

Exercises Program in Breast Cancer Patient with Chemotherapy Induced Peripheral Neuropathy: A Case Study.

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Abstract

Background: Breast cancer is one of the most common cancers in women worldwide, accounting for approximately 570,000 deaths in 2015. Over 1.5 million women (25% of all women with cancer) are diagnosed with breast cancer every year throughout the world. One of the most common complications after breast cancer surgery is functional limitation of the upper body. Up to 67% of breast cancer patients experience arm or shoulder impairment, including pain, numbness, loss of strength, and reduced ROM, after surgery. Breast cancer patients are presenting with chemo-induced peripheral neuropathy (CIPN) that is impacting their balance, quality of life, and overall participation, as a side effect of chemotherapy treatment.

Study Design: This case study was used to highlight the role of physical therapy interventions in the management of Breast cancer patient after surgery with chemo-induced peripheral neuropathy.

Case Description: A 55-years-old Saudi female, known case of diabetes mellitus on insulin, hypertension and history of DVT 27 years back on anticoagulant. She came to the combined clinic breast clinic and all workup and investigations were done and showed invasive ductal carcinoma. Referred to physical therapy department by breast and endocrine clinic for left shoulder limited range of motion, impaired mobility and managing the symptoms.

PT management and outcome: The patient received 2 phases of rehabilitations, phase 1 the patient was seen once a week for 4 weeks, phase 2 the patient was seen 3 times per week for 6 weeks. Exercise program of patient education, therapeutic exercise of low- to - moderate intensity resistance exercise for UE and LE. Aerobic Exercise; Cardio bike progressive training for UE and LE and balance exercise. By the end of phase 1 patient's ROM and pain improved significantly, and by the end of phase 2 of the rehabilitation program, patient's balance (using BBS), functional ability and QOL using (FACT-B) improved.

Discussion: This case study showed that physical therapy exercise program including therapeutic exercises, low- to moderate-intensity resistance exercise, aerobic exercise, balance exercise is an effective program for breast cancer patients as it improves CIPN, minimize dependency and improved QOL.

Introduction

Breast cancer is one of the most common cancers in women worldwide, accounting for approximately 570,000 deaths in 2015. Over 1.5 million women (25% of all women with cancer) are diagnosed with breast cancer every year throughout the world [1,2].

Breast cancer treatment options are based on the type of breast cancer, its stage and grade, size, and whether the cancer cells are

sensitive to hormones. Doctors also consider the overall health and patient's own preferences. Most women undergo surgery for breast cancer and many also receive additional treatment after surgery, such as chemotherapy, hormone therapy or radiation. Chemotherapy might also be used before surgery in certain situations [3].

One of the most common complications after breast cancer surgery is functional limitation of the upper body. Up to 67% of

breast cancer patients experience arm or shoulder impairment, including pain, numbness, loss of strength, and reduced ROM, after surgery [4,5].

Breast cancer patients presenting with chemo-induced peripheral neuropathy (CIPN) that is impacting their balance, quality of life, and overall participation, as a side effect of chemotherapy treatment that are amenable to physical rehabilitation should be referred to PT as soon as identified.

Study Design

This case study was used to highlight the role of physical therapy interventions in the management of Breast cancer patient after surgery with chemo-induced peripheral neuropathy.

Case Description

Patient History

A 55-years-old Saudi female, known case of diabetes mellitus on insulin, hypertension and history of DVT 27 years back on anticoagulant. She has a family history of various cancers, her sister with uterine cancer, grandmother with stomach cancer and brother with brain cancer, he passed away at young age. The patient had a left breast lump (around 2.5 cm mass on 2-3 o'clock, hard, no skin changes) for two months, increasing in size. Patient was seen in the Combined Clinic, all workup and investigations were done and showed invasive ductal carcinoma, stage at Presentation cT2N1M0, ER PR positive and Her-2 negative, Ki67-90%.

Diagnostic Mammogram and US showed BI-RADS 6: Known biopsy proven malignancy. Nuclear bone scan showed no scintigraphic evidence of osteoblastic bone metastasis. CT Chest, abdomen and pelvis showed no definite distant metastasis.

