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Importance of Physical Therapy in Breast Cancer Survivors

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Review Article

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Abstract

Women diagnosed with breast cancer have had a significant increase in life expectancy in recent years. However, many of these women are living with chronic complications resulting from treatment. It is common during and after the treatment of breast cancer, particularly at the trunk and upper limb (pain, movement disorders, among others). Physical therapy may play an important role in the immediate and late postoperative period of breast cancer surgery where it can be considered one of the main preventive agents for disorders after surgery. Physical therapy is considered an effective intervention for pain control, postural realignment and recovery of functional autonomy and is important at all stages of treatment, and helps overcome the side effects of breast cancer treatment.

Keywords: Physiotherapy; Breast cancer survivors; Musculoskeletal disorders; Posture

Introduction

Breast cancer is the most common tumor in women [1] and with the effectiveness of the means of treatment and early diagnosis; women diagnosed with breast cancer have achieved a significant increase in the average life expectancy. The number of survivors of breast cancer has increased considerably in recent years [2]. The high survival rate for breast cancer may mean that many women are living with musculoskeletal pain and limitations as a consequence of cancer treatment. In this chapter we will cite some of the most common complications after breast cancer treatment and the importance of physical therapy to minimize these effects and lead to improved functionality and quality of life after breast cancer.

The Breast Cancer Treatment

Surgical Treatment

Surgical treatment is the most commonly used therapy for the vast majority of cases of breast cancer [3] and adjuvant therapy may involve hormone therapy, radiotherapy and chemotherapy. Mastectomy is the removal of the breast in case of breast cancer and is currently the most common mastectomies are modified radical mastectomy with preservation of the pectoralis major muscle (Patey) or the preservation of the major and minor pectoral muscles (Madden) [4]. Breast-conserving surgery removes the tumor and most of the breast tissue remains intact [5]. The techniques of breast reconstruction are based on displacement of the breast volume or replacement of the breast volume. Volume displacement includes local tissue remodeling, mastopexy, and reductive mammoplasty. And breast volume replacement involves the placement of breast prostheses and local or distal myocutaneous flaps-particularly the *latissimus dorsi* and rectus abdominis muscle flap [6]. The decision about the type of surgery to be considered depends on several factors, such as the size and the tumor characteristic, the breast volume, and the clinical conditions of the patient. Breast cancer surgery may or may not involve axillary lymph node dissection through lymphadenectomy - where lymph nodes are removed from

the axillary region ipsilateral to the breast diagnosed with the neoplasm. The sentinel lymph node technique consists of the evaluation of the first lymph node that receives the drainage of the tumor.

In the absence of sentinel lymph node metastasis, other lymph nodes are admitted to be free from the disease [7]. This allows the total dissection of the axillary lymph nodes not to be performed.

Adjuvant Treatment

The adjuvant systemic treatment of breast cancer may involve hormone therapy, chemotherapy and radiotherapy, before or after surgery, according to the biological characteristics of the neoplasm and the general characteristics of the patient. These therapies aim to increase survival by preventing tumor metastases and recurrences, but there are adverse effects associated with treatment [8-10]. Hormone therapy is one of the pillars of breast cancer treatment. Patients with breast cancer with positive hormone receptors are candidates for hormone therapy [8].

Hormone therapy among other side effects leads to weight gain, accumulation of fat in the trunk and fatigue [9]. Chemotherapy among other side effects has high levels of fatigue [10]. Radiotherapy can reduce tissue elasticity, fibrosis, decrease strength and mobility in the upper limbs, increase fatigue levels, cause edema, superficial lymphatic thrombosis and lymphedema among other complications [11]. Generally, fatigue in patients with cancer is chronic. This state of extreme fatigue contributes to a decrease in performance, resulting in a decrease in quality of life [10] and levels of physical activity [12]. According to the recommendations of the American College of Sports Medicine [13] it is advise 150 minutes weekly of moderate-intense aerobic exercise or 75 minutes when vigorous associated with 2 to 3 weekly sessions of strength exercise targeting major muscle groups. Individuals with oncological diseases who are unable to achieve the recommended levels of physical activity should remain as active as their condition allows and, as soon as possible, avoid inactivity after diagnosis and/or treatment. These recommendations are valid even for those who present complications due to the disease [13]. Individuals, who cannot reach the recommended minimums of activity, nevertheless obtain benefits [14]. Any interruption in sedentary time is more positive than being always sedentary [13].

Musculoskeletal Disorder

Postural Changes

The biomechanical alignment of the body and its orientation to the environment can be defined as posture [15]. Postural changes may occur after cancer treatment, such as misalignment and limitation of shoulder amplitude, scapular misalignment [16,17]. Some studies have evaluated the posture of women undergoing breast cancer surgery and have identified significant postural changes in most of the women evaluated [16,17].

