CE Objectives and Evaluation Form appear on page 307.

CNE SERIES

Secondary Lymphedema in the Cancer Patient

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October is Breast Cancer Awareness Month, and nurses should engage in all the prevention, treatment, and survivorship education and related activities that take place during the month. Nurses play a vital role when interfacing with breast cancer survivors. Medical-surgical nurses may interact with these individuals when they need care for non-oncology problems. It is important to describe a serious problem encountered by many breast cancer survivors — lymphedema.

Lymphedema is a quality-of-life, non-fatal condition that receives less funding for research than other pathologies, yet it affects a large number of people. Actual numbers are hard to assess with ranges of 15%-25% in the breast cancer population alone. This does not include patients with melanoma or other surgical patients who are at risk for developing lymphedema. Perhaps 2 million cancer survivors or up to 400,000 patients cope with lymphedema daily (Petrek, Pressman, & Smith, 2000). The pathophysiology, etiology, stages, treatment, prevention, and nursing implications of lymphedema will be discussed in this column.

"Lymphedema is the accumulation of protein-rich interstitial fluid within the skin and subcutaneous tissue that causes chronic inflammation and reactive fibrosis of the affected tissues" (Wyatt & Pribaz, 2004, p. 817). Normally, lymph fluid is drained from the cells in the body and carried in the lymphatic system. Lymph is cleared through a network of thin-walled lymphatics, which cross the axillary nodal basin and ultimately empty into the venous system. The lymphatic system is part of the immune system, which carries lymphocytes throughout the body to respond to antigens and communicate responses to other parts of the body. The lymphatic system also carries excess fluid back to the venous bloodstream through a series of ducts or tubules, and

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empties excess fluid near the subclavian vein. Lymphedema occurs when the lymphatic ducts become blocked and a buildup of lymph fluid occurs in the fatty tissues just under the skin, resulting in swelling (Lymphedema, 2004). The ability of the medical-surgical nurse to recognize lymphedema and facilitate early treatment of this common side effect of breast cancer therapy will improve patient outcomes and quality of life (Sammarco, 2004).

