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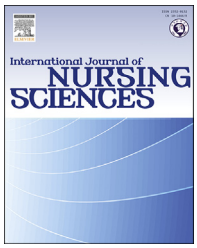

Review

Breast cancer-related lymphedema: A literature review for clinical practice

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ABSTRACT

Lymphedema is the swelling of soft tissues as a result of the accumulation of protein-rich fluid in extracellular spaces. Secondary lymphedema is precipitated by an event causing blockage or interruption of the lymphatic vessels. Secondary lymphedema is a potential complication that may affect the quality of life of patients treated for breast cancer. Life-long risk factors of post-breast cancer lymphedema are related to the extent of axillary node involvement, type of breast surgery, and radiation therapy. These factors decrease lymphatic drainage and increase stasis of fluids in the areas of skin and subcutaneous tissues that drain to regional lymph nodes. Breast cancer-related lymphedema can involve the arm and hand, as well as the breast and trunk on the operative side. Clinical symptom assessment and circumferential measures are widely used to evaluate lymphedema. Treatment of lymphedema associated with breast cancer can include combined modality approaches, compression therapy, therapeutic exercises, and pharmacotherapy.

Contents

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1. Introduction

Breast cancer has been the focused of many studies because it significantly affects both in developed and developing countries worldwide. In 2012, about 1.7 million women worldwide were diagnosed with breast cancer and 521,900 cases died from this disease [1]. The American Cancer Society reported that approximately 231,840 new cases of invasive breast cancer are expected to be diagnosed among women in the USA in 2015; this organization also predicted that 60,290 new cases of in situ breast cancer and 40,290 breast cancer deaths would occur in 2015 [2]. The 5-year relative survival of women diagnosed with breast cancer has increased from 80% in the 1950s to 89% today relative to age-matched women without the disease [2].

Although breast cancer treatments, including surgery, radiotherapy, chemotherapy, and hormonal therapy, have improved patient outcomes, these techniques cause patients to potentially suffer substantial adverse effects [3]. One complication of these treatments is lymphedema, a chronic health problem, troublesome to both patients and health professionals. Lymphedema describes a set of pathological conditions, in which protein-rich fluid accumulates in soft tissues because of interruption of lymphatic flow [4]. Lymphedema is most commonly found in the extremities but can also be found in the head, neck, abdomen, lungs, and genital regions [5]. Although the incidence of breast cancer-related lymphedema (BCRL) remains unclear because of differences in diagnostic criteria, the different characteristics of the patients and their inadequate follow-up delayed the developments in treatment of the disorder [6]. The overall incidence of upper extremity lymphedema ranges from 8% to 56% 2 years post-surgery [7]. The incidence of breast and truncal lymphedema has been rarely reported. Jeffs [8] reported a 13% incidence of breast/truncal lymphedema in 168 patients. This study was conducted to refresh the understanding of nurses and public health personnel on breast cancer-related lymphedema.

This article is divided into 55 parts, which include pathophysiology of lymphedema, risks and causes of lymphedema, diagnosis of lymphedema, treatment of lymphedema, and nursing implications.

2. Pathophysiology of lymphedema

The lymphatic system maintains fluid balance in tissues, fights infection, and assists in removal of cellular debris and waste products from extracellular spaces. Under normal conditions, the lymphatic system is involved in production of immune cells and antibodies, destruction of red cells, and lymph transport. The lymphatic system is divided into superficial and deep layers, which are connected by perforating vessels. The lymphatic system is assumed to function independently [5]. The superficial transport lymphatic vessels lie in subcutaneous tissues to provide drainage for the skin and subcutaneous tissues; moreover, deep transport lymphatic vessels lie near deeper blood vessels to provide drainage from muscles, tendon sheaths, nervous tissues, periosteum, and most joint structures [5]. Lymph from the lower body below the diaphragm and the left side of the body above the diaphragm is transported by the thoracic duct, which is the largest lymph vessel in the body. The thoracic duct empties into the left venous angle, which is formed by the left subclavian and left jugular veins. Lymph from the right side of the body above the diaphragm is transported by the right lymphatic duct, which empties into the right venous angle formed by the junction of the right subclavian and right jugular veins [9].

Fluids normally diffuse into interstitial spaces at the arteriolar end of the capillary and filter back into the capillary at the venular end. Up to 90% of fluids filtered into the interstitium from capillaries are reabsorbed into the venous side. The remaining 10% (or more) of fluids and proteins are removed from the interstitium by small, terminal (one-way) lymphatic vessels [10]. The normal outward flow of fluids slightly exceeds the inward flow, and the net filtrate enters the lymphatics and drains back into the bloodstream. This process creates stable interstitial pressure. If large molecules accumulate, such as in obstructed lymph transport because of axillary treatment, sufficient effective osmotic pressure develops and causes excessive fluids in the interstitial space [9]. This protein-rich swelling condition is called lymphedema.

3. Risks and causes of lymphedema

Lymphedema that develops after breast cancer treatment is thought to be related to the extent of axillary node involvement, type of breast surgery, and radiation therapy. These factors lead to decreased lymphatic drainage and stasis of fluids in the skin/tissue areas that normally drain to the axilla; these areas include ipsilateral breast, chest, lateral and posterior upper trunk, arm, and hand [10]. The lymphatic vessels in the radiation field are constricted after radiation because of the resultant fibrotic tissue constriction in the vessels [11]. In addition, radiation damages cells within the nodes, wherein high dose of radiation may be directed to eradicate malignant cells. Radiation compromises lymph node function and can cause a certain degree of lymphedema [11]. Cancer surgery also results in superficial scarring that inhibits lymphatic flow across the scar tissue, leading to lymphatic fluid collection proximal to the scar [19]. Moreover, local infection after surgery or radiation contributes to the development of