Diagnosis and Treatment of Lymphedema in Patients With Breast Cancer: An Overview of an Interdisciplinary and Patient-Centered Approach

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Lymphedema is a distressing consequence of breast cancer treatment affecting the patient in all domains of quality of life. Early identification and diagnosis are key to preventing long-term consequences. The goal of lymphedema management is to slow the progression and provide symptomatic relief to maintain quality of life. Preoperative education, intensive postoperative follow-up, and long-term survivorship care are important to minimize risk factors for developing lymphedema and to provide a mechanism for early detection, treatment, and patient self-care. An interdisciplinary approach, including nutritionists, physical therapists, psychologists, and advanced practice registered nurses (APRNs), is essential to provide a patient-centered approach to the management of lymphedema. APRNs are critical in providing comprehensive assessments, ongoing follow-up care, and patient education in self-care strategies.

Prevention of Lymphedema

Oncology nurses need to be aware of potential risk factors for developing lymphedema, identify patients at risk, provide...
Role of the Oncology Nurse in Assessment

Early identification and diagnosis of lymphedema are key to preventing long-term consequences, including paresthesia, range-of-motion impairments, loss of strength, disfigurement, physical discomfort, recurrent infections, and nonhealing wounds (McLaughlin et al., 2008; NLN, 2011; Papadopoulou et al., 2012; Stout Gergich et al., 2008; Torres Lacomba et al., 2010). Early identification is challenging because observable signs of lymphedema are usually absent in the early stages, so oncology nurses must perform thorough skin assessments for dryness, pigmentation, fragility, redness, pallor, cyanosis, warmth or coolness, dermatitis, cellulitis, infection, scars, hyperkeratosis, wounds, ulcers, and deepened skin folds (International Consensus, 2006; Papadopoulou et al., 2012; Ryan et al., 2012).

Varied diagnostic methods and a lack of standard diagnostic criteria add to the challenge of early diagnosis (McLaughlin et al., 2008; Stout Gergich et al., 2008). Current awareness of lymphedema diagnostic criteria by nurses and other professionals is poor, which results in late diagnosis, usually when lymphedema is in an advanced stage (Stout et al., 2012). On average, lymphedema is diagnosed about seven months after patients undergo treatment (Stout Gergich et al., 2008).

Objective measurements and symptom assessment are needed to determine clinically significant lymphedema (McLaughlin et al., 2008). Discordance usually occurs between subjective and objective measures of lymphedema because patients rarely notice the minimal changes in limb volume (McLaughlin et al., 2008). To enable the early detection of lymphedema, a comprehensive, structured, ongoing assessment performed by the same nurse is critical (International Consensus, 2006; Torres Lacomba et al., 2010) (see Figure 2). Initial preoperative assessment can prevent errors in diagnosing lymphedema because it allows for documentation of preexisting, normal interlimb variance (Stout Gergich et al., 2008). A surveillance model includes a preoperative examination, patient education, ongoing clinical monitoring, early identification, and early intervention (Stout et al., 2012).

A variety of subjective and objective diagnostic tools are available to clinicians. The Lymphedema and Breast Cancer Questionnaire is a subjective screening assessment of lymphedema and asks patients to indicate if they have experienced symptoms (e.g., heaviness, swelling, numbness) currently or in the past year (McLaughlin et al., 2008). Objective measurements of limb volume are currently the most commonly used tool, but a variety of methods are used to measure limb volume (International Consensus, 2006; NLN, 2011; Stout Gergich et al., 2008). A need exists for an accurate, easy-to-use method for arm volume calculation (Taylor et al., 2006). When nurses perform limb volume measurements, they should realize the patient’s dominant arm may be larger than the nondominant arm at baseline to avoid the misdiagnosis of lymphedema (McLaughlin et al., 2008). Quantitative measurements need to be done at the time of diagnosis and preoperatively and remeasured at defined intervals postoperatively to monitor response to interventions (Taylor et al., 2006). Current methods of measurement include water displacement, limb circumference measurements, perometry, and bioimpedance.

Water displacement is the gold standard for measurement of limb volume because it has the highest validity and reliability (International Consensus, 2006; Taylor et al., 2006). Water displacement is based on the principle that an object will displace its own volume of water and involves submerging the affected limb into water and measuring the amount of water displaced to determine limb volume (International Consensus, 2006). To maintain the validity of this instrument, clinicians need to ensure arms are submerged to same level at each visit (International Consensus, 2006; Taylor et al., 2006). A limb volume...
change of greater than 10% from baseline is diagnostic of lymphedema (Stout Gergich et al., 2008). A limb volume change of greater than 3% from baseline is recommended as diagnostic for subclinical lymphedema, and healthcare providers should initiate conservative interventions at that time (Stout Gergich et al., 2008). Although water displacement is the gold standard for measurement, this method is not routinely used because access to equipment is difficult, the cost is significant, and it is inconvenient for patients (International Consensus, 2006; Taylor et al., 2006).

