

REHABILITATION IN BREAST CANCER

Abstract

This chapter provides a comprehensive overview of breast cancer, covering its global impact, risk factors, pathophysiology, and various management strategies. The text describes the benefits and potential complications associated with breast cancer management. Emphasis is placed on the importance of onco-rehabilitation, with specific exercises outlined for post-surgery care, lymphedema management, and addressing chemotherapy induced peripheral neuropathy. The chapter also emphasizes the importance of psychological rehabilitation, highlighting the role of counselling and supportive therapies in enhancing patients' mental health and overall quality of life throughout the cancer journey.

Keywords: Breast Cancer, Pathophysiology, Chemotherapy, Lymphedema Management.

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Breast cancer is a serious health concern affecting women globally. It stands as the frequently occurring cancer, holding the position of the fifth primary contributor to cancer-linked fatalities. Shockingly, around 2.3 million new cases are estimated to emerge worldwide, as reported by GLOBOCAN 2020 data. The World Health Organization (WHO) highlights the immense impact of malignant neoplasms on women, accounting for approximately 107.8 million Disability-Adjusted Life Years (DALYs). Within this burden, breast cancer stands out, contributing to 19.6 million DALYs. Tragically, breast cancer is also the primary cause of cancer-related deaths among women worldwide [1].

- 1. Risk Factors:** Breast cancer has a substantial list of risk factors, which can be divided into two categories: Modifiable and Non-Modifiable, that are listed in table 1.

Table 1: Risk Factors of Breast Cancer

Non-Modifiable Risk Factor	Modifiable Risk Factor
Sex	Hormonal replacement therapy
Age	Physical activity
Family History of breast and ovarian cancer	Overweight/obesity
Genetic mutations	Alcohol intake
Race/ethnicity	Smoking
Pregnancy and breastfeeding	Insufficient vitamin supplementation
Menstrual period and menopause	Excessive exposure to artificial light
Density of breast tissue	Intake of processed food
Previous history of breast cancer	Exposure to chemicals
Non-cancerous breast diseases	Other drugs
Previous radiation therapy	

Adapted from Breast cancer - epidemiology, risk factors, classification, prognostic markers, and current treatment strategies—an updated review by Lukasiewicz S, Czezelewski M, Forma A, Baj J, Sitarz R, Stanislawek A. *Cancers* 2021, 13(17), 4287; <https://doi.org/10.3390/cancers13174287>.

- 2. Pathophysiology:** Breast cancer develops when DNA damage and genetic changes occur, that is often triggered by estrogen exposure. In certain cases, there's an inherited presence of faulty DNA or genes that promote cancer, such as BRCA1 and BRCA2. Consequently, the likelihood of developing breast cancer increases if there is family history of ovarian or breast cancer. In a healthy person, the immune system combats cells with abnormal DNA or irregular growth. However, this defence mechanism fails in individuals with breast cancer, allowing tumors to form and spread [2].

I. CLASSIFICATION

Carcinoma of Breast are broadly classified as [3,4,5]:

- 1. Carcinoma in Situ:** Since they don't penetrate the basement membrane, they are non-invasive. Ductal and lobular carcinomas in situ are the two primary kinds that are typically distinguished. Stage 0 or intraductal carcinoma is another name for ductal

carcinoma in situ. Breast cancer can be pre-invasive or non-invasive. This shows that the duct-lining cells have changed into cancer cells, but they haven't spread into the breast tissue around the ducts. As a normal lobule with swollen and filled acini (small sacs within the lobule), lobular cancer in situ is distinguished by this similarity to a normal lobule. In other words, although lobular carcinoma in situ contains aberrant cell development within the lobules, it resembles healthy breast tissue externally.