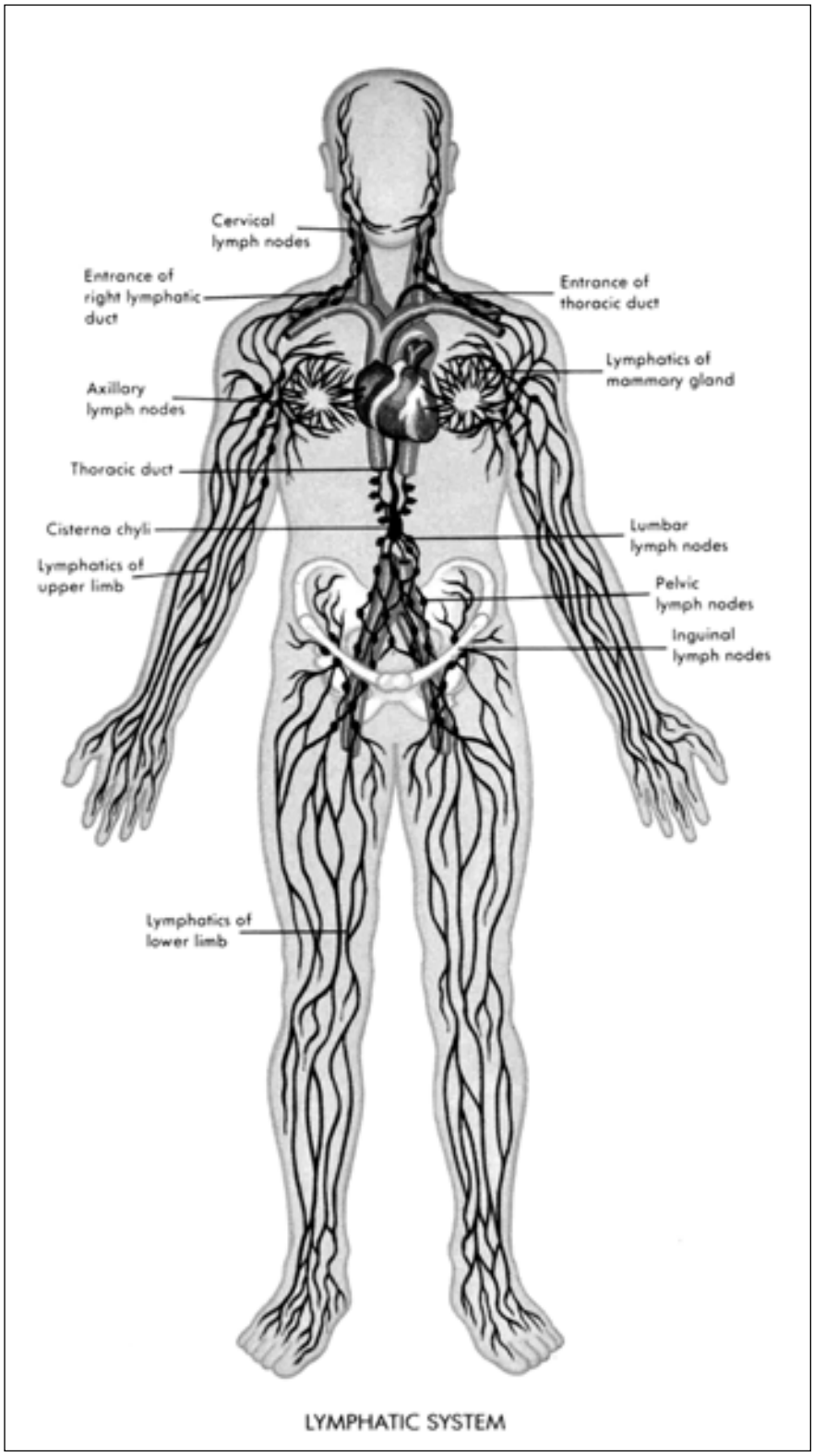
Pathophysiology of Lymphedema

The lymph fluid passes through the lymph nodes, which are found in the articulations of the large joints, the mesentery system, and the neck. A healthy adult has approximately 600-700 lymph nodes. The nodes act as filters to remove waste and help to regulate protein content in the lymph fluid (see Figure 1).

The lymph fluid is carried through long tubules called lymph *ducts,* which eventually empty the fluid into deeper and larger vessels called *trunks.* All the lymph trunks empty into either the thoracic duct or the right lymphatic duct. The thoracic duct drains the left arm, both legs, and three-fourths of the trunk of the body. The right lymphatic trunk drains the right arm and the remaining one-fourth of the trunk. The location of the surgery, tumor, or radiation therapy will predict whether or not the patient develops secondary lymphedema and how severe the lymphedema will be (Penzer, 2003).

Lymphedema results from either a mechanical or dynamic insufficiency in the lymphatic system or a combination of these conditions. In a dynamic insufficiency, the lymph *flow* actually exceeds the transport capability of the intact lymphatic system. Usually this type of lymphedema has a genetic etiology. This

Figure 1.
The Lymphatic System



Source: www.lymphomation.org/about-lay.htm

dynamic insufficiency causes *primary lymphedema*. In a mechanical insufficiency, an *injury* to the lymphatic system impairs the lymph flow due to paralysis, blockage, or inadequacy of the lymphatic system after surgery, radiation therapy, infection, or tumors. This mechanical insufficiency causes *secondary lymphedema,* which is the most common type of lymphedema in the United States. Approximately 15%-20% of breast cancer patients develop lymphedema up to 20 years following treatment. With 2 million breast cancer survivors, this number translates into approximately 400,000 patients coping with lymphedema on a daily basis (Petrek et al., 2000).

