Rehabilitation of the Postmastectomy Patient with Lymphedema

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Most patients experience some degree of lymphedema following radical mastectomy, at least initially. However, in about 10 percent of women, the collection of lymph in interstitial tissues, resulting from a functional overload of the lymph system, can cause not only annoyance and discomfort, but also disability.1-4 Twenty years ago, no effective treatment for postmastectomy lymphedema existed. Although the efficacy of individual procedures is still limited, a coordinated treatment program, which pays attention to seemingly trivial details, can now significantly reduce lymphedema and increase the functional capacity of the extremity.

The etiology of postmastectomy lymphedema is somewhat controversial, and probably a combination of factors are involved.5,6 The most likely are a combination of surgical techniques,7,8 infection7 and irradiation.9,10 Venous obstruction, autonomic nervous system reflex spasm and obesity have also been cited,7,8,11 but are less likely.

Regardless of the specific etiology, the mechanism producing lymphedema is the same.12 Lymph flow from the extremity is blocked, increasing hydrostatic pressure and causing dilation of lymph vessels, and valve incompetency. Concurrently, there is an increase in the protein content of lymph and a proliferation of fibroblasts in the tissues. Because lymphedema serves as an excellent growth medium for bacteria, resultant infection often leads to thrombosis of lymph vessels and further blockage. Increased lymph stasis and progressive fibrosis can occur. Olszewski has listed chronologically the events causing acute and chronic edema.13 (Figure.)

Before a treatment program can be planned, proper evaluation and classification are necessary. Tracy classifies postmastectomy lymphedema according to volume increase greater than the normal extremity,14 as follows:

| Type       | Volume Increase       |
|------------|-----------------------|
| Insignificant | 0-150 cc. greater than normal |
| Slight     | 150-400 cc. greater than normal |
| Moderate   | 400-750 cc. greater than normal |
| Severe     | More than 750 cc. greater than normal |

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However, others like Stillwell\(^4\) believe a classification should be based on the percentage of volume greater than normal, rather than absolute volume:

| Circumference (%) | Relative Magnitude |
|-------------------|--------------------|
| 0-10               | Insignificant      |
| 11-20              | Slight             |
| 21-40              | Moderate           |
| 41-80              | Marked             |
| More than 80       | Severe             |

In Stillwell’s study of 67 patients with postmastectomy lymphedema, the incidence of each category was approximately: 10 percent, insignificant; 20 percent, slight; 20 percent, moderate; 40 percent, marked; and 10 percent, severe.\(^4\) Although volume classifications are more precise, a comparison of the circumference of the normal and involved extremity is perhaps more practical for follow-up.

The goals of treatment for patients with postmastectomy lymphedema are to reduce edema, prevent recurrent swelling and minimize the formation of new lymph.\(^4\) Patients must be made an integral part of the treatment program and thoroughly instructed in the proper care of the affected arm.\(^1,12\)

Medical management includes the prevention of infection, a common complication of lymphedema.\(^4,7\) One study has shown that 53 percent of patients with postmastectomy lymphedema had a history of recurrent cellulitis; 77 percent had signs of subclinical infection, including warmth, redness and induration.\(^15\) For this reason, Nelson has suggested that all patients with postmastectomy lymphedema be given a prophylactic course of Erythromycin, 250 mg, four times a day for seven days.\(^15\) This regimen can be modified as necessary.

Diuretics and salt restriction diets to reduce the volume of the edematous limb are usually not included in the treatment program.\(^4,5\) as physical modalities can accomplish the same result. Sympathetic blocks have been suggested as adjunctive treatment, when indicated.\(^5\)

Numerous surgical procedures have also been advocated, usually for the patient greatly disabled by massive lymphedema.\(^3\)

- **Lymphangioplasty** creates new lymphatic pathways, and various materials have been implanted subcutaneously so that the ascension of lymph occurs by capillary attraction.\(^3\) These procedures have usually not been successful because of infection, extrusion of the foreign body or failure of the lymph to drain against gravity.\(^3\)

- **Bridging** utilizes normal tissue to connect diseased or blocked areas with intact lymphatics. This technique may be successful in secondary lymphedema, when a bypass draining into competent lymph nodes can be designed.\(^3\)

- **Lymphaticovenous shunt procedure** develops functional anastomoses between the lymph and venous system. Nielubowicz has used a lymphaticovenous shunt in four patients with secondary edema, with considerable improvement in all.\(^16\)