- 2. Invasive Breast Cancers:** These cells invade irregularly into the surrounding stroma, either scattering in varying amounts or forming sheets of consistent cells that disregard the typical structure and purpose of a glandular organ. These are broadly classified into ductal and lobular histologic types. Invasive ductal carcinoma, also known as infiltrating ductal carcinoma, accounts for 50% to 70% , and is the most common type of invasive cancer. It usually grows together as a solid lump and shows up as clear differences on mammograms. It can be often felt as a separate lump in the breast, and it's usually smaller than the lumpy kind of breast cancers. Invasive lobular carcinoma on the other hand accounts for 10% of breast cancers that has a tendency to spread through the breast in a single-file pattern. This is why it's often hard to spot during exams or mammograms until the disease is extensive.
- 3. Less Common Types of Invasive Breast Cancer:** Certain unique kinds of breast cancer fall under the category of invasive carcinoma subtypes. These are rarer compared to the types of breast cancer mentioned earlier, and each of them usually makes up less than 5% of all breast cancers. These special types are often named based on how their cells are organized when examined under a microscope, focusing on distinct features.

Some of these may have a better prognosis than the more common IDC. These include:

- Adenoid cystic (or adenocystic) carcinoma.
- Low-grade adenosquamous carcinoma (this is a type of metaplastic carcinoma).
- Medullary carcinoma
- Mucinous (or colloid) carcinoma.
- Papillary carcinoma.
- Tubular carcinoma.

Some sub-types have the same or maybe worse prognoses than IDC. These include:

- Metaplastic carcinoma (most types, including spindle cell and squamous, except
- Low grade adenosquamous carcinoma).
- Micropapillary carcinoma.
- Mixed carcinoma (has features of both invasive ductal and lobular).

II. CLINICAL FEATURES

- 1. Palpable Lump in the Breast:** About half of the lumps are often found near the upper part of the breast, close to the axilla. However, these can appear anywhere in the breast, and it's important to know that breast cancer can be detected even without a lump being present in many cases.

2. **Tenderness in Breast:** In case of lump, the breast may be tender, or it may feel normal. The patient may feel some discomfort or sometimes pulling sensation in the breast. Freely moving lump are usually harmless. The lump that are non-movable or that which makes the skin looks bumpy or puckering, are usually cancerous. However, further tests would be needed to determine the nature of the growth.
4. **Discharge from One of the Nipples:** It is the second most typical indicator of a possible issue. The discharge could be colorless, crimson, or clear. It's crucial to realize that a discharge in a woman who isn't breastfeeding can be quite natural. In this instance, unlike in cases of cancer, a tiny amount of fluid typically emanates from many apertures in both breasts. A spontaneous discharge that appears without pressing on the breast is far more concerning. An underlying mass may be present if a discharge in one breast is originating from the same general area. Although a bloody discharge during pregnancy is not uncommon, it can potentially be a serious cancer warning sign.
5. **Change in the Shape or Size of the Breast:** Sore nipple or retraction might occur within the breast, accompanied by the presence of scaly, reddish, or swollen skin around the nipple region.

III. INVESTIGATION [5,6]:

1. **Biopsy:** Even if there is no palpable lump seen during manual inspection, a biopsy must be performed if a nipple is inflamed, encrusted, has scaly or if it is oozing a bloody fluid.
2. **Fine Needle Aspiration:** FNAC can be used if the mass is merely a cyst and not a malignancy. To remove the fluid, a thin needle is placed into the mass. Local anaesthetic is typically used during the surgery. If the lump is actually a cyst, the sac will burst once the fluid is taken out, and the mass will vanish instantly. In this instance, a mammography must be performed for confirmation, along with a subsequent physical exam a few weeks later. There is usually no further cause for concern if the lump has not reappeared. However, a follow-up biopsy is always recommended if the clinician is unable to obtain any fluid, the fluid is bloody, the lump does not totally dissolve after the fluid is extracted, the "cyst" returns after two "successful" aspirations, or the mammography is worrisome. A core needle biopsy, which uses a bigger needle to collect tissue samples from the tumor, and surgical biopsies are further potential procedures.
3. **Mammogram:** Mammography is a well-known diagnostic technique used to find and evaluate breast lumps. It aids in locating parenchyma deformation and microcalcifications, two crucial indicators of possible malignancy. Mammography involves gently pressing the breast between the two plates to get clear images. While it's a valuable tool for detecting both known and small, undetectable lumps, some women find it uncomfortable. Each breast is imaged from two separate angles, the oblique and craniocaudal, utilizing an X-ray exposure that is often less than 1.5 mGy in conventional mammograms. Mammograms play a crucial role as they can reveal tumors that are still too small to be felt by touch, allowing for early detection and intervention. Some tumors might grow for years before becoming noticeable. However, it's important to note that a mammogram alone cannot establish the malignancy. A biopsy is necessary to determine whether a mass is cancerous.

