Microlymphatic Surgery for the Treatment of Iatrogenic Lymphedema

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KEYWORDS

• Lymphedema • Treatment • Autologous lymph node transplantation (ALNT)
• Microsurgical vascularized lymph node transfer • Iatrogenic • Secondary
• Brachial plexus neuropathy • Infection

KEY POINTS

- Autologous lymph node transplant or microsurgical vascularized lymph node transfer (ALNT) is a surgical treatment option for lymphedema, which brings vascularized, VEGF-C producing tissue into the previously operated field to promote lymphangiogenesis and bridge the distal obstructed lymphatic system with the proximal lymphatic system. Additionally, lymph nodes with important immunologic function are brought into the fibrotic and damaged tissue.
- ALNT can cure lymphedema, reduce the risk of infection and cellulitis, and improve brachial plexus neuropathies.
- ALNT can also be combined with breast reconstruction flaps to be an elegant treatment for a breast cancer patient.

OVERVIEW: NATURE OF THE PROBLEM

Lymphedema is a result of disruption to the lymphatic transport system, leading to accumulation of protein-rich lymph fluid in the interstitial space. The accumulation of edematous fluid manifests as soft and pitting edema seen in early lymphedema. Progression to nonpitting and irreversible enlargement of the extremity is thought to be the result of 2 mechanisms:

1. The accumulation of lymph fluid leads to an inflammatory response, which causes increased fibrocyte activation.
2. Fat deposition occurs when malfunctioning lymphatics are unable to transport fat molecules effectively.[1]

Clinically, patients develop firm subcutaneous tissue, progressing to overgrowth and fibrosis.

Lymphedema is a common chronic and progressive condition that can occur after cancer treatment. The reported incidence of lymphedema varies because of varying methods of assessment,[1–3] the long follow-up required for diagnosing lymphedema, and the lack of patient education regarding lymphedema.[4] In one 20-year follow-up of patients with breast cancer treated with mastectomy and axillary node dissection, 49% reported the sensation of arm lymphedema.[5] Of the patients who developed lymphedema, 77% were diagnosed within the 3-year period following breast cancer treatment, and the remaining patients developed arm lymphedema at a rate of about

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Clin Plastic Surg 39 (2012) 385–398
http://dx.doi.org/10.1016/j.cps.2012.08.002

1% per year after the 3 years. Therefore, about a quarter of patients will develop lymphedema years after breast cancer treatment, and a long follow-up is required.

The incidence of lymphedema after breast cancer treatment ranges from 24% to 49% after mastectomy and 4% to 28% after lumpectomy.[1] Patients requiring more extensive breast cancer treatment with axillary node dissection and radiation have the greatest risk for the development of lymphedema. However, even the less extensive lymph dissection in sentinel node biopsy is associated with a 5% to 7% incidence of upper-extremity lymphedema.[6]

The incidence of lymphedema after treatment of other malignancies is reported as follows: 16% with melanoma, 20% with gynecologic cancers, 10% with genitourinary cancers, 4% with head and neck cancers, and 30% with sarcoma. Patients requiring pelvic dissection and radiation therapy for the treatment of non–breast cancer malignancies have a reported lymphedema rate of 22% and 31%, respectively.[3] Risk factors for developing lymphedema after cancer treatment are obesity, infection, and trauma.[1,5]

In addition to the decreased amount of lymph tissue critical to a normal immune response, tissue changes and lymphostasis result in increased susceptibility to infection in the lymphedematous extremity. Clinically, patients may develop cellulitis from minor trauma that would otherwise be insignificant in a normal extremity (**Fig. 1**). Each episode of infection further damages lymphatic channels and perpetuates a vicious cycle. Patients may require lifelong antibiotic prophylaxis.

Lymphedema can also lead to erysipelas, lymphangitis, and even lymphangiosarcoma. Erysipelas is a streptococcal infection of the dermis. Lymphangitis is inflammation of the lymphatic channels as a result of infection at a site distal to the channel, such as a paronychia, an insect bite, or an intradigital web space infection. Lymphangiosarcoma is a rare malignant tumor that occurs in long-standing cases of lymphedema (**Fig. 2**). Stewart-Treves syndrome is angiosarcoma arising from postmastectomy lymphedema and has an extremely poor prognosis, with a median survival of 19 months.[1]

THERAPEUTIC OPTIONS FOR IATROGENIC LYMPHEDEMA

Conservative Treatment

Conservative lymphedema therapy is the backbone for providing symptomatic improvement of lymphedema and may slow the progression of disease. Multiple layers of short-elastic bandages are wrapped circumferentially around the lymphedematous extremity to squeeze edema fluid out of the tissue and push the edema fluid proximally. Customized compression garments are subsequently placed on the extremity to maintain the decreased extremity size. Decongestive lymphatic therapy usually begins with intensive (daily for several weeks) lymphatic massage and bandaging. This therapy is followed by less-frequent maintenance

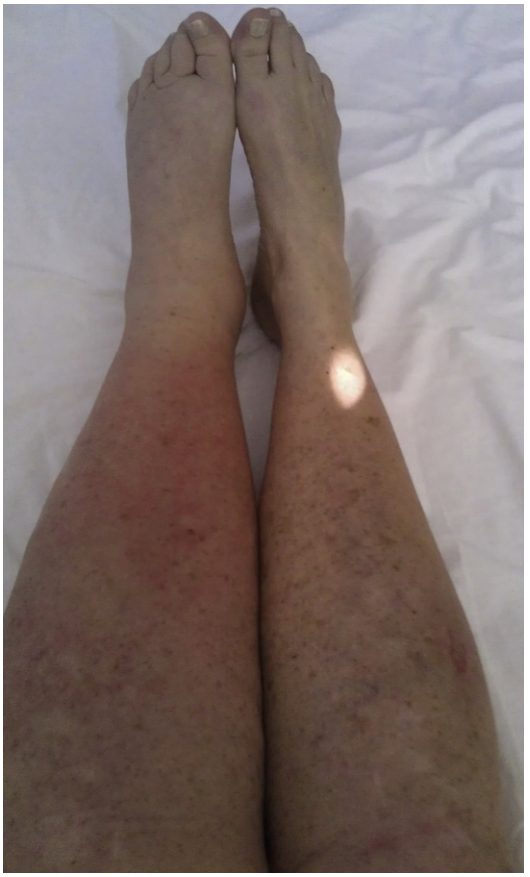

Fig. 1. Leg cellulitis in a patient with congenital lymphedema.

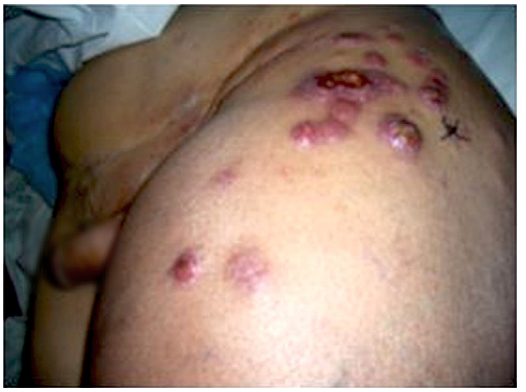

Fig. 2. Lymphangiosarcoma.