**REHABILITATION IN BREAST CANCER**

Author- Dr. Vandana Patel

Affiliation: Assistant Professor

Government Physiotherapy College, Raipur (Chhattisgarh),492001.

Breast cancer is a major health concern affecting women globally. It is the most commonly diagnosed cancer and ranks as the fifth leading cause of cancer-related deaths. 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].

**Risk Factors:** The number of risk factors of breast cancer is significant and includes both modifiable factors and non-modifiable factors as shown in table 1.

Table 1 showing the modifiable and non-modifiable risk factors of breast cancer.

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

**Pathophysiology:** Breast cancer develops due to DNA damage and genetic mutations that can be influenced by exposure to estrogen. Sometimes there will be an inheritance of DNA defects or pro-cancerous genes like *BRCA1* and *BRCA2*. Thus the family history of ovarian or breast cancer increases the risk for breast cancer development. In a normal individual, the immune system attacks cells with abnormal DNA or abnormal growth. This fails in those with breast cancer disease leading to tumor growth and spread [2].

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

**1. Carcinoma in situ:** This term is used when cancer cells do not invade through basement membrane i.e they are non-invasive. Non-invasive neoplasms of the breast are broadly divided into two major types, ductal carcinoma in situ (DCIS) and lobular carcinoma in situ (LCIS).

DCIS is also called intraductal carcinoma or stage 0 breast cancer. DCIS is a non-invasive

or pre-invasive breast cancer. This means the cells that line the ducts have changed to cancer cells but they have not spread through the walls of the ducts into the nearby breast tissue.

LCIS is characterized by its resemblance to a normal lobule, with enlarged and filled acini (small sacs within the lobule). In simpler terms, LCIS appears similar to healthy breast tissue but has abnormal cell growth within the lobules. Despite its name, LCIS is not a cancer itself, but it is considered a risk factor for developing invasive breast cancer in the future.

**2. Invasive breast cancers:** These are recognized by their lack of overall architecture, infiltration of cells haphazardly into a variable amount of stroma, or formation of sheets of continuous and monotonous cells without respect for the form and function of a glandular organ. Invasive breast cancer are broadly classified into ductal and lobular histologic types. Invasive ductal cancer, also known as infiltrating ductal carcinoma, is the most common form of breast cancer; and accounts for 50% to 70% of invasive breast cancers. It tends to grow as a cohesive mass; it appears as discrete abnormalities on mammograms and is often palpable as a discrete lump in the breast smaller than lobular cancers.

Invasive lobular carcinoma on the other hand accounts for 10% of breast cancers. It tends to permeate the breast in a single-file nature, which explains why it remains clinically occult and often escapes detection on mammography or physical examination until the disease is extensive.

Less common types of invasive breast cancer:

There are some special types of breast cancer that are sub-types of invasive carcinoma. They are less common than the breast cancers named above and each typically make up fewer than 5% of all breast cancers. These are often named after features seen when they are viewed under the microscope, like the ways the cells are arranged.

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).

**Clinical Features:**

**1. Palpable lump in the breast:** Nearly half of all lumps appear at the top of the breast on the side nearest the armpit. However, the lumps can turn up anywhere within the breast, and that in many cases breast cancer is found even if there is no lump at all.

**2. Tenderness:** In case of lump, the breast may be tender, or it may feel normal. There could be some discomfort or a “pulling sensation”. Cysts, which are benign, tend to move freely within the breast. However, the lump could be cancerous if it appears to be immobile or causes the skin to look dimpled or puckered. But it's essential to remember that this is not a definite confirmation, and further tests would be needed to determine the nature of the growth.

**3.** **Discharge from one of the nipples:** It is the second most common sign of a potential problem. The discharge may be clear, bloody, or colored. It is important to understand that a discharge can be perfectly normal in women who are not breastfeeding. In this case, a small amount of discharge usually comes out of several openings in both breasts and not from any one breast as in case of cancer. A spontaneous discharge that occurs without squeezing the breast is a far greater cause for concern. A discharge coming from the same general location in one breast may well indicate the presence of an underlying mass. Although a bloody discharge occasionally may occur during pregnancy, it can also be a significant warning sign of cancer. In older women there is greater the possibility that the discharge is being caused by cancer.

4. Change in the shape or size of the breast: The breast tissue may feel thicker, even though there is no lump. There may be pain or redness of the skin. There may be sore or retraction of the nipple inside the breast.