Primary Lymphedema

Lymphedema is categorized as either primary or secondary based on the etiology. In primary lymphedema, some type of developmental abnormality exists in the lymphatic system. Congenital lymphedema accounts for 10%-25% of all primary lymphedema cases, with females affected twice as often as males (Revis, 2005). Primary lymphedema may occur at any time in life; however, primary lymphedema is thought to be a genetically determined disease and may present at birth or shortly thereafter (Milroy disease), at puberty (referred to as lymphedema praecox), or after age 35 (lymphedema tarda) (Wyatt & Pribaz, 2004). Primary lymphedema usually affects the lower extremities (International Society of Lymphology, 2003).

Secondary Lymphedema

Secondary lymphedema is a result of some sort of an insult to the lymphatic system caused by an obstruction or a disruption that prevents the tubules from draining the fluid from the surrounding tissues. It may occur from infection caused by streptococci or filariasis (caused by a parasite), surgery, radiation therapy, or tumors. Lymphedema caused by infection must be treated with an antibiotic or antiparasitic agent (Petropoulos, 2005; Stedman, 2004). Secondary lymphedema may develop after surgery for malignant solid tumors, such as in breast cancer or lymphoma. It also may develop after an axillary node dissection, breast surgery, or after radiation treatments. Because surgery or radiation treatments are the most common cause of lymphedema in the United States, this type of lymphedema is the primary focus of this column. Although lymphedema may have different etiologies, the treatment for all types is the same.

Stages of Lymphedema: Stages I, II, and III

Stage I lymphedema is considered reversible. The lymphedema is pitting and the tissues are soft; the patient may or may not have an increased arm girth or feeling of upper-extremity heaviness. Elevating the affected area may reverse the edema. In Stage II, the lymphedema progresses and may become nonpitting and fibrotic. Stage II lymphedema is considered irreversible and elevation does not reduce swelling. In Stage III lymphedema, the tissues become hard and may have cartilage formation developing in the area. The swelling is severe and may form deep crevices. Stage III lymphedema is considered rare in patients with breast cancer (Harris, Hugi, Olivetto, & Levine, 2001).

Diagnosing Lymphedema

In 2004, the Oncology Nursing Society (ONS) described a cluster of symptoms that is unique to breast cancer survivors with lymphedema. The cluster of symptoms includes an altered sensation in the limb, fatigue, psychological distress, and decreased physical activity (Muscari-Lin & Ridner, 2004). Other symptoms of lymphedema include:

- Painless swelling of the arms or legs, which may get worse during the day and better at night.
- Warmth or achiness in the extremity.
- A feeling of tightness, heaviness, tingling, numbness, or weakness in the affected extremity.
- Redness of the affected extremity.
- Bracelets, rings, or shoes may become tight.

Changes of sensation in an arm may be an early indication of lymphedema and should be thoroughly investigated (Amer, Radina, Porock, & Culbertson, 2003).

Other causes of lymphedema include (a) metastasis or development of obstructive tumors, such as tumors of the axilla or brachial plexus; (b) lymphangiosarcoma; (c) infection; or (d) axillary vein thrombosis. Lymphoscintigraphy may be used to rule out a systemic cause of the lymphedema and may be used to predict who will develop lymphedema. Lymphoscintigraphy is 100% sensitive and specific for diagnosing lymphedema; however, it is expensive and may not be available at all facilities where medical surgical-nurses practice (Ferri, 2004).

A simple assessment tool for the medical-surgical nurse is preoperative and post-surgical measurements of both arms. The circumference of the arms should be measured at several anatomical positions: (a) finger joints, (b) wrist, (c) 10 cm distal to the lateral epicondyles, and (d) 15 cm proximal to the lateral epicondyles. A difference of greater than 2 cm between the arms at any one of the four measurement points, as well as presence of the ONS cluster of symptoms described previously, may alert the nurse to lymphedema

