Lymphedema Management Following Breast Cancer Treatment

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Abstract

Breast cancer is the most common type of cancer in women worldwide, and a significant number of breast cancer survivors suffer from lymphoma, upper extremity pain, numbness, and restricted arm/ shoulder range of motion. Breast cancer-related side effects impose on health care systems, daily physical activities, psychosocial function, and quality of life. The purpose of this narrative review was to assess the status of lymphedema after the breast cancer treatment. Modern treatment included surgery (lumpectomy or mastectomy with sentinel node biopsy or axillary dissection), radiotherapy, chemotherapy, endocrine therapy, and rehabilitation that are a process aimed at enabling patients to reach and maintain optimal physical, intellectual, psychological, social aspects.

Keywords: Lymphedema, Breast Cancer Therapy, Rehabilitation, Quality of Life, Range of Motion

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Introduction

One of the most common cancers among women is breast cancer. Since its prognosis has improved, complications are increasingly apparent (1). Almost 21% of women with breast cancer suffer from the lymphedema (2). Boyages *at al.* (3) studied the financial costs of lymphedema care in Australian women following the breast cancer. The average financial cost of lymphedema was $977 per annum; which 40% of that belonged to compression garments (3). In addition, breast cancer women with lymphedema spend more cost on their treatment than those without lymphedema (4). Nevertheless, severe lymphedema is not responsive to conservative treatments (3). The purpose of this study was to evaluate the management of lymphedema after the breast cancer treatment.

Overview of the pathophysiology

An imbalance in capillary clearance and lymph drainage causes lymphedema i.e., fluid and protein to accumulate in the extravascular and interstitial spaces of the affected limb (5). In other words, an inherent fault in the lymph vessels (primary lymph and vein) or damage to the lymph vessels or nodes (secondary lymph nodes) creates lymphedema (6). Secondary lymphedema remains a challenge for breast cancer survivors (7).

Incidence and etiology

In the United States, there is a high incidence of secondary lymphedema following medical or surgical procedures, such as radiotherapy or mastectomy, which may impair the lymphatic flow (8). Approximately 30% of breast cancer survivors in the United States have lymphedema after the breast cancer surgery (9). Many factors contribute to lymphedema such as axillary lymph nodes dissection (ALND), radiation therapy, and postoperative infection (5). It should be mentioned that secondary lymphedema can occur at any time after the cancer treatment, but usually 80% of breast cancer patients develop it within the first 3 years of treatment (8).

Clinical manifestations

It consists of swelling in part or the entire arm and fingers, a feeling of heaviness or tightness, restricted range of motion, aching or discomfort, recurring infections and hardening, and thickening of the skin (fibrosis) (8). These cause a functional impairment (10) such as a loss of functional capacity affecting patient's ability to work.

Table 1. The results of a systematic review [19] for evaluating the rehabilitation interventions in patients undergoing the breast cancer treatment

	Treatment Procedure	Advantages
1	Exercise and physical activities	- Increase the mobility in the shoulder complex - Decrease lymphedema, pain, and fatigue in the affected upper limb - Improve the quality of life
2	Yoga	- Decreases anxiety and depression - Improves sleep disturbance - Decreases fatigue and gastrointestinal symptoms - Significant effect on the quality of life
3	Complementary and alternative medicine	The positive effect on nausea, pain, fatigue, anger, and anxiety
4	lymphedema interventions	- Volume reduction and muscle strength - Improve the quality of life
5	Psychosocial interventions	- Positive effect on anxiety, depression, and mood disturbance - Improve the quality of life

Table 2. rehabilitation treatment advantages of lymphedema

	Treatment Procedure	**Advantages**
1	Complex decongestive therapy (consists of manual lymph drainage, exercise therapy, compression bandage, and skin care).	- Improves lymphatic function - Improves quality of life - Reduces edema volume - Reduces intensity of pain and arm heaviness - Reduces the incidence of cellulitis
2	Physical Exercise	- Safe and does not worsen lymphedema - Improves patients psychosocial and physical conditions - Improves active lifestyles
3	Pneumatic compression	- Reduces frequency of outpatient and inpatient services - Reduces manual therapy - Reduces costs - Reduces incidence of cellulitis

Medical diagnosis

The history of a surgical procedure is important for the diagnosis of lymphedema. Some imaging modalities in medicine standard (*e.g.*, CT or MRI scans, mammography, and diagnostic ultrasound) may confirm it. In addition, the patients' evaluation who are at risk for unilateral lymphedema, consists of a side-by-side comparison to circumferential measurements (mild <3 cm; moderate 3-5 cm; and severe <5 cm) and upper extremity volume (mild <20%; moderate 20-40%; and severe <40% increase in limb volume) (8). Also, the sensory integrity and calculation of body mass index (BMI) should be considered (8).