- 4. Ultrasonogram:** An ultrasonogram, also known as an ultrasound scan, is an affordable diagnostic tool that creates an image by bouncing sound waves off a mass in the breast. Compared to a needle biopsy, an ultrasound scan takes more time and might not provide as conclusive results. However, in cases of younger women with denser breast tissue, when it can be difficult to identify abnormalities clearly on a mammography, it becomes especially useful. It is especially useful for locating lumps in the breast that are deep and difficult to feel or reach with a needle. It allows healthcare professionals to evaluate these hidden masses accurately. While mammography is excellent for detecting most breast abnormalities, ultrasound serves as a complementary tool to provide a more comprehensive evaluation, especially for hard-to-reach areas. It plays a crucial role in diagnosing breast conditions and guiding further investigations or treatments when needed.
- 5. MRI:** Especially helpful in identifying malignancy when it is mammographically obscure or modest (lobular carcinoma). It can distinguish between cancer and scar tissue. thus can identify local recurrence following surgery. When determining how the tumor has responded to neoadjuvant treatment, MRI is preferable to mammography. Additionally, studies on thick breasts and during pregnancy is more beneficial.
- 6. Steroid Hormone Receptors:** The prognosis of breast cancer and the direction of hormone and endocrine therapy are significantly influenced by intracellular steroid hormone receptor proteins, particularly estrogen receptors (ER) and progesterone receptors (PR). Detectable levels of estrogen receptors are present in 50% to 85% of breast cancer which are invasive in nature. Age-related increases in estrogen receptors concentration typically occur, with postmenopausal patients exhibiting the highest levels. In healthy individuals, the normal value of estrogen Receptor is less than 10 Femtomoles per milligram proteins. If the ER level is equal to or higher than 10 fmol/mg proteins, it is considered positive. In some cases, the upper levels of ER can go as high as 1000 Femtomoles per milligramproteins. Measuring the presence and amount of ER in breast cancer cells is essential because it helps determine the appropriate treatment approach. If the cancer cells have high levels of estrogen receptor, hormone therapy might be effective in controlling the growth of the tumor. Understanding the status of ER and PR in breast cancer is crucial for tailoring personalized treatment plans and predicting patient outcomes. The presence of ER in breast cancer indicates that the cancer cells are still responsive to estrogen, which means that the normal cellular mechanism for processing estrogen is retained despite the malignancy. This is crucial information for treatment decisions. Those having malignancies that are estrogen receptor positive tend to have better outcomes compared to those with estrogen receptor negative tumors. After the initial therapy, they have better overall survival, longer disease-free survival, and longer survival even after a recurrence of the illness. Before starting hormonal therapy, Steroid hormone receptor levels must be monitored and measured especially estrogen receptor and progesterone receptor. Depending on the receptor status, whether positive or negative, the appropriate hormonal therapy is chosen. In most cases, tamoxifen is beneficial for all patients except for premenopausal patients with ER/PR-negative tumors. Tamoxifen treatment begins after the completion of chemotherapy and is typically given for a duration of 5 years.
- 7. HER-2/neu Receptor:** ER negative and high-grade tumors are frequently connected with the HER-2/neu receptor, which has a bad prognosis.

8. **Antigen Ki-67:** It is a cellular marker of proliferation, and the Ki-67 proliferation index is a great marker to give information on the proliferation of malignant cells, notably in the case of breast cancer. The proliferative activity assessed by Ki-67 are a reflection of the cancer's aggressiveness, treatment response, and time between recurrences.
9. **Chest X-ray:** Rules out secondaries in lung, Pleural effusion, or widening of mediastinum.
10. **Abdominal Ultrasonography:** To rule out ascites, rectouterine deposits, and secondaries in the liver. In 6% of Ca breast cancer cases, liver metastasis occurs. Only hepatomegaly, any LFT abnormality, or stage III or IV diagnoses warrant routine USG abdomen.
11. **Bone Scan:** To rule out Incidence of bone metastasis.

