

HOW I DO IT

Manual Lymphatic Drainage for Lymphedema Limited to the Breast

TAMMY E. MONDRY, PT, CLT-LANA^{1*} AND PETER A.S. JOHNSTONE, MD, MA^{2,3}

¹Breast Health Center and Naval Medical Center, San Diego, California

²Radiation Oncology Division, Naval Medical Center, San Diego, California

³Radiation Oncology Division, University of California, San Diego, California

Breast conservation therapy (BCT) is the conservative treatment for breast cancer, consisting of tumor excision and axillary lymph node sampling (ALNS) with or without radiation therapy. One of the potential adverse effects of ALNS and radiation therapy to the axilla is lymphedema of the ipsilateral breast, upper extremity, or both. This secondary lymphedema is caused by trauma to the axillary lymphatic system through surgery or radiation therapy. The vast majority of literature on the subject deals with extremity lymphedema; little has been written regarding edema limited to the breast.

The purpose of the lymphatic system is to remove lymph fluid (which consists of interstitial fluid, plasma proteins, cells, and debris) from the interstitial space [1,2]. This fluid is considered to be interstitial fluid until there is actual uptake by the lymphatic system, at which time it is lymph fluid. The lymph fluid is transported to the lymph nodes, where it is then filtered. Foreign particles, including bacteria, are removed, which helps combat infection [1].

Lymphedema occurs when there is an abnormal accumulation of protein-rich edema. In the context of breast cancer, this generally results from a mechanical insufficiency of the lymphatic system [3]. When the interstitial fluid begins to accumulate and becomes stagnant in the interstitial space, the patient is at an increased risk for infection [3]. Other potential complications for patients with lymphedema include pain, problems with cosmesis, and rarely, development of lymphangiosarcoma [4–8].

The frequency of breast edema appears to depend largely on the extent of axillary surgery. A review of the literature indicates that the risk of breast edema ranges from 15% to 80% in patients undergoing complete axillary dissection [9–11] compared with a risk of 8% to 25% in patients undergoing a more limited surgical procedure [9,10,12]. Radiation therapy to the draining lymphatics of

the breast may also contribute to lymphedema. Halverson and colleagues [13] found an increase in the frequency of breast edema in patients undergoing radiation therapy to the breast and draining lymphatics compared with those receiving radiation therapy to the breast alone. The frequency of breast edema as a complication of radiation treatment was found to be 28% (25% mild and 3% moderate) in patients treated with BCT for either synchronous or metachronous early-stage bilateral breast cancer [14]. Finally, large-breasted patients have been found to have a greater risk of breast edema. Pezner and colleagues [15] found that patients with a bra cup size of C or larger had a significantly greater risk of breast edema than those with a bra cup size of less than C ($P = 0.03$).

Several studies have shown that time plays a significant role in the resolution of breast edema [9,11,15]. Clinically, breast edema most often occurs 6 to 12 months after radiation therapy, with gradual resolution within 1 to 3 years [16]. This gradual reduction in lymphedema of the breast is typically complete by 3 years after radiation [10,11]. Because of this length of time and because of the potential complications associated with lymphedema, the need for therapy of chronic lymphedema of the breast is clear.

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*Correspondence to: Tammy E. Mondry, PT, c/o Clinical Investigation Department (KCA), Naval Medical Center San Diego, 34800 Bob Wilson Drive, Suite 5, San Diego, CA 92134-1005. Fax: (619) 532-5811.

E-mail: temondry@nmscd.med.navy.mil

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In a 1998 case study of treatment for breast lymphedema, Carl and Hartman [17] used hyperbaric oxygen (HBO2) therapy in an attempt to decrease edema through a postulated mechanism of hyperoxic vasoconstriction in a 54-year-old patient with a 3-year history of breast edema after BCT. The treatment was successful, with complete resolution of breast discomfort and tenderness. This result was maintained at follow-up evaluation 5 months after HBO2 therapy. Earlier attempts at treatment with non-steroidal antiinflammatory drugs and manual lymphatic drainage (MLD) to the ipsilateral upper extremity in this patient had not been successful. Although HBO2 therapy was successful in this patient, the results of this method have not been validated in any larger series of patients. Further, it must be noted that the equipment required to administer this treatment is not readily available to many patients.