- **Omental transposition** combines both excisional and bridging procedures. Diseased tissues are excised and new lymphatics introduced by transposition of the omentum with its rich lymphatic and vascular supply. In a study by Goldsmith and De los Santos, 12 of 14 patients with lymphedema showed objective improvement.\(^17\) Williamson has reported similar success in one patient.\(^18\)
- **Superficial to deep lymphatic anastomoses** connect lymphatics by converting shaved pedicle strips of deep fascia into muscle or bone.19 This procedure also includes the removal of involved tissue, the immediate reduction in size of the affected limb and the reversal in pressure gradients between muscle and subcutaneous tissue.20 Thompson noted good results in 13 of 14 patients with postmastectomy lymphedema treated in this manner.19

- **Radical excision and skin grafting** remove all tissue superficial to the deep fascia, where the disease is usually limited. After excision, the limb is resurfaced with split thickness grafts from another area.3

- **Lysis of axillary vein adhesion** is recommended by Liason for patients with abnormal adduction phlebo-grams. He has reported excellent results in four patients.21

- **Amputation** is a last resort, when all other methods have failed, when edema is severe and disabling and only when the limb has a useless hand.

Results of the surgical treatment of postmastectomy lymphedema have not been totally satisfactory and long-term follow-up on large numbers of patients must still be conducted.

A more conservative physical and rehabilitative program is recommended, and consists of three basic steps: elevation, exercise and compression.

- **Elevation.** The distal portion of the extremity should be placed higher than proximal regions. A compromise position (elevation with comfort) elevates the arm 45 degrees from the horizontal and abducts the shoulder 20 degrees by use of an arm support, board or pillows.4 It is suggested that the patient keep the arm elevated as long as possible, but for at least 30 minutes per treatment session.

- **Exercise.** Elkins and colleagues demonstrated a marked increase in lymph flow with exercise.22 Excessive
contraction is avoided since it increases blood flow and, hence, swelling. Isometric, rather than isotonic, exercises are preferred as they reduce joint motion and cause less constriction. A program of isometric contraction for one to two seconds, with two to three second rest-periods between each contraction, for a total of 20 contractions is recommended, and should be repeated frequently during the day. If the weight of an edematous arm results in poor body mechanics, postural exercises should be ordered. Range of motion, outlet and strengthening exercises are given to the patient as required.

- Compression therapy. Manual massage, which Elkins has shown mobilizes edema fluid, starts distally and progresses proximally. However, because it is time-consuming and inefficient, manual massage has been replaced by pneumatic massage devices, using a pressure of 40 to 60 mm. of Hg. (mercury), with a pressure phase of 45 seconds and a relax phase of 15 seconds for a minimum of two hours to a maximum of 12 hours per day. Compression therapy should not be considered if infection is present.

Elastic supports interrupt the cycle of edema and prevent stretching of tissue and the loss of elasticity. Bandages, reapplied many times a day, are initially preferred to sleeves, since the size of the arm changes rapidly. However, they should not be used for long-term therapy, as they may cause uneven pressure. Once the size of the arm has stabilized, an individually measured elastic sleeve is prescribed. Wrapping, by first enclosing the hands (fingers can be left out) and then bandaging as high as axillary folds will allow, must begin in the morning when the patient awakens and continued throughout the day.

Physical and rehabilitative treatment is usually started while the patient is in the hospital, and continued on an out-patient basis. At this institution, treatment is begun in the hospital for five days, with physical therapy twice daily. Pneumatic massage or manual massage, if necessary, are performed. Isometric exercises with the arm elevated are carried out for one minute, with four minute rests, for a total of 30 minutes many times during the day. Bandages are applied after exercise. The extremity is kept elevated during the night and as long as possible during the day. At the end of the week, the patient is measured and fitted with an elastic sleeve.

At home, the patient is instructed to apply the elastic sleeve in the morning on awakening, to elevate the arm and perform isometric exercises for 30 minutes every two hours. Elevation is gradually decreased to three times a day, and pneumatic compression is given as needed.

Patients should also be advised to take special care of the involved arm and to avoid: injury or accident; holding heavy objects; increased heat; injections or venipuncture; blood pressure recordings; and constrictive clothing. The patient should also be taught to wear protective covering to the hand or arm when working in the kitchen or garden, to keep the skin soft with lanolin and to see a physician at the first sign of swelling, redness or warmth.

Results of physical and rehabilitative programs for postmastectomy lymphedema have been widely reported. Decreased swelling of approximately 30 percent in three to four days can be expected. Zeissler has shown that 67.2 percent of 183 patients benefited from such a treatment program. Kruse also found good response to therapy. Britton and Nelson noted that the longer edema was present, the less successful was the therapy.

Of course, prevention is the best treatment. It begins with good surgical technique at the time of the radical mastectomy, including proper placement of the incision, careful handling of the tissue,
avoidance of damage to the axillary vein as well as to the clavicular portion of the pectoralis major muscle.\footnote{1,12} Postoperative care of the involved extremity that affords elevation, active motion with graduated exercises and the use of elastic compression bandages or sleeves offers the best chance of preventing postmastectomy lymphedema.

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