IV. STAGES OF BREAST CARCINOMA

The stage of the disease is determined by both the extent to which cancerous cells have spread throughout the breast tissue as well as the type of cells that have been affected. In comparison, stage 0 included the infiltrating type of non-invasive cancer and advanced cancer in stage 4. [3].

Stage 0: DCIS, or ductal cell carcinoma in situ, is a good example of such a disease stage since it reveals that both malignant and non-malignant cells have been contained inside the boundaries of either the region of a breast where the cancer cells first emerge. This stage of the illness occurs when the cancer cells are still in the early stages of their development.

Stage 1: There is still the possibility of a microscopic invasion, and therefore, each stage can be thought of as a form of cancer that spreads by infiltrating healthy tissue. There are two variations of this stage: stage 1A and stage 1B. stage 1A refers to cancers that are very small and are not associated with any lymphatic system, whereas stage 1B refers to a small cluster of tumor tissue that is larger than 0.2 millimetres and is found in a lymph system. Both of these stages are considered malignancies.

Stage 2: The staging process includes two variations known as 2A and 2B. In stage 2A, breast cancer is detected in the lymphatic and circulatory systems but has not spread to the chest cavity. The tumor size can vary, ranging from less than 2 centimeters to over 5 centimeters. In contrast, stage 2B indicates that the cancer might be more than 5 cm in size but has not yet reached the axillary lymph nodes, which are located in the armpit area.

Stage 3: This stage is further divided into three categories namely 3A, 3B, and 3C. In stage 3A, the cancerous cells have not been detected inside the chest, but they may be present in four to nine axillary lymph nodes or in the sentinel nodes. In stage 3B, the cancer has grown into the skin of the breast, causing inflammation and an ulcer. It may have also spread to as many as nine axillary lymph nodes (nodes in the armpit) or even just to the sentinel lymph node (the first node where cancer is likely to spread). In some cases, the tumor may appear red, warm, and swollen, which is why it is sometimes classified as inflammatory. In Stage 3C, involves the expansion of the malignancy to ten or more lymph nodes.

Stage 4: Progression stage of the illness refers to the spread of the disease to further organ systems, such as in liver, in brain, in lungs, in bones, and so on.

V. MANAGEMENT

Reducing the chance of recurrence and the risk of metastasis are the two primary objective of treatment. Cancer can be locally controlled by surgery, radiation, or both. When there is a chance of metastatic relapse, systemic therapy—which can take the form of hormone therapy, chemotherapy, targeted therapy, or any combination of these—is recommended. Systemic therapy is utilized in patients with locally advanced disease as a palliative therapy, with little to no surgical intervention. [4,5,6].

1. Surgery: Breast cancer surgery can range from removing just the lump to removing the whole breast as well as the muscles of the chest. Most of the time, the lymph nodes of axilla are also removed. When weighing breast cancer surgery choices, the position, size, and kind of the tumor are important considerations. Another aspect the surgeon must take into account while considering the surgery is the size of the breast. When deciding on surgical treatments, it's important to consider the patient's psychological viewpoint as well as her lifestyle and preferences. Depending on the type and location of the tumor, the degree of its malignancy, and the level of cosmetic damage the patient is willing to bear, any of the following operations may be opted.

- **Breast-Conserving Surgery:** The extensive local excision is intended to remove the tumor together with 1 cm rim of healthy breast tissue. It is also possible to remove axillary lymph nodes. Another name for this technique is lymph node resection. The term "lumpectomy" refers to the surgical removal of a benign tumour without removing healthy breast tissue.
- **Simple Mastectomy:** It is a procedure in which one or both breasts are surgically removed. The surrounding lymph nodes and chest muscles are spared in this procedure. Sometimes an extended simple mastectomy is performed to remove few lymph nodes in axilla. Patients with small tumors with negative sentinel lymph nodes are ideal for this surgery. Now a days more recent breast-sparing procedures have become more popular that involves conservation of the skin above the breast, the areola, and the nipple so that silicone prosthesis can be utilized for cosmetic breast reconstruction in the future.
- **Halsted's Radical Mastectomy:** This procedure involves removal of breast along with axillary lymph node and pectoralis muscles. It is no longer recommended due to the high rate of morbidity and disability associated with it.
- **Modified Radical Mastectomy:** It is a common surgical approach for treating operable breast cancer while preserving the chest wall muscles as much as possible. This procedure leaves the pectoral muscles intact, which is beneficial for two main reasons.