At our institution, we developed a treatment program for breast lymphedema based on an understanding of the physiologic cause of secondary breast lymphedema. A modification of the complete decongestive therapy treatment program has been offered to patients with breast edema. The treatment consists of educating patients about skin care and MLD, and the use of a compression bra.

TECHNIQUE

A retrospective chart review was performed of records of patients receiving follow-up evaluation after definitive therapy at the Breast Health Center Physical Therapy Service between May 1997 and June 2000. Specifically, cases of edema limited to the breast were culled from the records of the 349 patients with breast cancer who had undergone BCT during the study period. Four patients with edema limited to the breast were identified. Details of their presentation and therapy are listed in Table I. All four patients underwent wide local excision or lumpectomy and ALNS. Three received chemotherapy followed by radiation therapy, and one received radiation therapy alone.

Patients referred to the Breast Health Center Physical Therapist with a diagnosis of breast edema underwent a thorough evaluation. The breast edema was classified by

the physical therapist as mild, moderate, or severe compared with the contralateral breast. This classification was used on the first and last date of treatment to determine the effectiveness of treatment. All patients received therapy consisting of therapist-delivered MLD, self-MLD, and use of a compression bra. The number of treatment visits varied according to the specific needs of each patient.

Manual lymphatic drainage is a technique used to facilitate the lymphatic system to increase lymph transport. This is accomplished through manual mechanical compression, stimulating the smooth muscle surrounding the lymph vessels [4], which increases the pumping rate and therefore increases the propulsion of stagnant lymphatic fluid out of the breast.

Specific MLD techniques include manual therapy of the supraclavicular lymph nodes; cervical paraspinal lymph vessels and lymph nodes; superficial and deep lymphatic structures of the abdomen; contralateral axillary lymph nodes; axilloaxillary anastomoses of lymph vessels; ipsilateral inguinal lymph nodes; axilloinguinal anastomoses of lymph vessels; intercostal lymph vessels; parasternal lymph nodes; and the ipsilateral breast tissue. These techniques were administered by a certified lymphedema therapist.

Patients also were instructed in a self-MLD technique to achieve the same goal. They performed self-MLD for approximately 30 to 45 minutes at least once per day and underwent therapist-delivered MLD in the clinic one to five times per week, depending on the patient's availability to come into the clinic for treatment.

A compression bra was used in all four cases (Fig. 1). The elastic construction of the compression bra provides gentle uniform pressure to the entire trunk, reducing edema. The patients were instructed to wear the compression bra every day for 24 hours per day during the treatment phase. Once the treatment phase had been completed (2–8 weeks), the garment was then worn to maintain the size of the breast; patients were instructed to wear the compression bra during the day only. The compression bra provides increased tissue pressure in the edematous area and maintains the results of MLD.

The patients were also instructed in precautions and appropriate skin and nail care for the affected upper

TABLE I. Data for Disease Stage and Therapy in the Four Patients With Lymphedema of the Breast After Breast Conservation Therapy

Patient No.	Age (yrs)	Stage	(+) Nodes	Adjuvant therapy	RT dose c(Gy)	Latency of edema after RT (mos)
1	48	T1aN0M0	5/21	Adriamycin + CMF	5040 + 1000 + 5040	3
2	36	T1aN0M0	0/20		5000	6
3	45	T1N0M0	0/33	AC	5000 + 1000	1
4	40	T2N1M0	9/26	AC	5040 + 1000 + 4680 + 5040	2

Doses include tangential dose + scar boost dose + supraclavicular dose + axillary boost dose.

RT = radiation therapy; CMF = cytoxan, methotrexate, 5-fluorouracil chemotherapy; AC = adriamycin plus cytoxan.



Fig. 1. Photograph of a patient wearing the compression bra.

quadrant to allow for better management of the edema, including proper care of the area to avoid infectious or inflammatory processes that could potentially overload the lymphatic system and therefore result in progression of the breast edema.

