.

SAPL surgery has been proven to be an effective and long-term solution for lymphedema in many patients. The procedure is different from standard cosmetic liposuction, which is not suitable to treat lymphedema. SAPL has been described using various names including circumferential suction assisted lipectomy

(CSAL), liposuction in lymphedema and lympho-liposuction. First introduced in 1987, SAPL techniques have been refined over the years and have produced significant objective benefit in clinical trials with long-term follow-up. This surgery greatly decreases the incidence of severe cellulitis and hospitalizations requiring intravenous antibiotics to treat such infections. Medical literature overwhelmingly supports the safety and efficacy of this surgical treatment. We know of no studies or reports which have shown the procedure to be ineffective or harmful to patients if performed properly by an experienced surgeon with close coordination and post surgical treatment by a lymphedema therapist with SAPL experience.

Published studies document a 75 per cent reduction in the incidence of infections and an average 90 to 110 per cent reduction in excess volume. These include a 21-year, prospective study of 146 patients with arms treated with SAPL, and a 10-year, prospective study of 56 patients with legs treated with SAPL. In our own published series, we have reported average infection reductions of about 80 per cent and excess volume reductions of 111 per cent in arms and 86 per cent in legs. Statistically significant reductions in lymphedema impact on daily activities, ability to work, improved limb function, reduced lymphedema-specific emotional distress, and a clear improvement in patient quality of life have also been shown.

The safety of SAPL surgery has been studied in medical literature, which found the function of the lymphatics to be unaffected by the surgery. In our experience, SAPL appears also to improve the lymphatic drainage in the arm or leg after healing has occurred, and we have had no cases in which the patient's lymphedema has worsened from the procedure. Continuous compression garment use under the care of a trained lymphedema therapist following the surgery is essential to prevent the reaccumulation of the pathologic lymphedema solids and fat.

SAPL is very different from cosmetic liposuction in many ways including the type and amount of lymphedema

therapy required, the way the procedure is performed, the length of the surgery and solid materials removed and need for progressively smaller, specialized, custom-fitting garments after surgery. Lymphedema therapy performed by a specialized lymphedema therapist with specific experience with the SAPL is also essential to proper outcome following the procedure and cannot be substituted with a simple set of postoperative written instructions to the patient or therapist.

**FIGURE 3**



**Patient with a 4-year history of chronic, non-compressible, solid-predominant lymphedema following history of right breast cancer treated with lumpectomy, lymph node dissection and radiation therapy. A) Prior to surgery B) 28 months following combination of SAPL followed later by left VLNT. She achieved a stable reduction in volume of 95%, is out of compression garment approximately 12 hours every day, and has less shoulder and torso swelling as well.**

### Importance of integrated lymphedema therapy

Lymphedema therapy that is carefully integrated into any surgical treatment plan is of paramount importance. A lymphedema surgeon must work closely with a lymphedema therapist to ensure the best lymphedema therapy course is given both before and after any surgical procedure. This is especially true for the SAPL procedure, where pre- and postoperative planning, measurements, and lymphedema therapy are vital to the success of the surgery. Ideally, long-term lymphedema therapy

is administered by the patient's local lymphedema therapist under the direction of the lymphedema surgeon or surgical lymphedema therapist.

### Combined and staged lymphedema surgeries

Effectively treatment with lymphedema surgery now includes using multiple surgeries with proper therapy. Physiologic procedures such as VLNT and LVA can be combined during the same operation or in sequential operations for increased effectiveness.

Staged procedures can also be used to treat both solid and then fluid components of lymphedema separately. For instance, VLNT/LVA can be performed once healing after the SAPL surgery is complete to help address the persistent accumulation of lymphatic fluid and decrease the need for long-term compression garment use. We have documented significant reductions both in excess limb volume and also in the requirement for postoperative garment use in medical literature with the staged SAPL and VLNT combination of procedures.

Overall, multiple effective surgical options for lymphedema exist. Surgical treatments are not a "magic bullet", and should be pursued in the context of continuing lymphedema therapy and treatment to optimize each patient's outcome. When performed by an experienced lymphedema surgeon as part of an integrated system with expert lymphedema therapy, safe, consistent and long-term improvements can be achieved. [L3](#)

A comprehensive set of references can be found at [www.lymphedemapathways.ca](http://www.lymphedemapathways.ca).

#### Editor's Note:

Editors Note: It is important to note that patients are carefully selected and not every surgeon can reproduce these results. These specialized surgical procedures are still evolving in various parts of Canada as the medical community awaits more research data and as such are not readily available.