Firstly, keeping the pectoral muscles in place provides a soft tissue layer that covers the chest wall, resulting in a more natural appearance where the shoulder

meets the front of the chest. This can be important for maintaining a sense of body image and overall well-being for the patient.

Secondly, this surgical technique allows for the possibility of breast reconstruction, if desired, using the muscles around the affected side of the shoulder. Breast reconstruction is an option that some patients might consider after mastectomy for restoration of breast shape and its appearance. By performing a modified radical mastectomy, surgeons aim to achieve effective cancer treatment while preserving the quality of life of patient and offering the potential for breast reconstruction, should the patient choose it.

- **Reconstructive Surgery of Breast:** Reconstructive breast surgery might lessen the sense of loss that women experience when having a breast removed, particularly if it is performed in the same session as the simple or modified radical mastectomy. After the mastectomy, if there is not enough skin left over, a balloon-style expander is implanted. The expander is refilled with more saline solution in successive weeks to extend the skin. When it is the right size, the expander is taken out and a silicone breast implant is put in its place. If there is sufficient skin, a silicone implant can be put in straight away. Alternatively, tissue from the patient's back or belly is taken and grafted to the chest wall to create a breast.
2. **Radiation Therapy:** Radiation therapy is essential for managing cancer at the tumor's location. When given following the breast-conserving surgery (BCS), it lowers the chance of recurrence by around 50% over the course of 10 years and the risk of death from breast cancer by approximately 20% over the course of 15 years. Radiation therapy may not be required in women aged 70 and older with small, hormone receptor–positive (HR+), lymph node–negative tumors. Studies have shown that for these type of patients who receive at least 5 years of hormonal therapy adding radiotherapy does not improve survival rates. Radiation therapy is beneficial in certain situations, such as for large tumors (over 5 cm) or when the malignancy spreads to the chest wall or skin as well as in cases with positive lymph nodes. It may also serve as palliative therapy for more severe situations, such as when cancer has progressed to the bones or central nervous system (CNS). There are different ways to deliver radiation therapy, including external beam radiation, brachytherapy, or both as a combination, depending on the specific needs of the patient and the characteristics of the tumor.
 3. **Chemotherapy:** In breast cancer management, there are several systemic therapies used, including chemotherapy or hormone therapy, or targeted therapy. Chemotherapy is a powerful treatment that involves using drugs to kill cancer cells. First-generation chemotherapy regimens like CMF (cyclophosphamide, methotrexate, and 5-fluorouracil) have demonstrated a 25% decrease in the chance of a cancer relapse during a 10 to 15 years period. Anthracyclines (doxorubicin or epirubicin) and more recent drugs like taxanes are used in contemporary chemotherapy regimens. These are used for treatment of breast carcinoma, and the duration of chemotherapy can range from three to six months for adjuvant and neoadjuvant therapy. Hormone therapy which involves the use of Tamoxifen is essential for breast cancer which are hormone receptor-positive (HR+). Tamoxifen adjuvant therapy for at least five years lowers breast cancer mortality by roughly 30% in the first 15 years and reduces the recurrence rate in half over the first ten

years. Recent researches have suggested that extending tamoxifen adjuvant therapy from five to ten years further lowers the risk of mortality and recurrence associated with carcinoma breast. Therefore, clinical practice recommendations currently urge considering 10 years of adjuvant therapy with tamoxifen. For postmenopausal women with HR+ carcinoma breast, aromatase inhibitors (AIs) like anastrozole are commonly adopted in the treatment plan. In around 17% of breast tumors targeted therapy is recommended that overproduce the HER2/neu protein. The first targeted medication that has been approved is a monoclonal antibody called trastuzumab, which precisely targets the HER2 protein. When used in conjunction with chemotherapy, it lowers the recurrence rate by 52% and death by 33%, in HER2+ breast cancer of early stage compared to chemotherapy alone. These therapies play an important role in the management of carcinoma breast, helping to improve outcomes and lowers the risk of recurrence and mortality rate for women with different subtypes of breast carcinoma.

