

FUTURISTIC TRENDS IN PHYSIOTHERAPY MANAGEMENT OF BREAST CANCER RELATED LYMPHEDEMA

Abstract

A persistent illness known as breast cancer-related lymphedema is marked by the build-up of lymphatic fluid in the affected limb following breast cancer treatment. The entire care of lymphedema relies heavily on physical therapy, which aims to improve patients' quality of life while lowering swelling and limb dysfunction. Recent improvements in physiotherapy methods have produced encouraging outcomes in the treatment of this illness. Complicated decongestive therapy, manual lymphatic drainage, compression therapy, exercise regimens, and patient education are a few of these.

Additionally, emerging technologies such as pneumatic compression devices and laser therapy are being explored as potential adjunctive treatments. Evidence-based research has demonstrated the effectiveness of these interventions in reducing lymphedema volume, improving range of motion, and alleviating symptoms. Furthermore, advancements in tele rehabilitation have expanded access to physiotherapy services, allowing patients to receive remote guidance and support.

These most current developments in physiotherapy management, taken collectively, have enormous potential to enhance results and raise quality of life. This chapter details the appropriate or anticipated course of treatment for breast cancer-related lymphedema and also emphasizes the value of various physiotherapeutic measures in reducing the risk of problems following surgery.

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I. INTRODUCTION

Breast cancer, which affects more women than any other type of cancer worldwide, is the second most prevalent cause of cancer-related death among women. Breast cancer refers to tumors that form in breast tissue, most usually in the milk-producing lobules or the ducts' inner lining. Breast cancer is a metastatic condition that frequently invades the bone, liver, lungs, and brain.

The following factors can increase your risk of developing breast cancer: a family history of the disease, a personal history of the disease, hormonal factors, environmental factors, a change in lifestyle, and nutritional factors.

The major complications involved in breast cancer are arm lymphedema, axillary web syndrome, radiotherapy, neurological, coagulopathic and hepatic complications. The most dreaded post-breast cancer surgery consequence, lymphedema frequently causes functional, esthetic, and psychological impairment in the upper limbs. Lymphedema is the accumulation of fluid under the skin as a result of insufficient lymphatic system drainage, which causes swelling in the affected area. Lymphedema can also be categorized as acute or chronic depending on when it develops. During breast cancer therapy, upper extremity lymphedema is a common medical consequence marked by abnormal tissue swelling in the extremity.

The signs and symptoms usually seen in breast cancer lymphedema are swelling in limbs, persistent inflammation, limited range of motion, tenderness, edema and stiffness. There are various factors that increase the risk of lymphedema such as lack of reconstruction, age and family, high BMI, obesity or reproductive factors.

Regular screening enables the early identification of lymphedema and its treatment, which can prevent the edema from advancing. Physicians need to have a thorough understanding of the diagnosis and severity of upper limb lymphedema in order to treat patients effectively. Clinical diagnoses of BCRL have historically been made by medical practitioners based on their subjective assessments of edema. Various methods included in diagnosis of lymphedema are water displacement, perometry, bioimpedance spectroscopy and computed tomography. A patient's quality of life may be improved by early detection and prevention. Precautionary recommendations for lymphedema patients include avoiding needle jabs, avoiding limb constriction, elevating the affected limb, maintaining a normal body weight, and avoiding strenuous exercise.

The primary goal of treating lymphedema is to reduce edema volume and hence improve the patient's quality of life and functional capabilities. Currently, BCRL can be treated surgically and non-surgically. It can be difficult to decide which approach is appropriate for an individual patient.

Several techniques have been employed in the management of BCRL by physiotherapy, with varied degrees of success. Effective treatments for BCRL include pneumatic compression, active resistive exercises with sophisticated decongestive

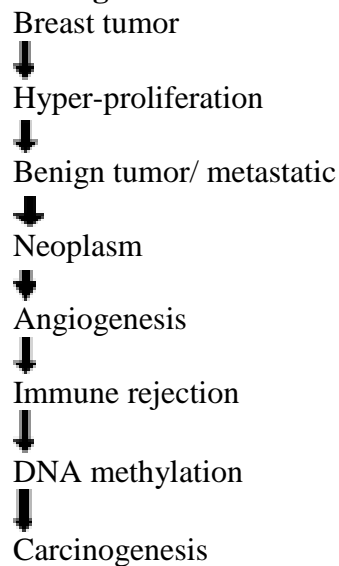
physiotherapy, physical therapy, and low level laser therapy (LLLT). This chapter will highlight the effectiveness of a variety of treatments available for BCRL.