**Investigation [5,6]:**

1. **Biopsy:** A biopsy must be done if a nipple is inflamed, encrusted, or has scaly lesions that do not go away, or if it is leaking a bloody fluid, even if there is no palpable lump detected on manual exmination. If the patient have not yet gone through menopause and does not have any signs or symptoms that point to the possibility of cancer, the doctor may decide to wait through one complete menstrual cycle before proceeding with biopsy.
2. **Fine Needle Aspiration:** If the lump is only a cyst and not a tumor, FNAC can be done. Thin needle is inserted into the lump to draw off the fluid. The procedure is usually done under local anesthesia. If the lump is really a cyst, the sac will collapse as soon as the fluid is removed, and the lump will suddenly disappear. In this case a mammogram needs to be done just to be sure, as well as doing another physical examination after a few weeks. If the lump has not returned, there generally is no further cause for concern. However, a follow-up biopsy is always indicated if the doctor is not able to get any fluid or if the fluid is bloody or if the mass does not completely disappear after the fluid is drawn or if the “cyst” returns after two “successful” aspirations or if the mammogram is suspicious. Another possible procedure is a core needle biopsy, which uses a larger needle to take a tissue sample from the mass and surgical biopsies.
3. **Mammogram:** Mammography is a well-known medical imaging procedure used to detect and investigate lumps in the breast. It helps identify areas of parenchyma distortion and microcalcifications, which are important signs of potential cancer. During the mammography, the breast is gently compressed between 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. Two different views, oblique and craniocaudal, of each breast are taken using X-ray exposure, which is typically less than 1.5 mGy in standard 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 determine if a lump is cancerous. To confirm whether a mass is malignant, a biopsy must be performed, which involves taking a small sample of tissue for further examination.
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, it becomes particularly helpful in cases of younger women with denser breast tissue, where it can be challenging to see abnormalities clearly on a mammogram. Ultrasound is most valuable in identifying masses located deep within the breast that cannot be felt or accessed 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:** Particularly useful in detecting malignancy when mamrnographically subtle or occult (lobular carcinoma). It can differentiate scar tissue from cancer. Hence can detect local recurrence after surgery. MRI is better than mammogram in assessing the response of the tumour to neoadjuvant chemotherapy. It is also better investigation in dense breasts and in pregnancy.
6. **Steroid hormone receptors:** intracellular steroid hormone receptor proteins, particularly ER (estrogen receptors) and PR (progesterone receptors), play a significant role in breast cancer prognosis and guiding hormone and endocrine therapy. Around 50% to 85% of invasive breast cancers contain detectable levels of ER. The concentration of ER tends to increase with age, with postmenopausal patients showing the highest levels. In healthy individuals, the normal value of ER is less than 10 fmol/mg 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 fmol/mg proteins. 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 ER, 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. Patients with ER-positive tumors tend to have better outcomes compared to those with ER-negative tumors. They experience longer disease-free survival after the primary treatment, superior overall survival, and extended survival even after a recurrence of the disease. Before starting hormonal therapy, it is essential to check and measure the levels of steroid hormone receptors, especially ER and PR. 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:** It is usually associated with ER negativity and high grade tumour, poor prognosis.
8. **Antigen Ki-67:** The Ki-67 protein is a cellular marker of proliferation and the Ki-67 proliferation index is an excellent marker to provide information about the proliferation of cancerous cells particularly in the case of breast cancer. The proliferative activities determined by Ki-67 reflect the aggressiveness of cancer along with the response to treatment and recurrence time.

Top of Form

1. **Chest X-ray:** Rules out pulmonary secondaries, effusion, or mediastinal widening.Bottom of Form
2. **Abdominal ultrasonography**: To rule out secondaries in the liver, ascites, rectouterine deposits. Incidence of liver metastasis in Ca breast is 6%. Routine USG abdomen is indicated only if hepatomegaly is present or any abnormality in LFT or in stage III or IV.
3. **Bone scan:** To rule out Incidence of bone metastasis.

**Stages of Breast Cancer:** 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 noninvasive cancer and described 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 step: step 1A and step 1B. step 1A refers to cancers that are longer than in length and are not associated with any lymphatic system, whereas step 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 larger than 5 centimeters but has not yet reached the axillary lymph nodes, which are located in the armpit area.

**Stage 3:**

This stage of breast cancer is further divided into three categories: 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 the liver, the brain, the lungs, the bones, and so on.