VI. COMPLICATIONS ASSOCIATED WITH CANCER TREATMENT

Whether receiving chemotherapy, radiotherapy, hormone therapy, or surgery, complications can occur.

Common Surgical Complications are:

- Infection at surgical site.
- Post Mastectomy Pain Syndrome/Phantom Breast.
- Backache / Alteration of posture.
- Lymphedema.
- Cosmetic issues.
- Permanent scarring.
- Axillary web syndrome (Figure 1)
- Altered or lost sensation in the reconstructed area of breast and chest.

Complications due to Chemotherapy include:

- Nausea and vomiting.
- Diarrhoea.
- Loss of Hair (Alopecia).
- Loss of Memory also called "chemo brain"
- Dryness of Vagina.
- Fertility problems and signs of menopause.
- Chemotherapy Induced Neuropathy.

Complications Associated with Hormonal Therapy are:

- Hot flashes.
- Vaginal dryness.
- Fatigue.
- Osteoporosis.
- Impotence in male breast cancer patients.

Radiation can result in the following Complications:

- Fibrosis.
- Heart / lung issues (long-term).
- Neuropathy.



Figure 1: Axillary web syndrome, Left Arm.

VII. ONCO-REHABILITATION IN BREAST CANCER

Onco-rehabilitation should be goal oriented. Goals of Onco-rehabilitation includes:

- PREVENTIVE (where impairment is preventable).
 - RESTORATIVE (where patients are anticipated to merely have a minor or lingering disability).
 - SUPPORTIVE (if patients have to cope up with a chronic illness or a lifelong impairment).
 - PALLIATIVE (in cases where disability cannot be corrected due to severe disease but where performance can be aided by training).
- 1. Benefits of Physiotherapy:** Apart from Physical benefits, patients are also psychologically benefited from preventive rehabilitation, because it provides individuals a sense of control over their circumstances. Perceived control from rehab strategies helps the patients with coping mechanisms for their diagnosis and treatment, decreasing the psychological morbidity (depression, anxiety) as they feel in control of the situation (Taylor et al,1983)
 - 2. General Guidelines:** After breast cancer surgery, many women may experience numbness, burning and tingling sensation or sometimes soreness in the back of the chest wall and arm. These sensations occur because of the effect of surgery has on some nerve endings [6].

Continuing with prescribed exercises is essential, even if the sensations increase slightly over a few weeks. However, any unusual swelling or tenderness of the arm or

shoulder area , or upper back, chest, and neck should be reported immediately to the surgeon. To help "desensitize" the area, gently massaging or stroking the area with fingertips or a soft cloth can be helpful.

Here are some tips for performing exercises correctly:

- Exercises should be performed when muscles are warm and relaxed preferably after the warm shower.
 - Clothing should be comfortable and loose during exercises.
 - Perform each movement slowly and hold it for a count of five.
 - Avoid bouncing or jerky movements and ensure there is no pain, only a gentle stretch.
 - Each exercises should be performed twice a day in five to seven repetitions.
 - It is best to perform the exercises under the supervision of a physiotherapist to ensure proper form and technique.
 - Remember to breathe deeply throughout each exercise.
- **Breathing Exercises:**
 - Patient sits in a relaxed comfortable position. Instruct her to take a deep breathe through nose and hold it for 3 sec. then exhale it through mouth.
 - The neck and shoulder muscles should not be tensed.
 - This exercises should be repeated for 4-5 times.
 - **Pumping Exercises:** Pumping exercises are a type of therapeutic exercise used to manage arm lymphedema, a condition where there is swelling in the arm due to the accumulation of lymph fluid. These exercises aim to promote the flow of lymph fluid and reduce swelling. Here's a description of the pumping exercises:
 - **Fist Clenching:** Make the patient to sit or stand in a comfortable position. She has to make a gentle fist with affected hand, squeezing it gently and then releasing it. This motion should be repeated for about 10 to 15 times.
 - **Wrist Flexion and Extension:** Again, sit or stand comfortably. The patient bends the wrist forward (flexion) and then backward (extension). This movement should be performed slowly and smoothly for about 10 to 15 times.
 - **Arm Pumping:** The patient holds the arm out in front , parallel to the ground. Arm is then flexed and extended at the elbow. This movement should be repeated for about 10 to 15 times.
 - **Shoulder Rolls:** Sitingor standing with the back straight. Roll the shoulders in a circular motion, first forward and then backward. Should be performed smoothly for about 10 to 15 times.
 - **Arm Elevation:** Patient raisesher affected arm above the head. It is then lower back down slowly. Motion should be repeated for about 10 to 15 times.