In the scapular region, the greatest changes were found both in relation to posture and trouble in function, associated with higher levels of pain that may remain chronic [18,19]. Post-surgical pain, including mastectomy surgeries and immediate or late reconstructive surgeries, may lead to scar tissue formation and the adoption of a protective stance, leading to shortening of the soft tissues of the anterior chest wall, including the pectoral muscles major and pectoralis minor, and may result in depression of the scapula in the frontal plane [20].

Abnormal positioning of the scapula leads the muscles of the shoulder complex to alter their tension and length relationships, generating a functional imbalance [21]. By adopting postures intended to protect the arm and breast, it can generate muscle shortening and decrease the strength of the shoulder-arm complex. With the application of radiotherapy and the consequent fibrosis, it can further aggravate this condition producing more tension in the soft tissues [22,23].

With the increasing number of breast reconstructions, it is important that during the evaluation of Physical Therapy, the knowledge of the type of surgical intervention used in performing breast reconstructions. Studies indicate that the morbities found in mastectomized women are higher than in women who underwent conservative surgeries and breast reconstructions with myocutaneous flaps [24-27].

Surgery that promotes immediate breast reconstruction leads to a better postoperative result regarding the reduction of changes in body posture, and consequently the alignment of the spine, with better posture and physical function [28]. Although women who performed immediate breast reconstruction had the effects of surgery such as the presence of fibrosis, shortening of the major and minor pectoral muscles and pain, altering the angle of the homolateral shoulder blade to surgery, however, the morbities found in mastectomized women were greater than the women who did breast reconstruction [25,27].

The intervention of physical therapy through stretching and strength exercises associated with ischemic compression of the trigger points favor both postural improvement and pain relief and functional autonomy with a positive impact on pain and posture improvement [29,30].

Exercises that promote postural reeducation, stretching and strengthening of trunk musculature and upper limbs are some of the physiotherapeutic actions that promote mass balance and postural alignment. One study compared conventional therapy exercises with the Pilates method, and concluded that Pilates's bodily and kinesthetic awareness reduces biomechanical dysfunctions [31] and improves postural alignment in women who are surviving breast cancer [32].

Musculoskeletal Disorders after Treatment of Breast Cancer

After surgery, there is an important asymmetry of the soft tissues and the distribution of the mass in the thoracic wall together with pain and fibrosis [25,33]. This condition may present after surgery and become chronic. Mechanical stress can have clinical and functional repercussions with effect on the connective and muscular tissues in the joints and change the distribution of load and pressure that will contribute to degenerative articular alterations and inadequate muscular tensions [34]. A 2015 study found that women who underwent lymphadenectomy and mastectomy had greater musculoskeletal complications, such as lymphedema, difficulty in raising the arm, pain in the shoulder-arm complex, and neck pain [35] when compared to the women who performed sentinel lymph node biopsy and breast reconstruction, respectively.

Surgery changes the anatomical relationship and causes changes in muscle tissue, connective tissue and skin, and affects glenohumeral joint, scapular movement and trunk alignment [16]. Decreased muscle strength, pain associated with the healing process, posture adopted with the objective of protecting the reconstructed breast or to compensate for the lack of breast, soft tissue fibrosis, associated with radiotherapy or originated by surgical intervention are some of the changes that may promote musculoskeletal changes and interfere with postural alignment [16,25]. In addition, sensitivity disorders, axillary network syndrome, lymphedema, limiting shoulder and cervical spine movement, scar adhesion and pain will affect the musculoskeletal condition of the breast cancer survivor [36,37].

Although the studies indicate that the morbities found in mastectomized women are greater than in women who underwent conservative breast surgeries and in mammary reconstructions with myocutaneous flaps [24-27], in clinical practice, it is not uncommon to observe these changes in women undergoing breast reconstruction.

The physiotherapist has a wealth of knowledge and resources that will contribute to pain relief and the reestablishment of the functionality of breast cancer survivors. Electrotherapy, therapeutic exercises and manual therapy. A therapeutic program aiming at maintaining or gaining the range of motion of the shoulder joint and upper limb muscle strength, balancing the strength of the postural muscles, increasing respiratory efficiency, improving physical fitness [38] will improve the condition musculoskeletal system of breast cancer survivors.

Lymphedema

Lymphedema results from the accumulation of lymphatic fluid in the interstitial space of the subcutaneous tissue and has a tendency towards chronic and progressive evolution. Lymphedema associated with breast cancer usually presents as edema of the upper limb on the same side as the operated breast [39,40] and may be associated with breast and trunk edema [41].