Limb circumference is the more commonly used method for limb volume measurement and is also valid and reliable when performed correctly (International Consensus, 2006; Taylor et al., 2006). Oncology nurses can be trained to perform this measurement accurately. Measurements are taken at 2 cm intervals from fingertips to axilla or using anatomical landmarks. Using this method, a change of greater than 2 cm from baseline is diagnostic of lymphedema (International Consensus, 2006; McLaughlin et al., 2008; Stout Gergich et al., 2008; Taylor et al., 2006; Torres Lacomba et al., 2010).

Other methods that are available, but not practical, include perometry and bioimpedance. Perometry is the use of infrared light to measure limb volume (International Consensus, 2006). Perometry is quick, accurate, reproducible, and sensitive, but its use is limited because of high cost (International Consensus, 2006; Stout Gergich et al., 2008; Taylor et al., 2006). Bioimpedance uses an electrical current to measure tissue resistance and calculate limb volume (International Consensus, 2006). Bioimpedance is useful in demonstrating early lymphedema and monitoring the outcome of treatment, but its use in routine practice is not established (International Consensus, 2006).

Oncology nurses need to be aware of potential risk factors for developing lymphedema, identify patients at risk for developing lymphedema, provide education, and make timely referrals as appropriate (International Consensus, 2006). Early diagnosis and intervention is critical to optimize patient outcomes. Early intervention protocols have been shown to prevent lymphedema in high-risk patients, reduce affected limb volume, and prevent progression to more advanced lymphedema (International Consensus, 2006; Stout Gergich et al., 2008).

Management and Treatment of Lymphedema

A thorough patient history and physical examination is important for clinicians to determine the cause of lymphedema (NLN, 2011; Tretbar et al., 2007). Other causes of edema must be ruled out to accurately diagnose lymphedema, and various diagnostic tools can rule out those other causes (see Figure 3). Healthcare providers can use radiology tools, including chest x-ray, electrocardiogram, echocardiogram, computed tomography, ultrasound, or contrast venography. Laboratory tools for the diagnosis of edema include kidney function, liver function, thyroid function, and D-dimer (NLN, 2011; Tretbar et al., 2007).

The goal of lymphedema management is to slow the progression of lymphedema, provide symptom relief, prevent medical complications, maintain skin integrity, reduce infection, maintain patient compliance with self-management, and maintain quality of life (NLN, 2011; Ryan et al., 2012). Management and treatment should be individualized for each patient.

Complete Decongestive Therapy

Complete decongestive therapy is recognized as the standard of care (International Consensus, 2006; Lymphedema, 2009; NLN, 2011; Oncology Nursing Society [ONS], 2014; Papadopoulou et al., 2012; Ridner et al., 2012; Ryan et al., 2012; Stout et al., 2012; Stout Gergich et al., 2008). This therapy includes education on skin care, infection prevention, and treatment; performing manual lymph drainage (a massage technique that increases the activity of normal lymphatics to move fluid away from the congested area); the use of compression bandaging and garments; specific exercises; and daily one-on-one therapy for three to eight weeks (International Consensus, 2006; NLN, 2011; ONS, 2014; Stout et al., 2012).

Two phases of treatment are recommended. The intensive treatment phase consists of interventions with complete decongestive therapy (NLN, 2011; Papadopoulou et al., 2012). Patients are transitioned to the maintenance phase of treatment when no changes in limb volume have been documented (Papadopoulou et al., 2012) (see Table 1).

Interdisciplinary Team Approach to Management of Lymphedema

An interdisciplinary team approach to lymphedema management and treatment is necessary to provide optimal, high-quality cancer care. Depending on diagnosis, a patient with breast cancer may benefit from timely referral to multiple disciplines, including plastic and reconstructive surgery, medical oncology, radiation oncology, radiation therapy, and radiation therapy physics.