**Management:** The 2 basic principles of treatment are to reduce the chance of local recurrence and the risk of metastatic spread. Surgery with or without radiotherapy achieves local control of cancer. When there is a risk for metastatic relapse, systemic therapy is indicated in the form of hormonal therapy, chemotherapy, targeted therapy, or any combination of these. In locally advanced disease, systemic therapy is used as a palliative therapy with a small or no role for surgery [4,5,6].

**1.Surgery:**

There are many different types of surgery for breast cancer; from removing just the lump to removing the entire breast and the muscles in the chest. The surgeon in most cases also removes some or all of the axillary lymph nodes. The location, size, and type of tumor are of primary importance when considering breast cancer surgery options. The size of the breast is another factor the surgeon has to consider when planning for surgery. The patient’s psychological outlook, as well as her lifestyle and preferences, should also be taken into account when surgical options are being decided. Depending up on the location and nature of the tumor, extent of its malignancy and extent of cosmetic disfigurement acceptable to the patient, one may have to undergo any of the following procedures.

**Breast-conserving surgery (BCS):** It is aimed at removing the tumor plus a rim of at least 1 cm of normal breast tissue (wide local excision). Lymph nodes in the axilla may also be removed. This procedure is also called lymph node resection. Lumpectomy is the removal of a benign mass without excision of the normal breast tissue.

**Simple mastectomy:**  Simple mastectomy is the surgical removal of one or both breasts. The adjacent lymph nodes and chest muscles are left intact. If a few lymph nodes are removed, the procedure is called an extended simple mastectomy. This procedure can be performed in small tumors with negative sentinel lymph nodes. Newer breast-sparing surgery has been gaining in acceptance since the mid-1980s. Breast-sparing techniques are used to preserve the skin over the breast, the areola and nipple, so that cosmetic breast reconstruction can be done later using silicone prosthesis.

**Radical mastectomy of Halsted**: This procedures involves removing of breast with axillary lymph node dissection and excision of both pectoralis muscles. is no longer recommended due to the high rate of morbidity without a survival benefit.

**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 layer of soft tissue covering over 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 to restore the shape and appearance of the breast. By performing a modified radical mastectomy, surgeons aim to achieve effective cancer treatment while preserving the patient's quality of life and offering the potential for breast reconstruction, should the patient choose it.

**Breast Reconstruction:** Breast reconstruction, especially if it is done in the same session as the simple or modified radical mastectomy, can minimize the sense of loss that women feel when having a breast removed. If there is insufficient skin left over after the mastectomy, a balloon-type expander is put in place. In subsequent weeks, the expander is filled with larger amounts of saline solution to stretch the skin. When it has reached the appropriate size, the expander is removed and a permanent breast implant made of silicone is installed. If there is enough skin, a silicone implant can be installed immediately. Alternatively, skin, fat, and muscle tissue are harvested from the patient’s back or abdomen and grafted to the chest wall to form a breast.

**2.Radiation therapy:**

Radiation therapy plays a crucial role in controlling cancer at the site of the tumor. When used after breast-conserving surgery (BCS), it reduces the risk of cancer recurrence by about 50% over 10 years and lowers the risk of breast cancer-related death by nearly 20% over 15 years. However, for women aged 70 and older with small, lymph node-negative, hormone receptor-positive (HR+) cancers, radiation therapy may not be necessary. Studies have shown that for this group of patients who receive hormonal therapy for at least 5 years, adding radiation therapy does not improve survival rates. Radiation therapy is beneficial in certain situations, such as for large tumors (over 5 cm) or when the tumor invades the skin or chest wall, as well as in cases with positive lymph nodes. It can also be used as palliative therapy for advanced cases, such as when cancer has spread to the central nervous system (CNS) or bones. There are different ways to deliver radiation therapy, including external beam radiation, brachytherapy, or a combination of both, 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, hormone therapy, and 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 shown a 25% reduction in the risk of cancer relapse over 10 to 15 years. Modern chemotherapy regimens include anthracyclines (doxorubicin or epirubicin) and newer agents like taxanes. These are used for breast cancer treatment, and the duration of chemotherapy can range from three to six months for adjuvant and neoadjuvant therapy. Hormone therapy is essential for hormone receptor-positive (HR+) breast cancer. Tamoxifen is a common treatment for premenopausal women with HR+ tumors. Adjuvant treatment with tamoxifen for at least 5 years reduces the recurrence rate by about half over the first 10 years and lowers breast cancer mortality by around 30% over the first 15 years. Recent studies suggest that extending adjuvant tamoxifen therapy from 5 to 10 years further reduces the risk of breast cancer recurrence and mortality. Therefore, clinical practice guidelines now recommend considering 10 years of adjuvant tamoxifen therapy. For postmenopausal women with HR+ breast cancer, aromatase inhibitors (AIs) like anastrozole are commonly used in the treatment plan. Targeted therapy is indicated in about 17% of breast cancers that overproduce the HER2/neu protein. Trastuzumab is the first approved targeted therapy, a monoclonal antibody that specifically targets the HER2 protein. When combined with chemotherapy, trastuzumab reduces the risk of recurrence and death by 52% and 33%, respectively, in HER2+ early breast cancer compared to chemotherapy alone. These therapies play a significant role in breast cancer management, helping to improve outcomes and reduce the risk of recurrence and mortality for patients with different subtypes of breast cancer.