(Brown, 2004). If lymphedema is accompanied by redness and swelling, and an elevated WBC (>12,000/ml) or an elevated temperature (>38° C or >100.4° F), the cause may be cellulitis or a local infection rather than lymphedema, and must be treated with antibiotic therapy. Streptococcus Group A usually causes cellulitis, but *staphylococcus aureus* also may cause it. Treatment would consist of penicillin, dicloxacillin, amoxicillin, ticarcillin, methicillin, or vancomycin for a highly resistant bacteria strain (Gilbert, Moellering, Eliopoulos, & Sande, 2005). Cellulitis may occur concurrently in lymphedema because the pooling of protein-rich lymph fluid makes it easier for the patient to develop an infection. Before treating lymphedema, possible tumor involvement of the axilla or brachial plexus, cellulitis, or even deep vein thrombosis must be ruled out. All these conditions may cause edema of the extremities, which may be misdiagnosed as lymphedema.

Treatment of Lymphedema

The literature is limited in regard to scientifically proven lymphedema treatments because of the lack of prospective, randomized clinical trials that accurately control all variables and measure the amount of lymphedema present. Little rigorous science supports recommendations; however, several professional organizations have guidelines or recommendations (Lacovara, 2006). Compression garments (elastic sleeves) that deliver 20-60 mm Hg of pressure are used for treating lymphedema. A prospective study by Collins, Mortimer, D'Ettore, Ahern, and Moscovic (1995) demonstrated significant decreases in lymphedema in 27 women using the garments. CT exams were used to compare unaffected arms with lymphedema arms using compression for 1, 3, and 12 weeks of treatment (Collins, Mortimer, D'Ettore, Ahern, & Moscovic, 1995).

High-quality compression garments are custom made and should be fitted by properly trained personnel. The practice guidelines of the Canadian Medical Association (CMA) encourage the long-term, consistent use of compression garments when lymphedema occurs. The garments last for approximately 4-6 months depending on how often they are worn and how well they maintain their elasticity. Recommendations about how long to wear the fitted sleeves vary from only during working hours to 24 hours a day. The CMA also provides practical advice regarding skin care, exercise, and weight control (Harris et al., 2001).

Massage and physical therapies have been used with variable effectiveness in treating lymphedema. Complex decongestive physiotherapy includes manual lymph drainage, bandaging garments such as elastic wraps, and exercises. Complex decongestive physiotherapy requires further evaluation in randomized trials (Harris et al., 2001). This therapy usually is performed by physical therapists who specialize in lymphedema treatment, and some rehabilitation centers offer this specialty treatment (Foldi, 1994). The Foldi two-phase approach of intensive skin care, exercise, massage, and compression bandaging has been used widely in the United Kingdom (UK) as a gold standard (Badger, Peacock, & Mortimer, 2000).

Currently, the position paper of the International Society of Lymphology recommends complex physiotherapy by a physician, nurse, or physical therapist who has been professionally trained. It should be noted that compression bandaging, if done incorrectly, may be harmful or useless. Complex physiotherapy treatment consists of two phases. The first phase involves preventive skin care, light manual massage, range-of-motion exercises, and compression with multilayer wrapping. The second phase, which must be initiated promptly after phase one, includes use of a compression sleeve, remedial exercise, and repeated light massage as needed (International Society of Lymphology, 2003). At the Breast Cancer Clinic of the Arizona Cancer Center, patients are advised to wear the compression sleeve prophylactically when flying because pressure changes may trigger lymphedema (NLN Advisory Committee, 2004).

Pneumatic compression devices have been used for treating lymphedema, but insufficient evidence exists to support or reject this treatment. In addition, these devices are expensive and are contraindicated in cases of cellulitis or deep vein thrombosis. These devices are not recommended by any of the professional organizations cited in this column.

Prevention: Sentinel Node Biopsy

The advent of sentinel node biopsy (SNB) should lead to decreased incidence of lymphedema. This newer procedure has changed the way axillary lymph nodes have been evaluated for the last 100 years. The procedure used in the past, known as complete axillary node dissection, removed a large number of lymph nodes and caused about 20% of patients to develop lymphedema. In sentinel node biopsy, a blue dye is injected in the area of the breast tumor and the dye is traced to the first few axillary nodes that drain the breast area. This "blue" node is then checked for malignancy and if it is cancer free it is not removed. Even if the sentinel node is removed along with other "blue" nodes, in many cases fewer nodes

are removed than in cases that require complete axillary node dissection (McCarthy, 2003).

