



Assessment of Postmastectomy Lymphedema and Current Treatment Approaches

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ABSTRACT

Lymphedema can be defined as the abnormal accumulation of protein-rich interstitial fluid that occurs primarily as a consequence of malformation or acquired disruption of the lymphatic circulation. Upper extremity lymphedema can develop in a significant proportion of patients after mastectomy. Currently, complex decongestive physical therapy is accepted as international standard treatment approach for the treatment of lymphedema. Complex decongestive physical therapy includes skin care, manual lymphatic drainage, compression bandage, compression garments, exercise and sometimes addition of intermittent pneumatic compression pump. When conservative treatments is not sufficient surgical intervention is an alternative to the patients. In this review, current treatment approaches are discussed.

Key words: Mastectomy, lymphedema, breast cancer, complex decongestive physical therapy

Postmastektomi Lenfödeminin Değerlendirilmesi ve Güncel Tedavi Yaklaşımları

ÖZET

Lenfödem; lenfatik dolaşım sisteminde malformasyon veya kazanılmış bozukluklara bağlı olarak ortaya çıkan, intertisyel hücre boşluklarında proteinden zengin sıvının birikmesidir. Mastektomi sonrası hastaların önemli bir kısmında üst ekstremitede lenfödem gelişmektedir. Günümüzde, lenfödem tedavisinde uluslararası tedavi yaklaşımı olarak kompleks dekonjestif fizik tedavi önerilmektedir. Kompleks dekonjestif fizik tedavi, cilt bakımı, manuel lenfatik drenaj, kompresyon bandajı, kompresyon giysisi, egzersiz ve intermittent pnömotik kompresyon pompası uygulamalarını içerir. Konservatif tedaviye cevap alınmadığı hastalarda alternatif olarak cerrahi müdahaleler de yapılmaktadır. Bu derlemede postmastektomi lenfödeminde güncel tedavi yaklaşımları tartışılmıştır.

Key words: Mastektomi, meme kanseri, lenfödem, kompleks dekonjestif fizik tedavi

INTRODUCTION

Lymphedema can be defined as the abnormal accumulation of protein rich interstitial fluid that occurs primarily as a consequence of malformation or acquired disruption of the lymphatic circulation (1). Lymphatic system consists of superficial and deep lymphatic vessels and of lymph nodes. Lymph fluid flows in the lymphatic vessels filtered by the lymph nodules. Besides the prevention of interstitial fluid accumulation, lymphatic system has an important role in terms of antigen presentation in the immune system (2).

80 % of the lymphatic circulation of upper extremity drainages to axilla in which there are approximately 20-30 lymph nodes and removing of the axillar lymph nodes for any reason leads up to develop lymphedema in the arm of the same side (3). For this reason, the patients having breast cancer develop lymphedema frequently because of both the nature of cancer itself and treatment of cancer. The incidence of lymphedema, one of the severe complications that comprise after mastectomy, is stated as 15-20 % (4). The probability of lymphedema progression increases according to the variety of applied surgery

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and the number of lymph nodes removed (5-7). It is also reported that there is a strong relationship between axillar dissection width and incidence of the lymphedema. Lymphedema can be seen rarely in some types of mastectomy in which lymph nodes are not removed such as lumpectomy and simple total mastectomy. On the other hand, risk of lymphedema progression increases as directly proportional for the number of removed axillar lymph nodes at the partial segmental mastectomy, modified radical mastectomy and radical mastectomy. Moreover, it is also known that performing chemotherapy and radiotherapy after surgery increases the risk of lymphedema (8).

Diagnosis and Assessment of Lymphedema

Lymphedema, principally, is classified as primary and secondary according to the etiology (9). Lymphedema is called as primary lymphedema when it progresses as a result of the congenital absence of lymphatic system components or their primary malformations. However, lymphedema depending on the factors such as radiotherapy, surgical intervention, trauma, inflammation, cancer invasion or mass compression is classified as secondary lymphedema (9,10). Lymphedema is categorized as acute and chronic based on time interval. Temporary lymphedema continuing shorter than 6 months and pitting when held down is called as acute. Nevertheless, lymphedema continuing longer and non-pitting with developing fibrosis is named as chronic (11,12).

There are two types of classification constituted with using volume difference between healthy arm and arm having lymphedema in order to evaluate lymphedema more objective. In the Tracey-volume categories lymphedema are expressed 3 degrees (2,12). Mild: Volume difference between two arm is about 150-400 mL. Moderate: Difference is about 400-700 mL. Severe: Difference is above the 700 mL.

In the Stillwell-percentage categories difference between the two extremities are shown as % (2,12). Mild: Volume difference between two arm is 11- 20 %. Moderate: Difference is 21-40 %. Evident: Difference is 41-80 %. Severe: Difference is more than 80 %.

