



Pioneering Innovative Surgery for Lymphedema

Recent advances in microsurgery and imaging enable surgeons to locate and reroute damaged lymphatic channels (glowing green) to reduce the risk of lymphedema.

Dhruv Singhal, MD, Director of Lymphatic Surgery at BIDMC, has for years participated in lymphedema conferences where the focus has been how to better manage this disease. He wants to reframe the conversation. He says, “Why do patients ever need to develop lymphedema in the first place?”

Recruited to the Division of Plastic and Reconstructive Surgery in the fall of 2016, Dr. Singhal is one of the few physicians in the world pioneering innovative surgery that aims to prevent lymphedema in patients most at risk. He’s also advancing another type of surgery that offers relief to patients with chronic lymphedema.

A challenging condition

In the United States, lymphedema most often occurs after lymph nodes and the vessels that connect them are removed during cancer surgery or damaged by radiation therapy. Lymph fluid accumulates, usually in the arm or leg closest to the site of treatment. This causes an uncomfortable and sometimes painful swelling that may make clothes and shoes feel tight, and impede movement. Although it is usually not life-threatening, lymphedema significantly affects quality of life — and can cause great distress. There is no known cure.

“Most patients with cancer who come to see us for lymphedema treatment feel like they’ve already fought

the battle of their lives,” says **Kathleen Shillue, PT, DPT, OCS**, Clinical Services Manager of Outpatient Rehabilitation Services at BIDMC, “and it’s like they can’t leave it behind.”

Patients with breast cancer are most often affected, but lymphedema can also occur after treatment of ovarian, uterine, prostate, and skin cancers. Although it is hard to predict who will develop lymphedema, risk increases with more extensive dissections of the lymph nodes.

In most cases, lymphedema develops slowly over time, and swelling can range from mild to severe. Until recently, the only management options were compression garments, exercise, and manual lymphatic drainage, a type of massage performed by physical therapists.

Prevention: Lymphovenous bypass

As the name implies, lymphovenous bypass involves rerouting damaged lymph channels so that lymphatic fluid is able to drain properly. First developed in Italy, the procedure is offered only at a few select hospitals in the United States, including BIDMC.

Dr. Singhal operates in conjunction with a cancer surgeon, so that the patient only goes to the OR once. For example, after a breast surgeon has performed

a lumpectomy or mastectomy and is preparing to perform an axillary dissection to remove lymph nodes, Dr. Singhal injects a fluorescent dye into the patient's arm.

Using a specially designed microscope made for lymphatic surgery, with a filter that can visualize the glowing dye, Dr. Singhal locates the tiny lymph vessels and observes how fluid is flowing through them. If he detects any leaking vessels, he isolates the damaged channels and reroutes them into a vein nearby. After ensuring lymphatic flow is restored, Dr. Singhal steps aside and the breast surgeon completes the original operation.

"It's not 100 percent," Dr. Singhal cautions, "but early data is pointing towards significant reductions in the risk of developing lymphedema. It just makes sense."

Although statistics vary widely — in part because studies use different measurements — approximately 30 percent of women with breast cancer undergoing an axillary lymph node dissection develop lymphedema. With lymphovenous bypass, the risk drops to 5 to 12.5 percent.

Assessment and follow-up are also key. For patients with breast cancer at risk of lymphedema, Ms. Shillue takes measurements of the arm that may be impacted. The traditional method — a tape measure — has been supplanted by more precise tools including bio-impedance spectroscopy, and the use of a perometer. The patient is assessed before treatment, and then at three-to-six month intervals afterwards, depending on risk profile, for two years.

"Our goal is to detect even a slight increase in limb size, before the patient sees it or feels it," Ms. Shillue says. Additional interventions — such as compression or massage — are more effective the earlier they begin.

Treatment:

Vascularized lymph node transfer

For patients with chronic lymphedema who are not getting adequate relief from physical therapy, compression, and exercise, vascularized lymph node transfer now provides another option. During the



Dhruv Singhal, MD, Director of Lymphatic Surgery, looks into a specialized microscope while performing lymphovenous bypass, as Senior Plastic Surgery Resident Brady Sieber, MD, looks on. The screen in the background displays an enlarged image of what Dr. Singhal is looking at (see related image).

procedure, Dr. Singhal and his team remove healthy lymph nodes and vessels (along with blood vessels and some surrounding tissue) from another area of the body and implant them in the extremity affected by lymphedema. The surgeons then connect the blood vessels.

"I've performed this procedure on patients who had lymphedema for four, five, or even six years," Dr. Singhal says, "and within six months of treatment, they had great improvement." Physical therapy is still necessary after surgery, as it improves the flow of lymphatic fluid in the affected area as the body heals.

"Lymphedema is often underestimated and can be a serious complication for some patients undergoing cancer treatment," says **Ted James, MD, MS, FACS**, Chief of Breast Surgical Oncology and Co-Director of the Joseph M. and Thelma Linsey BreastCare Center at BIDMC (see related story, page 16). "By eliminating this side effect of treatment, we can make patients more comfortable, improve their physical function, and enhance their care experience."

→ For more information about lymphatic surgery at BIDMC, visit our webpage: bidmc.org/lymphedema

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