Narrative Review

Upper Body Pain and Functional Disorders in Patients With Breast Cancer

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Upper body pain and dysfunction are common in survivors of breast cancer. Disorders of the upper body can result directly from breast cancer or from the surgery, chemotherapy, radiotherapy, or hormonal therapies used in its treatment. Although considerable information is available regarding impairments such as pain and restricted shoulder range of motion associated with breast cancer and its treatment, relatively little information is available about the specific neuromuscular, musculoskeletal, lymphovascular, and other diagnostic entities that underlie those impairments. This article will detail the common and specific causes of upper body pain and dysfunction in breast cancer survivors, including postsurgical pain, rotator cuff disease, adhesive capsulitis, arthralgias, cervical radiculopathy, brachial plexopathy, mononeuropathy, postmastectomy pain syndrome, lymphedema, axillary web syndrome, deep vein thrombosis, and cellulitis. Diagnostic specificity is a key first step to safely and effectively restore function and quality of life to breast cancer survivors.

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INTRODUCTION

Upper body pain and functional disorders are common after treatment for breast cancer. These disorders can manifest immediately after treatment of breast cancer or may present many years later. Reduced quality of life is not just a consequence of reduced physical functioning but also derives from adverse effects on the psychosocial and social domains of function [1]. Numerous studies have demonstrated the adverse upper body symptoms associated with breast cancer treatments. These studies have reported a wide range in the prevalence of symptoms at time points ranging from 3 months to 6 years after treatment [2-25]. Shoulder range of motion (ROM) is found to be restricted in 1.5%-50% of women after breast cancer treatment, pain is present in 12%-51% (with up to one third experiencing some pain after 5 years), upper limb weakness is present in 18%-23%, and numbness is found in 29%-81% [1,2]. Interpretation of these figures is complicated by the fact that they are reported for various time points along the survivorship continuum and for a variety of surgical and radiation therapy combinations. Still, the point is made that survivors of breast cancer experience significant posttreatment upper body sequelae that may last years. These sequelae may persist much longer than is reported in most studies. In many cases, the complications of breast cancer treatment may encumber the patient for the duration of her life.

Although a considerable amount of high-quality data is available regarding the prevalence of upper body symptoms associated with breast cancer treatment, with the exception of lymphedema, the information detailing the specific diagnostic entities responsible for these symptoms in survivors of breast cancer is less robust. This situation is not without consequence; diagnostic specificity is of paramount importance to the rehabilitation physician because it allows him or her to narrow and optimize a treatment strategy and thus obtain the best possible outcome with the safest and most efficacious treatment approach. For instance, use of opioids as monotherapy for adhesive capsulitis is inappropriate and generally ineffective compared with a more comprehensive strategy that might include physical therapy, prescription of a nonsteroidal anti-inflammatory drug (NSAID), and potentially an intra-articular injection [26]. It is important to recognize that

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more than one cause may be present in a given patient and that the cause of upper body pain and dysfunction may evolve over time [26].

In this article we will discuss a selection of the most common causes of upper body pain and dysfunction likely to be encountered in breast cancer survivors. An expanded list of disorders likely to cause pain and dysfunction in breast cancer survivors is presented in Table 1.

MUSCULOSKELETAL DISORDERS

Postsurgical Pain

Shoulder dysfunction in survivors of breast cancer can be caused by a number of pathologic conditions [1]. In the acute treatment setting, the effects of breast surgery, axillary dissection, and radiation dermatitis can cause pain and a subsequent disincentive for patients to move their arm [27]. Postsurgical pain (postmastectomy or reconstruction, both immediate or delayed), scar tissue formation, nerve dysfunction, and protective posturing may lead to shortening of soft tissues in the anterior chest wall, including the pectoralis major and minor muscles [28]. Both immediate and delayed breast reconstruction, whether by implant, free flap, or pedicle flap, also can cause pain, nerve dysfunction, pectoral tightening, and subsequent shoulder dysfunction [29]. Shortening of the pectoral muscles and associated soft tissues can result in forward depression of the shoulder girdle [28,30]. Radiation therapy and resultant soft-tissue fibrosis may exacerbate this misalignment [28]. These changes are thought to affect the size of the subacromial space, alter shoulder biomechanics, and thereby increase stresses on the tissues that traverse the subacromial space, leading to shoulder pain and dysfunction [28]. Misalignment of the shoulder may lead to rotator cuff (RTC) disease and ultimately adhesive capsulitis [26]. Most breast cancer treatment centers recognize the perils of shoulder immobility and weakness after surgery and have developed classes to help women stretch and strengthen the shoulder girdle after treatment. Table 2 details the common causes of restricted shoulder motion in survivors of breast cancer.

Table 1. *Upper body pain disorders in patients with breast cancer*

- Musculoskeletal
  - Postsurgical pain
  - Rotator cuff disease
  - Bicipital tendonitis
  - Adhesive capsulitis
  - Bony metastases
  - Epicondylitis
  - De Quervain tenosynovitis
  - Arthralgias
  - Arthritis
- Neuromuscular
  - Cervical radiculopathy
    - Leptomeningeal disease
  - Brachial plexopathy
  - Polyneuropathy
    - Chemotherapy-induced peripheral neuropathy
    - Diabetic peripheral neuropathy
  - Mononeuropathy
    - Dorsal scapular (rhomboids C5)
    - Suprascapular (supraspinatus and infraspinatus C5-C6)
    - Long thoracic (serratus anterior (C5-C6-C7)
    - Lateral pectoral (pectoralis major and minor (C5 to T1))
    - Medial pectoral (pectoralis major and minor (C5 to T1))
    - Thoracodorsal (latissimus dorsi C6-C7-C8)
    - Median
      - Carpal tunnel syndrome
    - Ulnar
      - Cubital tunnel
      - Guyon canal
      - Radial
      - Radial groove
    - Postmastectomy pain syndrome
      - Intercostobrachial neuralgia
    - Complex regional pain syndrome
- Lymphovascular
  - Lymphedema
  - Axillary web syndrome
  - Deep vein thrombosis
  - Postthrombotic syndrome
- Integumentary
  - Cellulitis
  - Radiation dermatitis

Rotator Cuff Disease

Although the incidence of RTC pathology in survivors of breast cancer has not been established, subacromial impingement syndrome and subsequent RTC disease is the leading cause of shoulder pain in the general population [28]. In our experience, RTC pathology is by far the leading cause of shoulder pain seen in survivors of breast cancer. Biomechanical imbalance resulting from oncologic and reconstructive surgery and radiation, foreshortening of the pectoral girdle muscles and soft tissues, and subsequent mispositioning of the RTC tendons within a narrowed acromial arch, as described previously, are likely major contributing factors (Table 2) [26,28]. Advanced age is a known risk factor for RTC disease [28]. Lymphedema, when present, also can contribute to RTC impingement [28,31].

The diagnosis of RTC pathology is usually made on clinical grounds. Patients generally report shoulder pain, limited ROM, and shoulder weakness that is accompanied by decreased function of the involved extremity. The pain can be anterior or anterolateral and may radiate to the elbow. Activities, particularly those that involve reaching above or behind, carrying objects, or sleeping on the affected side, often aggravate the pain.

Specialized physical examination maneuvers for impingement include the Hawkins-Kennedy test, Neer test, and supraspinatus test (aka the "empty can test") [31,32]. The Hawkins-Kennedy test has a pooled sensitivity of 79% and a specificity of 59% and the Neer test has a pooled