After surgical removal of the axillary lymph nodes by lymphadenectomy or sentinel lymph node biopsy, as part of breast cancer treatment, lymphedema can be manifested as a consequence of breast cancer treatment [42]. Axillary surgical intervention combined with other risk factors may lead to lymph stagnation. The lymphatic fluid is rich in protein and can be organized in a manner and promote a rigidity in the subcutaneous tissue to the more superficial layers of the skin [43].

The assessment of lymphedema is very important for the diagnosis and monitoring of patients, before, during and after treatment and should include palpation of the tissue - verify the extent and condition of the tissue as to the malleability and displacement of the skin over the deeper planes [44].

It is also important to assess lymphedema volume, sensitivity, range of motion, and muscle strength [44]. The most reliable and easily reproducible lymphedema volume assessment is volumetry and perimetry. Lymphedema presents some risk factors such as lymphadenectomy, axillary or supraclavicular radiotherapy, application of chemotherapy to the arm on the same side of the operated breast, presence of edema or seroma in the first 6 months after surgery, high body mass index, age - the greater the age, the greater the risk and infections [45].

The treatment of lymphedema shows good results with the combination of therapies such as manual lymphatic drainage, compressive therapy and pressure therapy. With the decrease of the immune response the risk of infection is higher in the presence of lymphedema. The use of compressive therapy will increase the temperature of the limb, so the skin care that will receive compression should involve hydration with neutral pH creams before starting compressive therapy. Even with the use of compressive therapy, the patient should

be encouraged to move the limb through kinesiotherapy.

Fibrosis

The healing tissue after surgery, radiotherapy is the main factors that trigger the onset of fibrosis and adhesions - which may lead to tissue tension and limitation of range of motion. After surgery, the healing process can produce an almost imperceptible scar or a scarring with exuberant fibrosis that may interfere with the functionality [46].

Fibrosis can be defined by overgrowth, hardening and/or healing of various tissues and is attributed to excess deposition of extracellular matrix components, including collagen. Fibrosis is the end result of chronic inflammatory reactions induced by a variety of stimulus, including persistent infections, autoimmune reactions, allergic responses, chemical insults, radiation, and tissue injury [47].

Fibrosis induced by radiotherapy has different characteristics from fibrosis by surgical trauma. It presents chronic and progressive changes in the subcutaneous tissue, the patient presents thick skin adhering to the irradiated site and limited movement [48].

Lymphatic transport may also receive interference from tissue fibrosis, since tissue may slow lymphatic regeneration. The accumulation of extracellular matrix or alteration in the amount of proteins - as occurs when there is fibrosis and scars, can inhibit the proliferation of endothelial and lymphatic cells [49]. Physiotherapy there are several techniques that work in the treatment of fibrosis. Manual therapies through maneuvers that mobilize tissue, slowly and smoothly, promote tissue organization, restoring tissue elasticity [50].

Axillary Web Syndrome

Also it is called lymphatic collector fibrosis is defined as a tight strings web and not erythematous, palpable and visible under the skin, with presence of pain on palpation and during shoulder movement and limitation of movement of the shoulder joint, essentially abduction and flexion [51].

The cords present in the axilla and can reach the medial part of the arm and in some cases until the antecubital, and can reach the base of the thumb [51]. The pathophysiology of the axillary web syndrome is controversial. There are studies that the cords are described as lymphatic vessels that have suffered fibrosis, and in other studies the cords are described as coming from blood vessels or mixed vessels [51-53]. Linfanodectomy is a risk factor for the formation of the axillary web syndrome, however after the sentinel lymph node biopsy can also be found axillary web syndrome [52].

By placing the patient in the supine position with abduction and external rotation of the shoulder, extension and supination of the elbow with extension of the wrist and fingers, it is possible to detect one or more cords in the axillary region and the patient commonly complains of pain and limitation of movement [54].

Conclusion

In general, the main complications following the treatment of breast cancer have been described in above. Physiotherapy's role in improving pain, functionality, and quality of life in these patients was observed in a study involving 94 women, most of who claim that physical therapy helped overcome pain and functional limitation of breast cancer treatment [55]. A functional assessment is critical to the development of the strategy of the treatment. The intervention by Physiotherapy should be started as early as possible in order to prevent further complications. The postural evaluation is fundamental for the elaboration of the ideal therapy. In a segmented way it is important that there is an evaluation of the scapular girdle, the cervical spine, the static and dynamic scapular symmetry. It is also important to assess the strength and range of motion of the upper limbs as well as the sensitivity and presence of lymphedema. To evaluate the positioning and displacement of the trunk and respiratory mobility.

Physiotherapy has been responsible for reducing pain, fatigue and lymphedema, and improving muscle strength, shoulder range of motion, functional activity and quality of life in women undergoing breast cancer treatment [56]. Physiotherapy has shown that it may play an important role in the postoperative period of breast cancer surgery [57-60] where it can be considered one of the main preventive agents for complications after surgery.

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