II. PREVALENCE AND EPIDEMIOLOGY

Breast cancer is the second-leading cause of cancer-related deaths in females. It is the second most frequent cause of cancer-related death for women in the United States, and it is the most typical cancer in females worldwide.

Breast cancer refers to tumors that form in breast tissue, most usually in the lobules that supply milk to the milk ducts or the inner lining of the ducts. Cancer may arise if the immune system is ineffective or if the quantity of cells produced is too great for the immune system to eradicate. Breast cancer is still challenging to avoid internationally due to its multi-step process and involvement of many cell types. Early detection is one of the best defenses against breast cancer. Early identification has led to a 5-year relative survival rate for breast cancer patients that is above 80% in several industrialized countries. Breast cancer spreads to distant organs such the bone, liver, lung, and brain frequently and is an incurable metastatic cancer.

1. Pathogenesis of Breast cancer:



- Lymphedema:** Insufficient lymphatic system drainage results in lymphedema, which is an accumulation of fluid under the skin that causes swelling in the affected area. One of the most dreaded side effects of breast cancer surgery is lymphedema, which frequently causes functional, esthetic, and psychological impairment in the upper limbs. Lymphedema is a chronic condition marked by areas of high protein content. Between 0% and 77% of breast cancer patients had lymphedema, according to reports. Lymphedema can also be categorized as acute or chronic depending on when it develops.

Acute breast cancer lymphedema typically develops three to six months after a mastectomy and manifests as a pitting, temporary, and self-limited swelling of the upper limbs. Instead, chronic lymphedema, which is characterized as a non-pitting upper limb

edema associated with skin abnormalities and a high risk of developing ulcers and infections, is present for at least three months. All of these facts demonstrate that lymphedema is a chronic illness, according to The International Society of Lymphology Staging System.

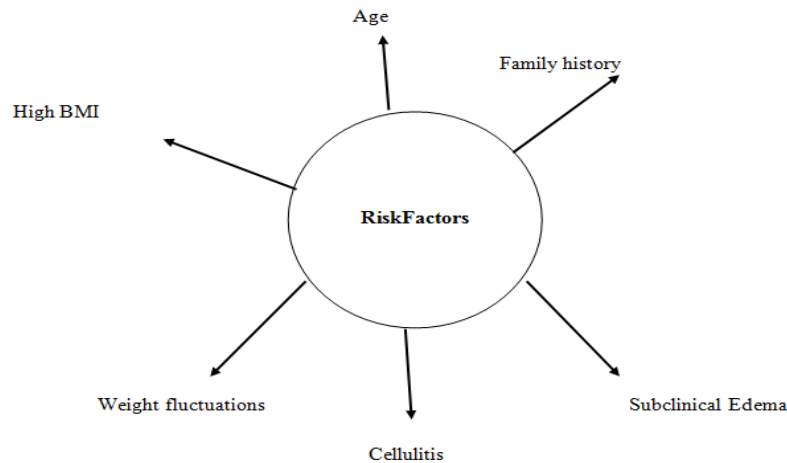
- **Stage 0:** subclinical or latent (swelling is present but not yet clinically evident despite decreased lymph transport) .
 - **Stage 1:** initial fluid buildup (tissue edema is clinically evident, reduces with limb elevation, and may pit).
 - **Stage 2:** Advanced fluid accumulation (limb elevation alone rarely reduces edema, pitting is evident, and recently, tissue fibrosis has overtaken it)
 - **Stage 3:** Lymphostatic elephantiasis, in which trophic skin alterations such as acanthosis and adipose hypertrophy emerge in the absence of pitting. Based on variations in limb volume throughout each stage, lymphedema severity can be categorized.
 - Breast cancer treatment frequently results in upper extremities lymphedema, which is defined by abnormal tissue swelling in the extremity.
- 3. How does lymphedema occur?:** It becomes worse when the axillary drainage system, which is a part of operations or laser therapy, becomes dysfunctional. The chest, ribs, and hand are the only parts of the upper body from which lymph fluids drain to the axillary nodes. When more lymph nodes and veins are removed, this flow is more likely to be impacted, which could lead to lymphedema.

