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# LYMPHEDEMA INTERVENTIONS: EXERCISE, SURGERY, AND COMPRESSION DEVICES

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**OBJECTIVES:** *To review exercise, surgical treatment, and intermittent pneumatic compression in the risk reduction and treatment of lymphedema, and to provide applications of the evidence to the care of the oncology patient with or at risk for lymphedema.*

**DATA SOURCES:** *Systematic reviews of the contemporary literature (2004-2010) examining exercise, surgical treatment, and intermittent pneumatic compression use in lymphedema therapy, peer-reviewed publications, and web sites of professional organizations.*

**CONCLUSION:** *Exercise and intermittent pneumatic compression are effective therapies and can be safely implemented in appropriate patients as an adjunct to complete decongestive therapy. Surgical treatments have proven beneficial in carefully selected patients, but require continued use of life-long compression therapy. Intermittent pneumatic compression devices are a safe adjunctive treatment option for in-home use in appropriate patients at low to moderate pressure ranges, following and in conjunction with complete decongestive therapy.*

**IMPLICATIONS FOR NURSING PRACTICE:** *Informed oncology nurses can assist patients in an individualized, integrated multimodality approach to lymphedema therapy.*

**KEY WORDS:** *Lymphedema, systematic review, exercise, surgery, intermittent pneumatic compression*

**L**YMPHEDEMA is a chronic condition of the lymphatic system that results from obstruction or disruption of the flow of lymph fluid. Disturbance of the lymph

flow leads to the accumulation of protein-rich fluid in interstitial tissues, thus resulting in swelling of the affected body part. The resultant swelling can range from mild to severe and, when left untreated,

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can lead to skin changes, impaired function, loss of normal sensation, discomfort, pain, and chronic infections that affect quality of life.<sup>1</sup> Lymphedema is classified as either primary or secondary. Primary lymphedema is caused by a congenital dysfunction or abnormality of the lymphatic system, while secondary lymphedema results from obstruction or disruption of the normal lymph flow because of tumors or damage to lymphatic channels. This disruption or damage is most commonly the result of surgery including lymph node surgery, radiation therapy, trauma, or infection. The most common cause of secondary lymphedema in the United States and developed countries is breast cancer treatment.<sup>2</sup> Although awareness of breast cancer-associated lymphedema is increasing, lymphedema is also reported following the treatment of other solid tumors including head and neck (4%), gynecologic (20%), melanoma (16%), and genitourinary (10%).<sup>3,4</sup>

The gold standard for the treatment of lymphedema is complete decongestive therapy (CDT), which should be performed by a trained, certified lymphedema therapist.<sup>5</sup> CDT is a two-phased, six-component treatment regimen. An initial reductive phase (phase I) aims at reducing the size of the affected area and emphasizing proper skin care. Once maximum fluid volume reduction has been reached, the maintenance phase (phase II) begins and requires life-long self-maintenance. While there is no cure for lymphedema, it can be successfully managed with CDT. Early diagnosis is important because lymphedema is most successfully treated and complications minimized when therapies are introduced early.<sup>6,7</sup> Beyond conventional treatment, exercise, surgical interventions, and intermittent pneumatic compression (IPC) devices have evolved as potentially effective treatment modalities. This article will discuss the role of exercise in lymphedema management, describe current research in surgical approaches to the management of lymphedema, and review the evidence for IPC in the treatment of lymphedema.

### **EXERCISE AND LYMPHEDEMA**

Exercise is an important component in cancer prevention and control.<sup>8,9</sup> Cancer survivors can receive many benefits from exercise, including reduced fatigue, increased strength and flexibility, and improved body image and quality of life.<sup>10</sup> Because the number of cancer survivors continues to increase, patient education regarding an appro-

priate exercise regimen for long-term health and cancer prevention is essential.

Approximately 2.5 million female breast cancer survivors reside in the United States.<sup>11</sup> The incidence of breast cancer-related lymphedema (BCRL) is conservatively estimated to be approximately 26% at 2 years post-operatively.<sup>12</sup> In addition to the previously noted benefits of exercise in cancer survivors in general, exercise and maintaining a healthy weight are specifically relevant to breast cancer survivors because weight gain and/or obesity are known to increase the risk of lymphedema in breast cancer survivors post-treatment.<sup>3</sup> Postoperatively, breast cancer survivors are often instructed on various restrictions and lifestyle modifications, including avoidance of trauma, phlebotomy, injections, blood pressure monitoring, tight-fitting clothing, as well as proper skin care, with the goal of lymphedema prevention. In the past, there was limited high-level research in the form of studies that specifically addressed exercise in relation to lymphedema. This left clinicians without conclusive evidence on which to advise patients about exercise, and patients were commonly instructed to avoid exercise to the affected extremity or were told that there was no clear answer, leaving the patient to decide on his/her own. This often resulted in frustration and fear in breast cancer survivors as to what level of exercise they could safely perform without increasing the risk of lymphedema occurrence or exacerbation.<sup>13</sup> Physiologically, exercise activates the musculoskeletal pumping mechanism that increases venous and lymphatic return in the extremity affected by lymphedema. It has been suggested that upper body exercises may reset the sympathetic nervous system drive to the lymph vessels and thus provide a benefit in the long-term management of lymphedema.<sup>14</sup> In recent years; additional research has been conducted to specifically address the issues of exercise and lymphedema. The dragon boat racing study in breast cancer survivors was among the first to demonstrate that there is no association between upper body exercise and the onset or exacerbation of BCRL<sup>15,16</sup>

In an effort to update the International Lymphoedema Framework Best Practices document,<sup>17</sup> which summarized the literature up to the year 2004, the American Lymphedema Framework Project in partnership with the International Lymphoedema Framework commissioned a systematic review of 2004-2010 literature on exercise

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