**Complications:**

Complications can arise from the treatment, whether chemotherapy, radiation, hormonal therapy, or surgery.

Surgical complications include:

* Infection.
* Post Mastectomy Pain Syndrome/Phantom Breast.
* Backache / Alteration of posture.
* Lymphedema.
* Cosmetic issues.
* Permanent scarring.
* Axillary web syndrome (Figure 1)
* Alteration or loss of sensation in the chest area and reconstructed breasts.

Chemotherapy complications include:

* Nausea/vomiting and diarrhoea.
* Hair loss.
* Memory loss ("chemo brain").
* Vaginal dryness.
* Menopausal symptoms/fertility issues.
* Neuropathy.

Complications accompanying hormonal therapy include:

* Hot flashes.
* Vaginal discharge dryness.
* Fatigue.
* Nausea.
* Osteoporosis.
* Impotence in males with breast cancer.

Radiation can result in the following complications:

* Fibrosis.
* Heart and lung issues (long-term).
* Neuropathy.



**Figure 1.Axillary web syndrome, Left Arm.**

**Onco-Rehabilitation in Breast Cancer:**

Onco-rehabilitation should be goal oriented. These goals are:

* PREVENTIVE(when disability can be predicted)
* RESTORATIVE(when patients can be expected to have only minimal or residual handicap)
* SUPPORTIVE(if patients will have to tolerate ongoing disease or permanent disability)
* PALLIATIVE(if there is advanced disease and basic disability cannot be corrected, but where training can aid performance)

**Benefits of Rehabilitation:**

Apart from Physical benefits, patients are psychologically benefited also from preventive rehabilitation,as it gives them percieved control over their situation.Percieved control from rehab strategies helps the patients to cope with their diagnosis and treatment, reduces level of psychological morbidity (anxiety,depression) as they believe they gain mastery over the situation(Taylor etal,1983)

**General Guidelines:**

After breast cancer surgery, many women may experience burning, tingling, numbness, or soreness in the back of the arm and chest wall. These sensations occur because the surgery has affected 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 in the arm, shoulder, upper back, chest, or neck should be reported to the surgeon immediately.

To help "desensitize" the area, gently rubbing or stroking it with a hand or soft cloth can be helpful.

Here are some tips for performing exercises correctly:

* Do the exercises after a warm shower when muscles are warm and relaxed.
* Wear comfortable, loose clothing during exercises.
* Perform each movement slowly until a gentle stretch is felt and hold it for a count of five.
* Avoid bouncing or jerky movements and ensure there is no pain, only gentle stretching.
* Do five to seven repetitions of each exercise.
* It is best to perform the exercises under the supervision of a physiotherapist to ensure proper form and technique.
* Exercises should be done twice a day until normal flexibility and strength are regained.
* Remember to take deep breaths while performing each exercise.
  1. **Breathing Exercises:**
  2. 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.
  3. The neck and shoulder muscles should not be tensed.
  4. This exercises should be repeated for 4-5 times.
  5. **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:

1. Fist Clenching: The patient should be in a comfortable sitting or standing 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.
2. Wrist Flexion and Extension: Again, sit or stand comfortably. The patent bends the wrist forward (flexion) and then backward (extension). This movement should be performed slowly and smoothly for about 10 to 15 times.
3. 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.
4. Shoulder Rolls: Siting or 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.
5. Arm Elevation: Patient raises her affected arm above the head. It is then lower back down slowly. Motion should be repeated for about 10 to 15 times.
   1. **Shoulder Mobility Exercises:**

**Shoulder Shrugs:**

1. Have the patient stand or sit comfortably with their back straight and shoulders relaxed.
2. Instruct the patient to slowly lift both shoulders up towards their ears in a smooth and controlled manner.
3. Emphasize that they should not force the movement but rather do it gently.
4. 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.
5. Repeat this for 10 to 15 times.