Detailed assessment is needed to choose the most appropriate treatment and its optimal follow-up for lymphedema. An extensive anamnesis should be taken specifically in terms of family history, the progression of cancer, the way of applied operation, radiotherapy history, whether

being an infection on the effected extremity or not, the time of lymphedema, feeling pain and being a sense of heaviness (13). Then, patients should be checked about skin color and temperature, pulses, appearance of nails, whether they have pitting edema or not and having tight clothes or incision scars that block the lymph flux. In the extremities, the range of motion of joints should be evaluated and the effects of lymphedema on daily activities should be defined (14).

Some methods such as tonometry, radionuclide scintigraphy, computerized tomography, magnetic resonance imaging, ultrasonography, bioelectric impedance can be used for evaluation of lymphedema (4,15-24). On the other hand, using these methods for the follow-up leads to both higher costs and not to be able to exclude external factors adequately such as gaining or losing weight. For this reason, these aforementioned methods are used mostly in studies. Rather, volumetric and peripheral measurements are preferred in clinics.

For the follow-up of lymphedema, the volumetric measurement method is accepted as golden standard. Because, it is thought that this methods reflects the changings on lymphedema better than others (25). In this method, the extremity of a patient is immersed into a water tank that is full of with water and the volume of overflowing water is measured. The difference of the overflowing water volume of the two extremities determines the amount of lymphedema. This method especially reflects objectively lymphedema changings in which depend the weight gaining or losing.

However difficulties in obtaining water tanks in which volumetric analysis are done and needed to determinate the volume of water attentively during the practice complicate the usability of this method. For such reasons, the method of circumferential measurement is used generally in clinics. This method is preferred due to its lower cost and ease of use (26). In the circumferential measurement method, circumference of limb is measured with taking specific osseous regions as points of reference such as ulnar styloid process, olecranon, lateral epicondyle, metacarpophalangeal joints. Another circumferential measurement method is measuring the arm with identical distances. So as to exclude the effects of changing's in weight of the patients; both lymphedematic and healthy arms are measured and accepted the difference between the two arms. 2 cm or more difference between two arms is significant in terms of lymphedema (12).

Treatment Methods of Lymphedema

Because any standard treatment procedure has not yet been defined that is shown to be effective, each patient with lymphedema should be assessed individually. First of all, the patient should be educate to prevent lymphedema. Especially in the early period after surgery, information should be given to the patients about swelling of the arm, avoiding from infection, skin care, exercises and scar massage. To protect themselves from skin injury, patients should wear dense nylon gloves in kitchen, use soaps having neutral pH and sun creams having high factor, and they should not get vaccines, blood taking, injection and blood pressure from the effected arm and should be avoided from warm baths and suntan (27). When they feel redness or swelling on their arm, it is advised that they consult a doctor immediately.

In the first period of lymphedema, holding the arm up above the level of heart is quite beneficial. On the other hand, when the interval and intension of lymphedema increase, other methods should be added to the treatment. In the treatment of lymphedema, especially in the early period, it is recommended to use conservative approaches. Today, various physiotherapy modalities and rehabilitation applications are practiced as conservative treatment methods. These methods called complex decongestive physiotherapy and comprise of two phases. Phase 1 is the treatment phase including skin care, a technique of special massage known as manual lymphatic drainage, multi layer bandaging, applying various therapeutic exercises under the bandage and using intermittent pneumatic compression pump. After obtaining maximum volume reduction, we could apply the second phase. This phase called protection phase and it contains skin care, compression garments, compression bandage and again exercise programs done with compression garments (28,29).

Manual lymphatic drainage is a tactful massage technique that is done by only the hand and fingers with skin lotion in neutral pH. With applying 30-45 mmHg pressure to superficial lymph vessels just below skin, firstly supraclavicular lymphatics is stimulated, and than it is ensured to drain anterior and posterior axilla-axillar, axillo-inguinal anostomosis, cysterna cyhli, proximal arm and finally distal arm, respectively. In manual lymphatic drainage, edema fluid is transferred to the opposite side from the midline of the body, towards the functional lymphatic structures and inguinal lymphatic. Then from the top of the shoulders lymphedema will be transferred to upward

and back. Finally, massage is practiced to arm, forearm, hand and fingers. It is extremely important that it should never be practiced massage from distal to proximal and the interval of massage should be 45-60 minutes.

Manual lymphatic drainage stimulates the contraction of lymph collectors. Therefore, it causes to an increase in protein excretion and transportation. Additionally, it decreases edema providing elimination of lymph liquid by lymph nodule. Also it prevents tissue fibrosis by the effect of massage, thus it transforms the tensed tissue to flaccid (30). On the other hand, under circumstances such as acute cellulite, bacteriological, viral or fungal oriented infections, arterial or venous occlusion, congestive heart failure and renal dysfunction, applying manual lymphatic drainage is contraindicate (31).

In the treatment of lymphedema, bandages should be applied that having low resting pressure and high working pressure. When patient practices massage, antagonistic force between the muscle and the bandage leads to a pump effect and this facilitates lymph transportation (32,33). Moreover, because bandages perform low pressure during the rest, they do not cause to a problem when they are used for a longtime. Conversely, elastic bandages they damage to lymphatics due to their high resting pressure (33).