Signs and symptoms

- ripping of tissues
- Infection
- minimal movement
- Heaviness
- Hardness
- Tenderness
- Soreness
- Numbness
- constant swelling
- Edema
- Itching
- Stiffness
- weakened limb movements
- sensory dysfunction
- Weakness in the grip
- Acute thrombosis, low back pain, disc pain, osteoarthritis, rheumatoid arthritis, infections, or musculoskeletal diseases including adhesive capsulitis and rotator cuff illness are all examples of skin problems.
- A poorer quality for the patient and body image.
- Difficulty carrying out certain daily tasks, such as putting on a bra, tying shoes, shampooing one's hair, or hanging up laundry.

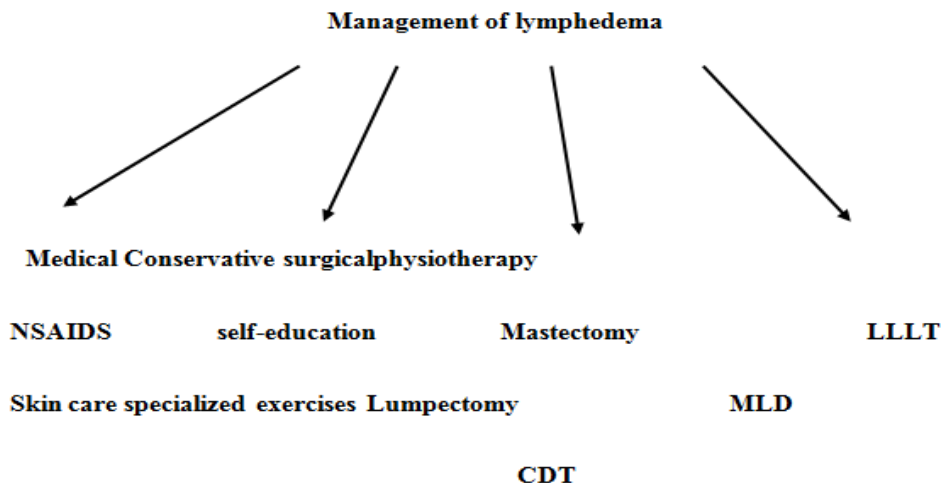
- Weakness and hearing loss under high doses of chemotherapy, hormone therapy, and radiation therapy.
- External changes, psychological thoughts, and outward manifestations of depression, sadness, and loneliness

4. Risk Factors:



- Age
- Inadequate reconstruction
- Family background
- Estrogen
- Reproductive influences
- High BMI
- Weight fluctuations: Lymphedema was more likely to develop in obese women.
- Edema that is not yet clinical
- Lymph nodes receive radiation therapy
- Cellulitis

III.MANAGEMENT OF BCRL (BREAST CANCER RELATED LYPHHEDEMA)



- 1. Conservative Treatments:** For extremity lymphedema, CDT is usually regarded as the standard first-line treatment. It comprises self-education, skin care, specialized workouts, compression clothing, and manual lymph drainage (MLD). To increase its efficacy and control costs, CDT is separated into two phases: Phase I Decongestion and Phase II Maintenance . A CDT can benefit from a number of things, including:
 - Lymphatic Drainage Is Improved,
 - Lymphedema Volume, Discomfort, And Arm Heaviness Are Reduced.
 - A Reasonable Quality Of Life;
 - Fewer Cases Of Cellulitis

Although conservative therapy alone may be able to alleviate symptoms sufficiently, The ability of the patient to wear compression clothing for the rest of their lives and their compliance with the treatment plan are key factors in its effectiveness.