This case was discussed in the Tumor Board and the decision was to receive neoadjuvant chemotherapy, and the patient received four cycles of Taxotere and Cyclophosphamide. followed by surgery: left wire localization lumpectomy plus sentinel lymph node biopsy. Adjuvant radiation therapy to left breast, axilla and supraclavicular fossa for 15 fractions over 3 weeks and hormonal therapy. She was referred to physical therapy department by breast and endocrine clinic for left shoulder limited range of motion and impaired mobility. During the first session a full assessment of the patient was carried out including setting long and short-term goals.

Long term goals: Were that the patient to maximize left shoulder range of motion and strength. To decrease pain at left upper quadrant, to maximize independence with functional activities and to be independent with home exercise program.

Long term goals to be met within 3 months. As for the short-term goals: they were to reduce pain by 25-50%, to increase her left shoulder range of motion, to be independent with home exercise program.

Examination

Observation

- Skin: Tight, hard as a result of the surgery and radiation

therapy.

- Scars: Lumpectomy scar, healed.
- Wounds: None.
- Edema: Left breast edema, minimal hardness and fibrosed.

Palpation/Skin and scar assessment

- Assessment of skin tissue texture: dry skin.
- Assess scar tissue: None.

Pain

Left shoulder and left upper quadrant tightness and pain.

Graded 10/10 using adult communicative / numeric intensity pain scale.

Pain increased with left arm overhead activities.

General body / joints pain with walking long distance.

Sensation

- Patient reported chemo-induced peripheral neuropathy in her hands and feet.

ROM

Right shoulder movement: Within functional limit.

Left shoulder:

Flexion= 100 degrees

Abduction= 120 degrees

Internal and external rotations= within normal limit.

Functional Status

The patient's functional abilities were severely affected due to the side effects of the treatments she underwent.

Transfer and walking

Patient is modified independent in transfer using standing pivot technique.

Gait

Patients can walk only for short distances and use wheelchair for long distance.

Functional Assessment of Cancer Therapy – Breast (FACT-B)

Scored= 62.5

Berg balance scale (BBS)

Scored= 49 (Low fall risk)

Findings

Patient presents with limited left shoulder ROM, generalized body / joint pain, impaired mobility. All mentioned problems contributed to her functional dependency.

As consequences of her functional dependency resulted from the cancer treatment side effects, the patient lost her job and became unemployed, which affected her psychologically, socially and financially.

Intervention

Initially, at phase 1 the patient was seen once a week for 4 weeks at the physical therapy outpatient clinic, focusing on patient education, therapeutic exercise and manual therapy for left shoulder ROM, pain and edema. Patient treatment protocol phase 1 at (Table 1).

Outcomes after 4 weeks / 4 sessions end of phase 1: Outcomes at (Table 2).

Phase 2 of the intervention, the patient was seen at the gym for low- to moderate- intensity resistance exercise for UE and LE. Aerobic Exercise; Cardio bike progressive training for UE and LE and balance exercise [6,7,8,9,10]. 3 times per week for 6 weeks, exercise program at (Table 3).

Outcomes after 6 weeks / 18 sessions end of phase 2: Outcomes at (Table 4).

Table 1: Patient treatment protocol phase 1

Patient Treatment Protocol	Frequency
Progressed Therapeutic exercises targeting pectoralis minor and major.	Daily, 3 times per day, 10 repetitions
Deep breathing exercises.	Daily, 3 times per day, 3 repetitions
Self-manual therapy techniques: self-stretch techniques for pectoralis major.	Daily, 3 times per day
Scar management to enhance healing and improve sensation over the scar.	Daily, before the exercises for 3 repetitions
Self-manual lymphatic drainage: Axillo – Axilla and Axillo - inguinal	3 times per week
Wearing proper compression bra	Daily during daytime
Manual therapy technique for axillary web syndrome: Skin traction technique and cord bending technique.	Once a week by PT at the clinic

Patient education of the following:

- Importance of following the given home exercise program.
- Skin care and moisturizing to minimize the risk of infection.
- Weight reduction advised and its impact on lymphedema.
- Proper compression bra advice and education to manage her breast edema.
- Understanding the radiation functional side effects.
- Understanding chemotherapy's functional side effects.
- Early signs and symptoms of lymphedema and when to seek medical attention.

Table 2: Outcomes after phase 1.

	Before	After
Left shoulder flexion	100 degrees	180 degrees
Left shoulder Abduction	120 degrees	180 degrees
Left shoulder and left upper quadrant tightness and pain	10-Oct	10-Mar
Left breast edema	Edema, minimal hardness and fibrosed	No edema, soft and equal to right breast size.

Table 3: exercise program phase 2.