**Shoulder Squeeze Exercise:**

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

**Pectoral Stretch:**

1. Have the patient Stand in an open doorway. Instruct her to raise each arm up to the side, bent at 90-degree angles with palms forward. ...
2. Guide the patient to slowly step forward with one foot. Feel the stretch in the shoulders and chest.
3. Ask the patient to hold for 15 seconds, or as instructed. Step back and relax.
4. This is repeated for 3 times.

**Lymphedema Management:**

Breast cancer related lymphedema (BCRL) is a much-feared sequela of breast cancer treatment, results from disruption to the lymphatic system that prevents adequate drainage from lymphatic vessels causing protein-rich lymph fluid to accumulate in the interstitial space. This excess fluid can cause abnormal swelling in the breast, trunk or upper extremity on the side of treatment ( Figure 2). Depending on the extent of edema, symptoms of BCRL can include arm tightness, heaviness/fullness, pain, and impaired limb function. Furthermore, as BCRL progresses, adipose deposition and fibrosis can result. BCRL negatively affects a patient’s quality of life, causing elevated rates of depression and anxiety in addition to physical impairment compared to patients without BCRL.



**Figure 2. Breast Cancer Related Lymphedema of Right Upper Limb.**

**Classification of Lymphedema:**

INTERNATIONAL SOCIETY OF LYMPHOLOGY CLASSIFICATION:

1. STAGE I- Accumulation of tissue fluid that subsides with limb elevation. The oedema may be pitting at this stage.
2. STAGE II- Pitting starts to reduce and fibrosis gets evident.
3. STAGE III- The tissue is hard (fibrotic) and pitting is absent. Skin changes such as thickening, Hyper pigmentation, increased skin folds, fat deposits and warty overgrowths.

**Precautions in Lymphedema:**

1. Potential use of a compression garment during air travel.
2. Avoidance of blood pressure cuffs and other forms of limb constriction.
3. Reduction of trauma to the at-risk limb by avoiding venipuncture, sunburn, insect bites.
4. Skin Care, Keep the skin supple with a good moisturizer, particularly over skin grafts, if any.
5. Do not to lie on an arm at risk when sleeping or resting.
6. Regular Exercise.
7. Lifestyle alterations.

**Treatment of Lymphedema:**

Complete decongestive therapy (CDT) is the widely used treatment, administered by a certified lymphedema therapist, whose goal is to decrease symptoms and limb volume. CDT is individualized for each patient, but it typically includes 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 which helps to stimulate excess fluid reflux by mimicking pumping action of lymphatic vessels (International Society of Lymphology 2013). MLD as an important part of decongestive lymphatic therapy is often given to patients to improve the effectiveness of treating lymphoedema.

MLLB involves application of shortstretch bandages are applied to conform to the patient’s tissues and are reapplied on a daily basis. They resist muscle contraction, apply inward pressure and are applied with comfortable padding underneath. The bandages help to maintain the reductions achieved with MLD and may even cause further reduction (Figure 4).



**Figure 4. Multi-Layered Limb Bandaging**

After bandaging, therapeutic exercises may be demonstrated that the patient can easily perform. These also help in further reducing the limb. Patients may join a group exercise class or be shown individual exercises.

*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, and for edematous limbs, the optimal material to use is a flat knit, low-stretch fabric. This material is similar to 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.

**Management of Chemotherapy-induced peripheral neuropathy (CIPN):**

Chemotherapy-induced peripheral neuropathy (CIPN) is a common side effect of certain chemotherapy drugs, and it can cause pain, tingling, numbness, and weakness in the hands and feet. Physiotherapy can play a significant role in managing CIPN symptoms and improving the quality of life for cancer patients. Here are some physiotherapy treatments for CIPN:

1. Sensory Exercises: Sensory re-education exercises aim to improve the function of the nerves 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): TENS is a non-invasive technique that uses electrical stimulation to relieve pain. Some studies have shown that TENS can be effective in reducing pain and improving sensory function in patients with CIPN.

It's important to note that the effectiveness of physiotherapy treatments for CIPN may vary from person to person, and the treatment plan should be tailored to each individual's specific needs and condition.

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