Prognosis

Lymphedema may develop slowly after the surgery or radiation therapy and disappears over time (18 to 24 months or more) [8]. Lymphedema is usually painless, however, some researchers showed there are several different types of pain in the affected area (*i.e.*, severe pressure, feeling stretched, neuropathy, and pain caused by infection or inflammation) (8). Early diagnosis and interventions (*e.g.*, education, exercise with or without manual therapy, and compression) play an important role in a good prognosis (*e.g.*, 59% volume reduction within 16 days) (8). Although patients with stage IV cancers do not expect the good results; physical therapy and weight management should be used throughout their life to prevent the recurrence or exacerbation (8).

Early identification and intervention for lymphedema after the breast cancer are the key components of treatment. Several symptoms are more common including larger arm size, firmness/tightness, numbness, anxiety, depression, memory, and attentiveness. Management of long-term side effects of breast cancer treatment has main role to improve quality of life (QOL) of these survivors (11, 12). Rehabilitation includes the inputs from the different health professionals such as physical therapy, occupational therapy, psychosocial, cognitive (12) that have important role for decreasing those symptoms (12-14). Physical therapy methods (manual lymph drainage and standard physiotherapy) and exercise interventions (home based exercise routine and weight training) can restore the impaired physical mobility and limited social function in women with breast cancer, and also decrease time needed for returning to work (15-17).

Management and Treatment:

Radical mastectomy lymphedema causes chronic or recurrent edema in the affected side (arm, chest and upper back). The alignment and mobility of spine are disturbed due to unilateral lymphedema (18). Thus, postural correction should be considered when managing a patient who is suffering from unilateral lymphedema. In addition, a prospective study (between 2005 and 2017) including 2171 women who received the surgery for the unilateral or bilateral breast cancer at institution, showed that the time course for lymphedema development depended on the treatment strategies (19).

Table 1 shows five rehabilitation interventions and their benefits, taken from a recent systematic review study (20).

Therapeutic exercise of patients with lymphedema consists of positioning (gravity has an effect on venous drainage), active range of motion exercise (causing muscular pumps for moving fluid proximal through the veins and lymphatic system), flexibility exercises (create a greater range of joint), anaerobic exercise, aerobic exercise (it assists with lymphatic return), and breathing exercises (improve the respiratory pump and lymphatic return) (8). In addition, one of the main modalities is compression therapy (8); and also, obesity reduces the effectiveness of treatment (21).

On the other hand, Ezzo *et al.* (4, 21) reported that manual lymph therapy is safe and can reduce swelling; especially, if using in mild to moderate lymphedema is associated with an intensive course of compression bandage treatment. The benefits of manual therapy techniques (MTT) include increasing lymph formation, propelling lymph proximal, increasing lymph angiomotoricity, rerouting stagnated lymph fluid, encouraging development of collateral circulation, reducing sympathetic nervous system stimulation, decreasing pain, and promoting relaxation (8) In other word, manual lymph drainage is a massage technique applying a rhythmic pumping, stimulate lymphatic contractility, and increasing lymphatic drainage (21).

He *et al.* showed the characteristics of current lymphedema physical therapy treatment (Table 2): (21)

In addition, He *et al.* (21) mentioned about some surgical treatments for lymphedema in breast cancer survivors as follows:

1) Lymphatic venous end-to-end anastomoses which can be used only in the early stage of lymphedema, reduces limb volume or circumference, improves quality of life, minimizes trauma, lowers the risk of complications, and can be performed under the local anesthesia.

2) Vascularized lymph node transfer which can be used only in the moderate-to-advanced stage of lymphedema, reduces limb volume or circumference as well as the incidence of cellulitis, improves quality of life, and donor-site lymphedema ((DSL)) is a potential complication.

3) Liposuction which removes excess adipose tissue, improves lymph flow, increases blood flow to the skin, and reduces the incidence of erysipelas and cellulitis.

Conclusion

Lymphedema is a major problem for breast cancer survivors and causes arm swelling. Patients (with high BMI) who undergo surgery due to breast cancer, should be screened for lymphedema. It is a potentially devastating complication, but the timing of lymphedema development is unknown and further studies need to find the role of chemotherapy and hypertension in the lymphedema development.

Recently, the knowledge about the effects of breast cancer rehabilitation is expanding and some studies showed the positive and significant effects of physical therapy, yoga, complementary and alternative medicine, lymphatic therapy, and psychosocial interventions.

I would suggest a useful physical therapy protocol for lymphedema of breast cancer survivors which may be education, light exercises for encouraging lymph fluid drainage, pneumatic compression, and combined techniques such as massage, compression garment, arm bandage and manual lymph drainage, postural correction, and shoulder mobility in affected side and breathing exercise. We also need more investigations to analyze the research literature that has examined the effectiveness of physical therapy in the management of lymphedema following treatment for breast cancer and suggest new therapeutics with focus on particular range of motion, strength, and shoulder function.

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