Shoulder Mobility Exercises which includes following Exercises:

- **Shoulder Shrugs:**

- Have the patient stand or sit comfortably with their back straight and shoulders relaxed.
- Instruct the patient to slowly lift both shoulders up towards their ears in a smooth and controlled manner.
- Emphasize that they should not force the movement but rather do it gently.
- Once the patient has lifted their shoulders as high as they can comfortably go, have them hold the shrug position for a brief moment (1-2 seconds) and feel the squeeze in their upper trapezius muscles.
- Repeat this for 10 to 15 times.

- **Shoulder Squeeze Exercise:**

- Have the patient sit or stand comfortably with their back straight and shoulders relaxed.
- Instruct the patient to place their hands by their sides or on their thighs for support.
- Ask the patient to inhale deeply and exhale slowly to relax their shoulders.
- Instruct them to start by gently squeezing their shoulder blades together and downward.
- Encourage them to imagine trying to pinch a pencil between their shoulder blades.
- Guide the patient to hold the squeeze for about 5 to 10 seconds initially, as they get comfortable with the movement.
- Remind them to keep breathing normally throughout the exercise.
- After holding, instruct them to slowly release the squeeze and return to the starting position.
- Repeat this for 10 to 15 times.

- **Pectoral Stretch:**

- Ask the patient to Stand in an open doorway. Tell her to raise each arms to her sides with palms facing forward and elbow bent at 90-degree angles.
- Instruct the patient in taking a single, gradual forward step, until a stretch is felt at chest and shoulders.
- Ask the patient to hold this position for 15 - 20 seconds. Now, get back to the starting position and relax.
- This is repeated for 3 times.

VIII. LYMPHEDEMA MANAGEMENT

Breast cancer related lymphedema (BCRL) is the most common complication after treatment of Breast Cancer, that results from disruption of the lymphatic system thereby preventing the adequate drainage from lymphatic vessels resulting in accumulation of protein-rich lymph fluid in the interstitial space. At the therapeutic side, this extra fluid can result in aberrant swelling in the breast, trunk, or upper extremity (Figure 2). Symptoms of

BCRL can include tightness and heaviness in arm, pain, and reduced limb function, depending on the degree of edema. Additionally, fat accumulation and fibrosis may appear as BCRL worsens. When compared to patients without BCRL, patients with BCRL have higher rates of anxiety and depression as well as physical disability, which has a detrimental impact on their quality of life.



Figure 2: Lymphedema of Right Upper Limb.

1. Lymphedema Classification:

- **International Society of Lymphology Classification:**

- **ISL Stage I:** Accumulation of tissue fluid that goes away with elevation of limb. At this point, the oedema may be pitting.
- **ISL Stage II:** Pitting starts to reduce and fibrosis gets evident.
- **ISL Stage III:** The tissue lacks pitting and becomes stiff (fibrotic). Increasing skin folds, hyperpigmentation, thickness, fat deposits, and warty overgrowths are the skin changes that occurs at this stage.

2. Precautions in Lymphedema:

- Potential use of a compression sleeves during travel especially air travel.
- Limb constriction devices like blood pressure cuffs should be avoided.
- Avoiding venipuncture, sunburn, and bug bites to lessen harm to the at-risk limb.
- **Skin Care:** Use of good moisturizer to keep the skin supple, paying special attention to any skin grafts.
- When sleeping or taking a break, avoid lying on the side of affected arm.
- Regular Exercise.
- Lifestyle alterations.