- 2. Compression Bandages and Compression Garments:** By using compression bandages, CDT largely maintains the therapeutic effects of MLD. A resting pressure is applied by compression bandages while the limb is at rest; and A working pressure created when muscles contract and push the skin up against the bandages. Low-stretch bandages produce the highest working pressure when used with multiple layers of compression bandaging. Compressive multilayer bandaging was used to activate lymphatic capillaries and enhance lymphatic outflow by externally raising tissue pressure in accordance with the concept of progressively increasing compression. After the MLD application and the exercise program, bandaging was done every day for three weeks. The compressive multilayer bandage consists of a stockinette sleeve, a soft cotton wrap, gauze fingers, two to three layers of short-stretch bandaging with different widths, depending on the area to which it is applied. Before the next appointment, the bandage should be left on for 21–23 hours. Since the goal of CDT is to maintain the volume reduction caused by MLD and bandaging, compression clothing is a crucial component. The most pressure is applied above the wrist and the least pressure is applied to the arm when wearing compression gear, which results in a two-way stretch in both the longitudinal and transverse directions.

There needs to be longitudinal pressure for the joints to move. Patients with BCRL often use full arm sleeves and gloves to prevent cutaneous backflow. There is no consensus on the proper compression levels. On average, 12 hours per day should be spent wearing class 2 compression garments with 30-40 seamless.

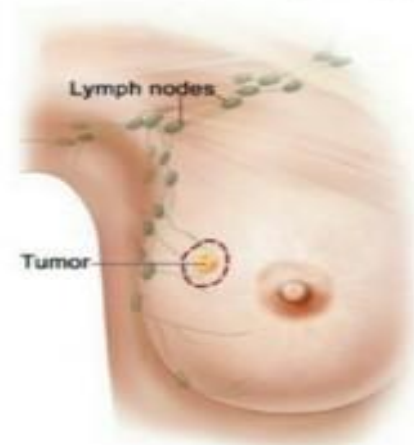
- 3. Exercises and Life-Style:** Patients with a confirmed diagnosis of breast cancer as well as those who run the risk of developing lymphedema should exercise frequently as part of their treatment. This panel encourages cancer patients to stay active, continuing daily activity while receiving adjuvant therapy, and soon resuming daily activity after surgery. Numerous exercise trials in women with breast cancer show that a progressive program of regular aerobic and resistance exercise is safe and does not trigger BCRL. Exercises are an essential part of CDT with the objectives of
 - Promoting Lymphatic Flow,
 - Facilitating Joint Movement,
 - Enhancing Muscle Strength.



Figure 1: Exercise for Lymphedema Caused by Breast Cancer

4. **Exercise Program:** The exercise program also included exercises for diaphragmatic breathing, posture and trapezius stretching, shoulder girdle mobilization, upper extremity range of motion, shoulder abductor and flexor strength, strengthening of the elbow flexors, and ball squeeze exercises. Participating in exercise has been shown to enhance physical and psychosocial conditions, hence enhancing quality of life, both during and after cancer treatment. Recent studies showed that compared to patients who do not exercise. The risk of BCRL is not made worse by a moderate weightlifting program.
5. **Surgical Treatments:** Depending on the size and kind of the tumor, either a lumpectomy (removal of the lump alone) or a mastectomy (surgical removal of the entire breast) may be required. According to conventional practice, the surgeon must attest that the tissue removed during the surgery has margins free of malignancy, indicating that the cancer has been completely excised.

Breast-Conserving Surgery

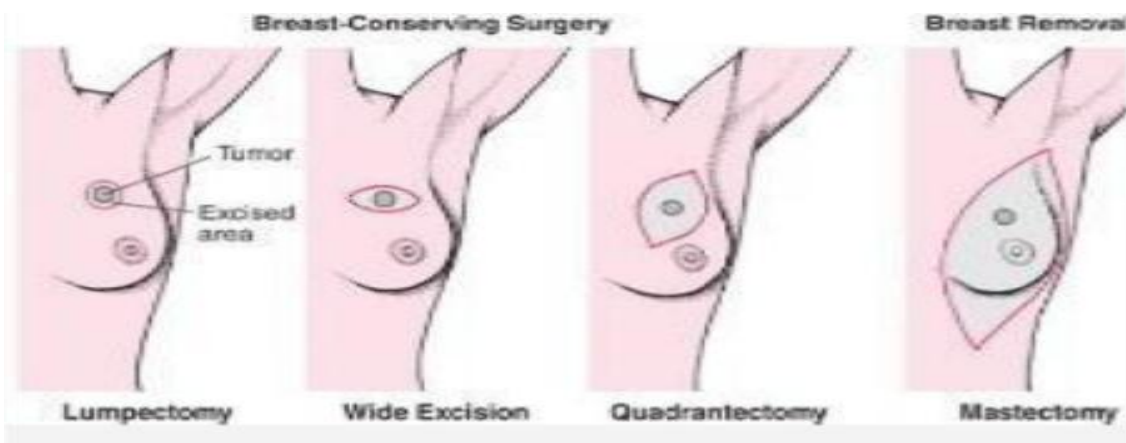


Total (Simple) Mastectomy



If the removed tissue does not have clean margins, further procedures to remove more tissue might be necessary.

