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# A lymphedema surveillance program for breast cancer patients reveals the promise of surgical prevention

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### ABSTRACT

**Background:** Breast cancer–related lymphedema (BCRL) is one of the most significant survivorship issues in breast cancer management. Presently, there is no cure for BCRL. The single greatest risk factor for developing BCRL is an axillary lymph node dissection (ALND). Lymphatic Microsurgical Preventative Healing Approach (LYMPHA) is a surgical procedure to reduce the risk of lymphedema in patients undergoing an ALND. We present our single institution results after offering LYMPHA in the context of an established lymphedema surveillance program.

**Materials and methods:** A retrospective review of our lymphedema surveillance program at the University of Florida was performed over a 2-year period (March 2014–March 2016). LYMPHA was offered to patients undergoing ALND beginning in March 2015. Patients who developed lymphedema were compared with those who did not. Demographics and potential risk factors for development of lymphedema such as age, body mass index, clinical stage, radiotherapy, and chemotherapy were reviewed.

**Results:** Eighty-seven patients participated in the surveillance program over the study period with an average age of 60 y (range 32–83) and body mass index of 30 kg/m<sup>2</sup> (range 17–46). The single most significant risk factor for the development for lymphedema was an ALND ( $P < 0.001$ ). One of 67 patients undergoing a sentinel lymph node biopsy developed lymphedema (1.5%). Four of 10 patients who underwent an ALND alone developed

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lymphedema (40%). One of 8 patients in the ALND + LYMPHA group developed transient lymphedema (12.5%).

**Conclusions:** Offering LYMPHA with ALND decreased our institutional rate of lymphedema from 40% to 12.5%. Long-term follow-up and randomized control trials are necessary to further elucidate the promise of this surgical technique to reduce the incidence of BCRL.

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## Introduction

Breast cancer–related lymphedema (BCRL) is one of the most significant survivorship issues in breast cancer management.<sup>1</sup> Of 2.8 million breast cancer survivors in the United States, it is estimated that one in five suffers from BCRL.<sup>2</sup> Patients presenting with BCRL often complain of tightness, heaviness, fatigue, and inability to fit into clothing secondary to swelling. In select cases, patients present with repeated episodes of rapidly spreading cellulitis of the affected extremity that can be life threatening if not treated expeditiously. The signs and symptoms of BCRL have been associated with a predilection toward anxiety, depression, and overall reduced quality of life.<sup>3</sup> The most common risk factors for the development of BCRL are an axillary lymph node dissection (ALND), regional lymph node radiation (RLNR), and/or an elevated body mass index (BMI) (>30).<sup>4</sup> The standard treatment for BCRL has been physical therapy with manual lymphatic drainage, compression, local skin care, exercises, and pneumatic devices. More recent advances in the surgical management of chronic lymphedema including lymphovenous bypass and lymph node transfer have offered new hope for improving the quality of life of patients with BCRL. Unfortunately, neither therapy nor surgery provides a definitive cure.

Consequently, a focus on limiting progression of disease with early physical therapy intervention has emerged in the form of lymphedema surveillance programs.<sup>4–9</sup> In these programs, patients with newly diagnosed breast cancers are evaluated preoperatively to obtain critical baseline objective measures of the at-risk extremity followed by close postoperative surveillance. Early diagnosis of lymphedema and implementation of therapy has been correlated with improved long-term outcomes in randomized control trials.<sup>8</sup>

In parallel, an innovative approach to surgically prevent lymphedema in high-risk patients, such as those undergoing ALND, has been developed. In 2009, the Lymphatic Microsurgical Preventative Healing Approach (LYMPHA) was first described.<sup>10</sup> Divided arm lymphatics are identified at the time of ALND, and lymphovenous bypasses are performed to an axillary vein tributary. More recently, the authors reported a lymphedema rate of 4.05% after ALND + LYMPHA with a 4-year follow-up compared to 20–40% by historical controls.<sup>11–15</sup> This study was replicated by Feldman *et al.*<sup>16</sup> who confirmed a significant reduction in lymphedema rates after ALND + LYMPHA to 12.5%.

In validating a reduction in lymphedema rates, following LYMPHA, it is important to compare results against institutional controls as differences in surgical technique and delivery of radiation are likely to differ between centers thereby limiting

the value of historical controls. One year after initiating a lymphedema surveillance protocol at our institution, we made an institutional decision to begin offering the LYMPHA procedure to any patient undergoing an ALND. We, therefore, had a control group of patients not being offered LYMPHA in the early part of the surveillance program to compare against those undergoing LYMPHA later in the program. Of significant note, both groups of patients were followed utilizing the same protocol for both diagnosis and follow-up.

Our present study aims to compare lymphedema rates of patients at a single institution before and after the implementation of the LYMPHA technique.

## Materials and methods

A retrospective review of our lymphedema surveillance program at the University of Florida was performed. This retrospective review was approved by our internal review board with a waiver of documentation of informed consent. In March 2014, we initiated a lymphedema surveillance program where all newly diagnosed breast cancer patients were offered a lymphedema evaluation preoperatively and were followed by standard protocol postoperatively. Each evaluation, preoperatively and postoperatively, consisted of three components: (1) evaluation by a certified lymphedema therapist for signs and symptoms of BCRL, (2) circumferential measurements, and (3) bioimpedance spectroscopy. Lymphedema was defined as having signs/symptoms of BCRL and one positive objective measure. If a patient's lymphedema was diagnosed within 6 mo of their final oncologic treatment (chemotherapy, radiotherapy, and surgery), the lymphedema was defined as transient. If the lymphedema was diagnosed or continued beyond 6 mo after their final cancer treatment, it was defined as lymphedema.

Newly diagnosed breast cancer patients with unilateral disease participating in our surveillance program over a 2-year period (March 2014–March 2016) were included in the study. Participation in the program was defined as presenting for a preoperative lymphedema assessment and a minimum of one postoperative assessment. Baseline demographics (age, BMI, prior radiation, or chemotherapy), cancer treatment characteristics (chemotherapy, type of radiation treatment, and surgical management), and physical therapy evaluations (circumferential measurements, bioimpedance spectroscopy data, and follow-up) were included in the analysis.

## Surgical technique

From March 2014 to February 2015, all patients undergoing an ALND underwent the procedure in standard fashion,

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