The average time of onset of breast edema in the four patients was 3 months after radiation therapy (median, 2.5 months; range, 1–6 months). Three of the four patients reported an insidious onset of breast edema without precipitating factors; one of the four patients reported vigorous activity before the onset of breast edema. During the initial evaluation by the physical therapist, three patients presented with moderate breast edema, and one presented with severe breast edema. Patients were treated for a mean of 12.8 visits (median, 9;



Fig. 2. Photograph showing patient 4 before therapy, with edema evident in the right breast.



Fig. 3. Photograph of patient 4 after therapy, showing resolution of the edema.

range, 3-30). Patients participated in the treatment program described above, after which they were evaluated again for classification of breast edema. Two patients completed therapy with mild breast edema; in the remaining two patients the affected breast returned to normal size after treatment. Figures 2 and 3 show the edema before treatment and the results of treatment in one of the patients.

Three of the four patients were reevaluated a median of 40 months after treatment (range, 23–56 months). The patients were evaluated for breast edema by the same physical therapist using the classification of mild, moderate, or severe as compared with the contralateral breast. All three patients presented with no visible breast edema. The last patient had moved out of the area and was therefore lost to follow-up.

DISCUSSION

Breast edema is a common complication of BCT that, if left untreated and allowed to progress, may have significant risks for the patient. Lymphedema of the breast occurs as a result of surgery, radiation therapy of the draining lymphatics, or both. Studies have shown that lymph nodes are sensitive to radiation therapy and can be traumatized by it [18,19], and lymph transport may be impaired by fibrosis of the tissue surrounding the vessels after surgery or radiation [9]. Singly or in combination, these can cause an impediment in the lymphatic drainage and lead to lymphedema of the breast and upper extremity.

We have successfully used MLD techniques, compression therapy, and patient education regarding skin care and self-management to resolve breast edema associated with BCT. All four patients in this review demonstrated an improvement in breast edema after a treatment program of

physical therapy. This treatment was based on clinically accepted treatment for lymphedema of the upper and lower extremities.

Patients who present with lymphedema of an extremity are typically offered a treatment program of complete decongestive therapy. This treatment program consists of MLD, skin and nail care, compression bandaging, and therapeutic exercise. This particular treatment program has been shown to be quite successful in the management of lymphedema of the upper and lower extremities, as well as in decreasing the frequency of secondary infections [3,20].

It is important to note that there is no cure for lymphedema, and it is generally progressive in nature. The treatment techniques described help to decrease the amount of stagnant lymph and maintain the size of the affected body part so that the lymphedema does not progress, which also decreases the risk of cellulitis [3,21,22].

Manual lymphatic drainage was used to increase the rate of lymphatic flow and facilitate the movement of lymph fluid out of the breast into other areas of the body. The MLD technique described by Vodder [23] was used, and the primary areas targeted were the contralateral axillary lymph nodes and ipsilateral inguinal nodes. These areas are theoretically accessed via superficial lymph vessels comprising the axilloaxillary anastomoses and the axilloinguinal anastomoses [4]. Self-MLD was used to allow the patient to receive MLD five to seven times per week. A compression bra was used to maintain the results of MLD and to facilitate softening of the edematous tissue to allow for more effective MLD.

As previously mentioned, patients with chronic lymphedema are at risk for secondary side effects. There are no criteria at this time to determine which cases of lymphedema will resolve with time or which patients will develop chronic, stagnant lymph fluid within the remaining breast tissue. It is therefore suggested that patients who present with breast edema be treated early to avoid long-term complications. The treatment program used in the patients discussed here hinges on self-treatment techniques, therefore allowing the patient to gain independence in the management of the condition.

Further research is necessary to determine the most efficient approach to the treatment for patients with secondary lymphedema limited to the breast. Although this is an infrequent occurrence in our experience (1% of patients), in centers performing large numbers of breast conservation procedures for cancer, lymphedema limited to the breast will be a more frequent complication. The use of MLD and compression garments are an attractive option for such patients.

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