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Axillary reverse lymphatic mapping reduces patient perceived incidence of lymphedema after axillary dissection in breast cancer

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Abstract

BACKGROUND: Lymphedema is a feared complication of many patients following axillary lymph node dissection for breast cancer. Axillary reverse lymphatic mapping (ARM) was adopted to decrease the incidence of lymphedema.

METHODS: A retrospective review was conducted on 139 patients with breast cancer who had greater than 10 lymph nodes removed. A survey was sent to patients to identify those with lymphedema.

RESULTS: One hundred nine women were contacted via mail survey to determine the presence of lymphedema. Of the 46 surveys returned, the incidence of lymphedema was 39%. Twenty-seven percent of the ARM group identified themselves as having lymphedema compared with 50% in non-ARM group. Eighteen percent of women in the ARM group needed an arm sleeve for treatment compared with 45.8% in the non-ARM group.

CONCLUSIONS: The incidence of perceived lymphedema and the need for arm compression sleeve devices were lower in the ARM cohort. ARM should be adopted to decrease patient perception of lymphedema.

Lymphedema is one of the most well-recognized complications for women undergoing axillary lymph node dissection (ALND) for invasive breast cancer. A disruption of the lymphatics that drain the arm is thought to be the cause of lymphedema. Although popularization of the sentinel lymph node biopsy procedure (SLNB) has decreased the incidence of lymphedema by minimizing the dissection of the axilla, even SLNB has been associated with lymphedema. Estimates of lymphedema vary widely between patients based on disease burden and treatments received. The rates of lymphedema can range anywhere from 6% to 57%[1–5] in patients undergoing ALND, and 0% to 20% in patients undergoing SLNB.[2,4] One recent study found the rate of lymphedema for ALND to actually be closer to 19%, compared with 30% in those undergoing ALND and radiation.[6]

The use of axillary reverse lymphatic mapping (ARM) with blue dye was a novel idea described by Klimberg et al and Nos et al[2,3,7] in 2007 as a method of isolating arm lymphatics from breast lymphatics. The technique involves injecting

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lymphazurin blue dye in the upper inner aspect of the medial arm. Theoretically, the dye will be taken up by the lymphatics that drain the arm, thus allowing the surgeon to identify and spare these lymphatic tracts during the dissection of level I and II nodes. Surgeons at our institution adopted this technique in 2009 as a means of identifying and preserving arm lymphatics in an attempt to decrease the morbidity associated with ALND.

Methods

This is a retrospective review of all breast cancer patients from 2009 to 2012 in our Community Hospital System Tumor Registry, in whom greater than 10 lymph nodes were removed from the axilla as part of surgical management. All women in the study had pathologically confirmed invasive breast cancer. Women who required an axillary dissection for node-positive disease were instructed with an informed consent about the procedure before operation. The ARM procedure was performed by 2 of the 12 surgeons at our institutional network.

In the operating room, the medial arm on the side of the ALND was injected with 3 to 5 mL of lymphazurin blue dye. During the dissection, the blue lymphatics were identified and preserved. If the lymphatics or nodes that stained blue were concerning for harboring malignancy, the nodes were removed regardless of color.

A survey of questions was created and sent to these patients via the US postal system (Fig. 1). Survey results were de-identified. Patients could elect to identify themselves, but it was not a requirement. The survey queried on whether they identified themselves as suffering from lymphedema, and if they required any treatment or therapy for it. Additionally, we asked if they underwent the ARM procedure. The surveys were then collected and the data were extrapolated. This study followed institutional review board protocol for data review.

Results

The Community Hospital System Tumor Registry identified 137 women who had undergone an ALND for invasive breast cancer between 2009 and 2012. Thirty of the women were lost to follow-up, had a noncurrent address, or had died. The surveys were sent out to 107 patients and 46 were returned for a response rate of 43%.

The reported incidence of lymphedema among survey responders was 39%. Twenty-two patients reported undergoing the ARM procedure compared with 24 patients who underwent non-ARM procedure. Only 27% of the women who underwent ARM identified themselves as having lymphedema compared with 50% of the non-ARM patients. Eighteen percent of women in the ARM group required a sleeve as treatment for the lymphedema as compared with 45.8% of the women who underwent ALND without ARM.

The ages of the patients ranged from 29 to 88 with an average age of 57 years. The average body mass index (BMI) of the group was 27.1. Not unexpectedly, axillary contents in these women were positive for malignancy in 121 of the 141 (85%) dissections. The other 15% of women without positive lymph nodes had undergone neoadjuvant therapy before ALND. The average number of positive nodes per dissection was 5.9. The average number of nodes removed was 14. The operations performed with the ALND can be seen in Table 1.

Comments

Lymphedema was first described by Halsted in 1921. The development of lymphedema post-treatment in breast cancer patients can have differing degrees of emotional and physical disability on patients, which may ultimately diminish their quality of life (QOL).[8] In the current treatment paradigm as we focus not only on extracting cancer but maintaining function, great strides have been made to decrease its occurrence.[9] ARM was developed in an effort to protect the lymphatics of the arm during axillary dissection and decrease the incidence of lymphedema.

The overall incidence of lymphedema for our surveyed group was 39% between both the ARM group and the non-ARM group, which falls between the reported incidence of lymphedema, which is up to 50% in some series[1–3,10] after ALND. Of note is the high rate of radiation therapy seen in our population. This is not common in most series and may also explain the higher rate of lymphedema seen overall. In our survey, the ARM patients had a self-reported incidence of lymphedema of 27%. Boneti et al also reported a decrease in the incidence of lymphedema after using ARM. In their study, 220 patients underwent ARM with no cases of lymphedema at 6 months postoperatively.[11,12] Additionally, recently a 5-year review of the ARM procedure was published showing rates of lymphedema between 0% and 18.9%.[13] It is important to note that we did have a 23% lower incidence of lymphedema in the ARM (27%) versus the non-ARM group (50%). This was demonstrated by the finding that only 4 patients (18%) in the ARM group required compression sleeve garments post-treatment versus 11 in the non-ARM group (45.8%) who required sleeves. This suggests that ARM helped decrease both the incidence of subjective lymphedema as well as the need for ongoing therapy.

The risk of developing lymphedema post-ALND is multifactorial. Togawa et al[14] did a 10-year prospective study of self-reported lymphedema on 1,183 patients and found that women were at increased risk of having lymphedema if they had undergone more extensive ALND defined by increased number of lymph nodes excised, received chemotherapy, and had higher BMIs. Other studies have highlighted the risk of obesity and weight gain on the development of lymphedema; one study showed that with both multivariate and univariate analysis, obesity was the