**Figure 3**. Causes of Edema Other Than Lymphedema

<table>
<thead>
<tr>
<th>Unilateral with pain</th>
<th>Acute Swelling</th>
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<tbody>
<tr>
<td>Drug reactions</td>
<td>Bilateral swelling</td>
</tr>
<tr>
<td>Hypoproteinemia</td>
<td>Congestive heart failure</td>
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<tr>
<td>Cellulitis</td>
<td>Glomerulonephritis</td>
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<tr>
<td>Abscess</td>
<td>Venous insufficiency</td>
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<tr>
<td>Trauma</td>
<td>Pelvic or abdominal malignancy</td>
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<td>Muscle compartment syndrome</td>
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<tr>
<td>Unilateral without pain</td>
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<td>Venous insufficiency</td>
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<td>Post-thrombotic syndrome</td>
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<td>Venous compression</td>
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<td>Arteriovenous fistula</td>
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<td>Tumor</td>
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TABLE 1. Phases of Complete Decongestive Therapy

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intensive Phase</th>
<th>Maintenance Phase</th>
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</thead>
<tbody>
<tr>
<td>Deliverer of care</td>
<td>Healthcare provider</td>
<td>Patient (self-managed)</td>
</tr>
<tr>
<td>Frequency</td>
<td>Daily to three times per week</td>
<td>Daily</td>
</tr>
<tr>
<td>Duration</td>
<td>Three to eight weeks</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Interventions</td>
<td>Skin care, infection prevention, manual lymph drainage, compression garments, exercises, and elevation</td>
<td>Hygiene and skin care, infection prevention, manual lymph drainage, exercises, compression garments, weight management, and education</td>
</tr>
</tbody>
</table>

Note. Based on information from International Consensus, 2006; National Lymphedema Network, 2011; Papadopoulou et al., 2012; Ryan et al., 2012; Stout et al., 2012; Torres Lacomba et al., 2010.

including surgery, medical oncology, radiation oncology, physical therapy, nutrition, pain management, and psychology (Stout Gergich et al., 2008). A thorough assessment and examination are needed to initiate appropriate referrals in a timely manner (Papadopoulou et al., 2012; Tetreau et al., 2007).

Physical or occupational therapists trained in lymphedema management perform a functional assessment that includes range of motion, ability to use fastenings, ability to apply or remove compression garments or bandaging, hand grip, pincer movement, ability to perform activities of daily living, and the use of any aids (International Consensus, 2006). Certified physical and occupational therapists perform manual lymph drainage, scar massage, stretching exercises, shoulder exercises, and functional activities (Torres Lacomba et al., 2010). Lymphedema therapists also take routine measurements to monitor response to treatment and progression, make exercise recommendations, fit patients for compression devices, provide garment education, and assist patients in the maintenance of daily function (Papadopoulou et al., 2012).

A nutritionist performs a body weight assessment, nutrition advice and recommendations, and can design a weight loss program with a goal body mass index of less than 25 (International Consensus, 2006; Papadopoulou et al., 2012). Pain management and palliative care experts are useful in determining the cause, nature, frequency, timing, site, severity, and impact of pain on quality of life (International Consensus, 2006; Torres Lacomba et al., 2010).

After appropriate screening and referral, a psychologist assesses for signs of depression, social isolation, sexuality concerns, anxiety, reduced self-esteem, distorted body image, and relationship concerns (e.g., sexual, family, social) (International Consensus, 2006; Papadopoulou et al., 2012). Psychologists also assess patients’ understanding of their disease and assist in setting treatment expectations (International Consensus, 2006; Papadopoulou et al., 2012). A quality-of-life assessment is performed to make recommendations for self-management and to teach coping skills (International Consensus, 2006; Papadopoulou et al., 2012; Ryan et al., 2012).

Patient Education to Prevent and Manage Lymphedema

No strategies currently exist that show lymphedema is preventable or that it can be cured; therefore, initial and ongoing patient education is critical to the management of lymphedema (International Consensus, 2006; McLaughlin et al., 2008; NLN, 2011; ONS, 2014; Ridner et al., 2012; Ryan et al., 2012). Patients who received education practiced more risk-reduction behaviors, reported fewer lymphedema symptoms, and had improved cognitive and behavior outcomes (Ryan et al., 2012).

Preoperative education includes an individualized discussion of the incidence and pathogenesis of lymphedema (Papadopoulou et al., 2012). Patients should also receive printed material of the lymphatic system, understand sources of lymphedema, verbalize the identification of risk factors, and discuss interventions to prevent lymphedema (Torres Lacomba et al., 2010). Postoperative education should include an individualized intervention plan to minimize risk and promote lymph drainage, and it should include the use of compression garments (Papadopoulou et al., 2012). Patients need to be educated on the early signs and symptoms of lymphedema, including clothing or jewelry becoming tighter; aching; feelings of heaviness, tightness, fullness, or stiffness; and observable swelling (International Consensus, 2006; Lymphedema, 2009; Taylor et al., 2006). Patients also need to be educated on precautionary and avoidant behaviors to reduce their risk of lymphedema development (see Figure 4). Patient education is important to monitor for early signs and symptoms of adverse effects, such as pain, immobility, and weakness (Stout et al., 2012). Ongoing reinforcement of these interventions is important at every encounter with the patient to promote adherence to the treatment plan and maximize outcomes.