Exercise	Week 1 and 2
Low- to moderate- intensity resistance exercise for UE	Using Yellow TheraBand 3 sets – 15 repetitions
Low- to moderate- intensity resistance exercise for LE	1. Leg Press: 15 X10 N (40 repetitions) 2. Knee Extension: 0 X10 N (20 repetitions) 3. Knee Flexion: 5 X10 N (40 repetitions) - 3 seconds hold 4. Heel raise x15 repetitions
Aerobic Exercise: Cardio bike progressive training for UE and LE.	For 5 minutes
Balance Exercise	Turning head left, right, up, and down: (3 times). Feet together, Tandem stance, 1 foot stance (Eyes-open, eyes-closed).

Exercise	Week 3 and 4
Low- to moderate- intensity resistance exercise for UE	Using Red TheraBand 3 sets – 15 repetitions
Low- to moderate- intensity resistance exercise for LE	1. Leg Press: 20 X10 N (40 repetitions). 2. Knee Extension: 1 X10 N (20 repetitions). 3. Knee Flexion: 8 X10 N (40 repetitions) - 3 seconds hold. 4. Heel raise x15 repetitions
Aerobic Exercise: Cardio bike progressive training for UE and LE.	For 10 minutes
Balance Exercise	Turning head left, right, up, and down: (3 times). Feet together, Tandem stance, 1 foot stance (Eyes-open, eyes-closed).
Exercise	Week 5 and 6
Low- to moderate- intensity resistance exercise for UE	Using Blue TheraBand 3 sets – 15 repetitions
Low- to moderate- intensity resistance exercise for LE	1. Leg Press: 25 X10 N (40 repetitions). 2. Knee Extension: 2 X10 N (20 repetitions). 3. Knee Flexion: 11 X10 N (40 repetitions) - 3 seconds hold. 4. Heel raise x15 repetitions
Aerobic Exercise: Cardio bike progressive training for UE and LE.	For 15 minutes
Balance Exercise	Turning head left, right, up, and down: (3 times). Feet together, Tandem stance, 1 foot stance (Eyes-open, eyes-closed).

Table 4: Outcomes after phase 1.

	Before	After
FACT-B score	62.5	93
BBS score	49	55
Gait	Patient was able to walk few steps	Patient was able to attend her PT sessions walking using cane
CIPN	Patient reported that her symptoms improved with the program 50% -75%	

At the last session

The patient reported that she is very satisfied with the physical therapy program provided to her.

Follow up after 6 months.

Patient reported that she is compliant with exercises, being physically active and she reported that she is now employed working at school which affected her socially and financially status positively.

Discussion

Breast cancer is one of the most common types of cancer in women worldwide [1]. Breast cancer patients face an array of problems and have specific needs which must be addressed to prevent long term functional limitations and disability. Upper limb dysfunction and decreased quality of life are frequently reported sequelae of early-stage breast cancer treatment.

Based on the result, we supported the physical therapy exercise program including patient education, therapeutic exercise, manual therapy, edema management, low- to moderate- intensity resistance exercise for UE and LE, Aerobic exercise, Cardio bike progressive training for UE and LE and balance exercise in the treatment of breast cancer patient post breast surgery limitations, radiation and chemotherapy functional side effects.

That goes with Ian R. Kleckner (2017) who proved that exercise reduces CIPN symptoms in patients receiving taxane-, platinum-, or vinca alkaloid-based chemotherapy [6]. Shaoning Guo (2022)

showed that combined exercise could be an effective option for improving quality of life, physical function (balance control and muscle strength), and neuropathic pain in cancer patients with chemotherapy-induced peripheral neuropathy [9].

In general, balance training is known to induce neuronal adaptations and improve muscular output leading to enhanced postural control [11,12]. It is well known that patients with a proprioceptive deficit such as peripheral neuropathy suffer from postural instability [13], as do patients with CIPN [14,15].

This case study provides a good learning opportunity for the physical therapist to be able to design a complete plan of treatment for breast cancer patients suffering from the mentioned symptoms and treatment's side effects. Further exploration of appropriate exercise prescriptions is needed.

Conclusion

The physical therapy exercise program including therapeutic exercises, low- to moderate- intensity resistance exercise, aerobic exercise, balance exercise is an effective program for breast cancer patients as it improves CIPN, minimize dependency and improved QOL.

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None.

Conflicts of Interest

No conflicts of interest.

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