Breast-conserving surgery just eliminates the tumor and a small amount of the surrounding healthy tissue. The following procedures are part of breast conserving surgery:



- 6. Physiotherapy Management :** Several techniques have been used in the treatment of BCRL with physiotherapy, with varied degrees of success. Compression bandages, physical activity (aqua lymph training, swimming, yoga, aerobics), kinesiological taping, low level laser therapy (LLLT), and advanced pneumatic compression device (APCD) are all used during the management and home maintenance phase of BCRL.
- 7. Manual Lymphatic Drainage:** It has been shown that the specific type of massage known as MLD has a number of physiological consequences.
- 8. Method:** The MLD skin massage technique uses precise hand movements to improve lymphatic flow without increasing capillary filtration. It softens fibrotic stiffness and eliminates interstitial fluid that has built up in tissues. The regular and gentle movements go in the lymph flow's direction. MLD was used on the affected limb's side, starting with the removal of any lymph nodes in the supraclavicular and axillary regions. The lymphatics on the lateral side of the belly, shoulder, and axillo-axillary anastomoses were activated and moved toward the edematous limb. Usually, the massage was given proximally, starting with the upper arm, continuing to the axilla, then to the finger, hand, elbow, and shoulder. MLD was performed with a gentle, sweeping motion with just enough pressure to change the skin's surface.
- 9. Low – Level Laser Therapy:** Recently, attention has been drawn to low level laser therapy (LLLT), also known as photobiomodulation (PBM) therapy, as a non-pharmacological therapeutic option for BCRL. A non-invasive form of phototherapy is LLLT (PBM). With little irradiance, it modulates biological processes in the target tissue using light with wavelengths between 650 and 1000 nm. LLLT (PBM) has been found to be a safe technique. Numerous experimental studies have shown that LLLT (PBM) is effective in reducing inflammation, promoting lymph vessel regeneration, increasing lymphatic motility, and preventing tissue fibrosis. On the other hand, the crucial approach to LLLT (PBM) uses cellular-level biochemical changes. During the course of the therapy, changes are made to lymphocytes, smooth cells, fibroblasts, and osteoblasts. The LLLT has drawn a lot of interest. Numerous ailments, including lymphedema and musculoskeletal issues, have been treated with it.
- 10. Complex Decongestive Therapy :** Compression therapy, manual lymphatic drainage (MLD), therapeutic exercise, and skin care are also included in the most popular therapy, known as CDT. Despite the fact that CDT is the most popular treatment for lymphedema, it has been noticed that combining approaches yields a more complete and efficient course of care. Effective treatment can enhance the quality of life for lymphedema-afflicted breast cancer patients. The initial phase of CDT consists of exercises, skin care, manual lymphatic drainage (MLD), and compressive multilayer bandaging. The second phase aims to protect and maximize the gains obtained in the first by incorporating skin care, therapeutic exercise, a compression sleeve, and, if necessary, mild massage. It has been shown that bandaging, MLD, and CDT can all lessen lymphedema.

IV. CONCLUSION

Physiotherapy intervention for BCRL is supported by evidence at various evidence levels. The reduction in arm volume brought on by Low Level Laser Treatment (LLLTT), Kinesiotaping Exercise, and (KT) can be inferred from the available data as being justified. The following moderate evidence indicates Active resistance training is a further strategy, along with compression bandaging for minimizing lymphedema pressure. The residential phase of treatment for the arm with persistent lymphedema uses the Advanced Pneumatic Device for Compression (APCD, Flexi touch) system. There is substantial proof. recommending manual lymphatic drainage Intermittent pneumatic and (MLD) PCcompression is effective for treatment of lymphedema.

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