3. Treatment of Lymphedema: Complete decongestive therapy (CDT), which is frequently utilized and delivered by a licensed lymphedema therapist, aims to reduce limb volume and symptoms. Each patient's CDT is unique, although it usually involves manual lymphatic drainage (MLD), multi-layered limb bandaging (MLLB), exercise, skin care, and patient education. It has two phases Intensive Treatment Phase and Maintenance Phase [6,7]

- **Intensive Treatment Phase:** MLD is a massage technique that aids in stimulating the reflux of extra fluid by simulating the pumping action of lymphatic vessels (International Society of Lymphology 2013). Patients frequently receive MLD as a crucial component of decongestive lymphatic therapy to increase the efficacy of treating lymphoedema.

MLLB involves application of short stretch bandages to conform to the patient's tissues and are applied daily with comfortable padding underneath. When tolerated they are usually wore for 20-23 Hours. These bandages provide high working pressure and low resting pressure, that produces the massaging effect and aids in lymph flow. These bandages are indicated when there is marked skin changes or limb distortion. The bandages help to maintain the reductions achieved with MLD and may further causes reduction in swelling (Figure 3).



Figure 3: Multi-Layered Limb Bandaging

Following bandaging, the patient could be shown simple rehabilitative exercises. These also helps in additional limb volume reduction. Patients can either be instructed in individual exercises or join a group exercise class.

- **Maintenance Phase:** As the initial phase of lymphedema management progresses, the volume reduction of the affected limb starts to stabilize. At this stage, the therapist may recommend fitting the patient with a compression garment. Compression garments are important in managing edema, flat knit, low-stretch fabric is the optimal material which is used. This material mimics the short-stretch crepe bandages often used during the initial phase of treatment. These compression garments provide consistent pressure, which helps control the swelling and maintain the reduction achieved during therapy. In addition to compression garments, aquatic exercises can be beneficial in assisting and sustaining edema reduction, especially in the lower limbs. Performing exercises with the edematous part submerged in water creates hydrostatic pressure, which aids in reducing swelling and supporting the overall management of lymphedema. By combining the use of compression garments and engaging in aquatic exercises, individuals with lymphedema can effectively manage edema and maintain the progress achieved during therapy, leading to improved quality of life and better long-term outcomes. It is essential to work closely with a qualified therapist to determine the most suitable compression garment and exercise plan tailored to each individual's specific needs.

IX. MANAGEMENT OF CHEMOTHERAPY-INDUCED PERIPHERAL NEUROPATHY (CIPN)

A common side effect of some chemotherapy medications is chemotherapy-induced peripheral neuropathy (CIPN), which can result in pain or tingling sensation, numbness, and paralysis in the hands and feet. Physiotherapy has a major impact on CIPN symptom management and cancer patients' quality of life.

Here are some physiotherapy treatments for CIPN:

- 1. Sensory Exercises:** Sensory re-education exercises helps to improve the nerve function, affected by CIPN. These exercises focus on stimulating the sensory nerves through various sensory experiences, such as texture discrimination, temperature differentiation, and proprioception activities.
- 2. Balance and Gait Training:** CIPN can affect balance and coordination, leading to an increased risk of falls. Physiotherapy interventions that include balance and gait training have shown to be beneficial in improving balance and reducing the risk of falls in cancer patients with CIPN.
- 3. Strength Training:** Peripheral neuropathy can cause muscle weakness, leading to functional limitations. Strength training exercises have been shown to help improve muscle strength and function in individuals with CIPN.
- 4. Transcutaneous Electrical Nerve Stimulation (TENS):** It is a non-invasive technique that uses electrical stimulation to relieve pain. Some research have shown that TENS has the potential to reduce pain and improve sensory function in patients suffering with CIPN.

It is significant to note that physiotherapy treatment for CIPN may vary in effectiveness from person to person, and the treatment plan should be customized to each patient's unique requirements and state of health.

Psychological Rehabilitation: Regardless of the cancer's stage, psychological assistance is essential for the overall health of breast cancer sufferers. It aids patients in overcoming the psychological and emotional difficulties associated with a cancer diagnosis and treatment. Support can take the form of counselling, therapy, and support groups, which offer a secure setting for expressing emotions, controlling anxiety, and enhancing mental toughness throughout the treatment process.

By providing supportive therapies like cognitive-behavioural therapy and mindfulness techniques, psychology plays a critical role in resolving the negative body image that impacts the patient's self-esteem and emotional well-being. These therapies can improve patients' general quality of life both during and after treatment by assisting them in adjusting to changes in their body image.

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