FIGURE 4. Postoperative Interventions to Reduce the Risk of Lymphedema Development

Note. Based on information from Lymphedema, 2009; McLaughlin et al., 2008; Ryan et al., 2012; Stout et al., 2012; Torres Lacomba et al., 2010.
Implications for Practice

- Establish an interdisciplinary approach for patient-centered care in lymphedema management.
- Provide pretreatment education regarding self-assessment, pre- and post-treatment risk factors, and the importance of patient self-care.
- Ensure immediate post-treatment follow-up with long-term surveillance for early detection of lymphedema, initiation of interventions, and patient adherence to self-care.

Follow-Up for Patients With Breast Cancer During Survivorship

Because of the high incidence of lymphedema in patients with breast cancer, routine follow-up is critical to early diagnosis and initiation of interventions to slow the progression of lymphedema. About 25% of women who undergo ALND develop lymphedema within three years postoperatively, and about 55% of patients who undergo sentinel lymph node dissection experience numbness within five years postoperatively (McLaughlin et al., 2008). These statistics reinforce the need for assessment and evaluation to continue several years after surgery. Recommendations for follow-up include a physical examination and measurements one month postoperatively and then at three-month intervals for 18 months postoperatively (Stout Gergich et al., 2008; Torres Lacomba et al., 2010). Continued follow-up may be difficult for some patients because of a lack of motivation, financial stress, transportation or distance, and availability for appointments (Papadopoulou et al., 2012). Thorough patient education, reinforcement of interventions, and follow-up is important because of decreased compliance with long-term self-care seen in patients with breast cancer over time (International Consensus, 2006; Papadopoulou et al., 2012).

Quality of Life in Patients With Lymphedema

Quality of life encompasses physical, psychological, social, and spiritual well-being. Patients who develop lymphedema are at risk for decreased quality of life and functional status related to physical changes, such as disfigurement, discomfort, disability, and the inability to perform activities of daily living (International Consensus, 2006; Ryan et al., 2012; Taylor et al., 2006). Alterations in psychological well-being are also affected by body image changes and emotional distress (Ryan et al., 2012; Taylor et al., 2006). Patients’ perception of lymphedema is also an important factor in psychological and social quality of life (McLaughlin et al., 2008). Lymphedema in the nondominant arm may be less problematic to patients than lymphedema in the dominant arm, and clinicians need to be aware that patients may report fewer symptoms in the less dominant arm (McLaughlin et al., 2008).

Improved quality of life has been seen in patients who received therapy and education versus education alone (NLN, 2011; Torres Lacomba et al., 2010). The current traditional model depends on patients seeking care when signs and symptoms of lymphedema are present, which may result in a delay in diagnosis and treatment and have a negative impact on quality of life (Stout et al., 2012). A surveillance model allows for early diagnosis and intervention, leading to improved or maintained functional status and quality of life (Stout et al., 2012).

Implications for Nursing Practice and Conclusion

As clinicians, oncology nurses are critical members of the interdisciplinary team and are in a unique position to provide consistent patient education, comprehensive assessments, and ongoing follow-up care for patients with breast cancer, particularly those at risk for lymphedema. Oncology nurses provide patient education regarding risk factors, prevention, treatment options, and self-management (Ryan et al., 2012). Setting expectations and providing interventions should be done before treatment, during treatment, and during survivorship (Ryan et al., 2012). Oncology nurses can perform targeted assessments and make appropriate referrals to other members of the interdisciplinary team (Ryan et al., 2012). Early detection, intervention, and adequate self-care can help to prevent the progression of lymphedema and have a positive effect on quality of life (Ryan et al., 2012).

Oncology nurses are essential members of the interdisciplinary team in the management and treatment of lymphedema. Oncology nurses involved in cancer rehabilitation and survivorship are key to the identification of patients with breast cancer at risk for lymphedema, providing comprehensive assessment and early intervention, coordinating appropriate referrals to interdisciplinary team members for lymphedema management, and supporting patient self-management of lymphedema. This patient-centered approach may improve functional status and improve quality of life.

References