Sentinel lymph node removal is better than complete axillary lymph node dissection with regard to lymphedema, range of motion, quality of life, and sensory loss for clinically node-negative patients. More than 5,200 patients participated in the Axillary Lymphatic Mapping Against Nodal Axillary Clearance randomized multi-center trial (ALMANAC) in the United Kingdom. Results were presented at the San Antonio Breast Conference in 2005 (Fleissig et al., 2006). This study provided the first long-term quality-of-life results from a randomized trial comparing SNB with standard treatment. Results demonstrated that SNB is associated with less arm morbidity and better quality of life than standard axillary treatment. Consequently, every oncology surgeon in the United Kingdom is currently being trained in SNB. *It is currently the gold standard in the United States and should be offered to all patients at the time of their surgery.* Once the surgery has been performed, the lymphatic pathways may be disrupted and so SNB cannot be performed later or after the surgery.

Prevention and Ongoing Care: Nursing Implications

Because breast cancer survivors remain at life-long risk of developing lymphedema, prevention of lymphedema is a very important role for the medical-surgical nurse. Clearly, the prevention of lymphedema is much more effective than treating the problem after it occurs. The National Lymphedema Network (NLN) published a position statement that lists risk-reduction practices, such as proper skin care (avoiding injury, reducing infection risks), appropriate activity levels, avoidance of constrictive clothing, use of compression garments, avoidance of temperature extremes, and other suggestions (NLN Advisory Committee, 2005). This handout for breast cancer patients and others at risk for lymphedema may be accessed online (http://www.lymphnet.org). The handout may be used by health care personnel in its entirety for educational purposes only. Recommendations in the NLN handout help nurses with ongoing prevention and assessment of problems such as cellulitis to keep patients functioning optimally. ■

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Answer/Evaluation Form: Secondary Lymphedema in the Cancer Patient

MSN J612

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Answer Form:

1. If you applied what you have learned from this activity into your practice, what would be different?

_____

_____

_____

Evaluation	**Strongly disagree**				**Strongly agree**
The offering met the stated objectives.					
2. By completing this activity, I was able to meet the following objectives:					
a. Identify the difference between primary and secondary lymphedema.	1	2	3	4	5
b. List at least five ways of preventing secondary lymphedema.	1	2	3	4	5
c. Discuss the different treatment options for secondary lymphedema.	1	2	3	4	5
d. Describe how sentinel lymph node biopsy may decrease the incidence of lymphedema.	1	2	3	4	5
3. The content was current and relevant.	1	2	3	4	5
4. The objectives could be achieved using the content provided.	1	2	3	4	5
5. This was an effective method to learn this content.	1	2	3	4	5
6. I am more confident in my abilities since completing this material.	1	2	3	4	5

7. The material was (check one) ___new ___review for me

8. Time required to complete the reading assignment: _____minutes

I verify that I have completed this activity: _____

Comments

_____

_____

_____

Objectives

This educational activity is designed for nurses and other health care professionals who care for and educate patients and their families regarding secondary lymphedema. For those wishing to obtain CNE credit, an evaluation follows. After studying the information presented in this article, the nurse will be able to:

1. Identify the difference between primary and secondary lymphedema.
2. List at least five ways of preventing secondary lymphedema.
3. Discuss the different treatment options for secondary lymphedema.
4. Describe how sentinel lymph node biopsy may decrease the incidence of lymphedema.

CE Instructions

1. To receive continuing education credit for individual study after reading the article, complete the answer/evaluation form to the left.

2. Detach and send the answer/evaluation form along with a check or money order payable to **AMSN** to *MEDSURG Nursing*, CE Series, East Holly Avenue Box 56, Pitman, NJ 08071–0056.

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