Bandage sets should include cytokinet, finger bandage and 6 cm, 8 cm and 10 cm bandages. Firstly, cytokinet is dressed over the extremity of the patient. Secondly, finger bandage is applied to hand and fingers. Finally 6, 8 and 10 cm bandages are wrapped from fingertip to axilla so as to give maximum pressure to distally (Figure 1). Bandaging protects skin from trauma; it organizes venous cycle, prevents reflux and increases venous and lymphatic transport (31,34).

Intermittent pneumatic compression pump which constitutes gradual pressure gradients on lymph vessels, provides to organize the lymph flow (35,36). These devices can apply either one type of pressure or pressure having different ratios in an adjustable time interval on extremity (Figure 2). Although the devices can apply different pressures (between 0-300 mmHg pressures), pressures between 30-60 mmHg are preferred in the treatment generally. It is believed that intermittent pneumatic compression devices can reduce lymphedema more successfully in early phase and can be more beneficial if they are used with compression garments (31).

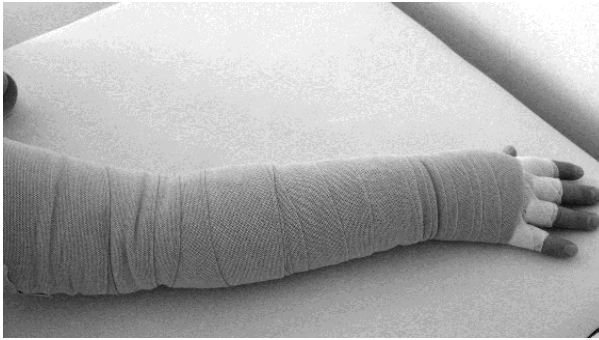


Figure 1. The bandaging in lymphedema

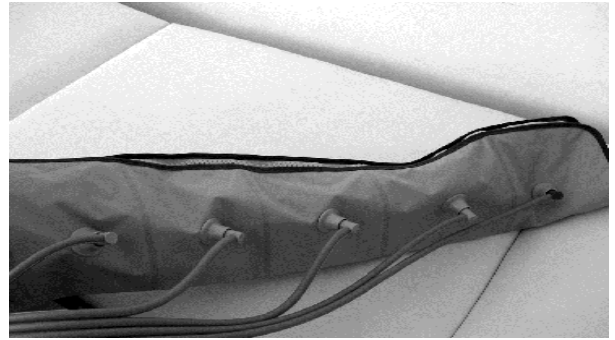


Figure 2. The intermittent pneumatic compression pump device

Compression garments used in phase II is utilized for reducing volume continuously and supporting skin which has lost elasticity (27). They show these effects by means of increasing venous cycle, accelerating lymphatic flow and preventing protein accumulation (31). Ease of use of compression garments and not interfere with continuing daily activities are its advantages (32). Compression garment which is prepared according to patient has 30-40 mmHg pressure. Also it has a detachable glove section and that provides ease of use in daily usage. Additionally, elasticity should be checked and renewed in every 6 month (12). In either phase, exercise program should be applied after wearing compression bandage or garment. Exercise constitutes muscle contraction and therefore it increases lymphatic flow and protein absorption (37).

Exercises should be done according to a specific order:

1. Breathing exercises: First, breathing exercises are done 2-3 times a day and for 5 minutes for each time. With the help of breathing exercises, intraabdominal pressure is increased and provided to stimulate the lymphatic system.
2. Range of motion exercises: After breathing exercises, for the shoulder region, range of motion exercises should be repeated 20 times.
3. Pumping exercises: Rhythmic contractions and relaxation are provided by muscle contraction and repeated compression effect on lymph vessels.
4. Stretching and strength-enhancing exercises: Functional capacity of muscles can be increased by means of exercises that force the limits.
5. Aerobic condition exercises: These exercises increase sympathetic tonus and because of this, the contraction occurs in lymph vessels. Also, pumping on the proximal of vessels constitute negative pressure effect distally. So all these cause the lymphatic absorption.

In cases of lymphedema that do not respond to conservative treatment, surgery is an alternative treatment (14). Surgical methods are usually applied as recreation of lymphatic channels, removal of lymphodematous tissue or constituting a bridge from oedematous region to normal region (38). Nevertheless, surgical intervention should be considered for the cases that do not respond adequately to the conservative treatment due to complications such as sensory loss, formation of hypertrophic scar, developing deformity on extremity and insufficiency of shunt.

Finally, all mastectomized patients having breast cancer should be enlightened and educated about lymphedema. Afermentioned procedures may prevent from the development of lymphedema. When lymphedema occurs, the appropriate treatment must be organized via complex decongestive physical therapy program. If conservative methods have not responded, patients should be directed to surgical treatment modalities.

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