Axillary Lymph Node Visualization on Pre-surgical Mammograms as a Predictor of Lymphedema Onset in Surgically Treated Breast Cancer

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BACKGROUND

- Lymphedema is a potential complication of axillary lymph node surgery affecting 10-53% of women with breast cancer who undergo sentinel lymph node (SNL) or full axillary node dissection (ALND). The complications of lymphedema include functional disability, limited range of motion, infection, pain, and rarely, malignant transformation.
- This retrospective study aims to determine if fat deposition in the lymphatic system as identified by nodal fat expansion on imaging studies has a role in decreased lymphatic clearance and subsequent lymphedema after nodal surgery.

METHODS

- A roster of 274 women who received a referral to physical therapy (PT) for lymphedema following a breast cancer diagnosis was collected from Dartmouth-Hitchcock's electronic medical record (eDH).
- Inclusion criteria: presence of lymphedema in upper extremity ipsilateral to breast cancer; lymphedema must have developed after breast cancer diagnosis; mammogram imaging taken at time of diagnosis must be available in eDH to assess size of axillary lymph nodes.
- 53 individuals met inclusion criteria
- Data collected: breast cancer diagnosis date, PT referral date, last date of radiation (if applicable), histologic grade, presence of lymphovascular invasion, nodal metastasis, metastasis beyond nodes, hormone receptor status, surgery type, cancer recurrence, development of cancer in contralateral breast.
- All statistical analyses were completed using R Statistical Software (version 4.1.0; R Studio: Integrated Development Environment for R, Boston, Mass).

ACKNOWLEDGMENTS

RESULTS

	No Lymph Nodes Visualized (N = 24)	Visualized Lymph Nodes (N = 29)	P-Value
Age (Years)[1]	54.8 (9.0)	57.5 (13.1)	0.37[3]
Tumor Size (mm)[1]	21.5 (15.6)	32.9 (34.7)	0.16[3]
BMI[1]	31.4 (7.2)	32.7 (6.8)	0.53[3]
Number of Positive Nodes[1]	2.2 (2.6)	1.1 (1.6)	0.11[3]
Time to Lymphedema Onset (Years)[1]	7.3 (7.1)	2.1 (2.1)	0.002[3]
Surgery Type [2]			
Sentinel LN Dissection	10 (47.6)	20 (69.0)	
Axillary LN Dissection	11 (52.4)	9 (31.0)	0.15[4]

Table 1: Patient Characteristics Across Lymph Node Visualization Status
[1] Numbers presented as Mean (SD)
[2] Numbers presented as N (%)
[3] p-Values (two-sided) for continuous variables were calculated using Paired T-Tests with significance at α = 0.05
[4] p-Values for categorical variables were calculated using Fisher's Exact Test
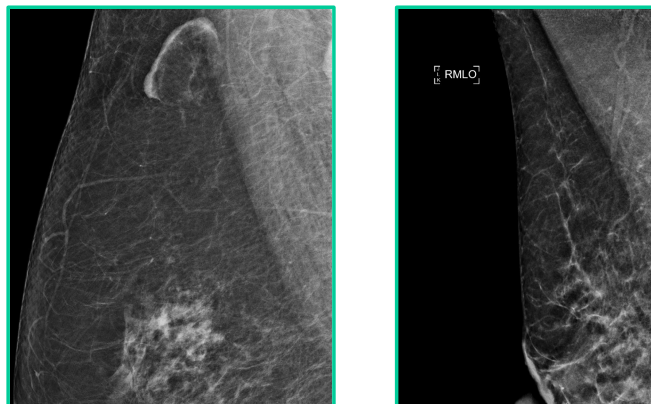

A   B

Figure 2: Mediolateral oblique (MLO) mammogram showing enlarged fat-infiltrated lymph node (A) MLO mammogram with no lymph nodes visualized (B)

CONCLUSION

We were unable to determine an association between fat infiltrated lymph nodes and development of lymphedema given our limited data set. A secondary analysis showed that patients with visualized axillary lymph nodes developed a more rapid onset of lymphedema (mean of 2.1 years vs mean of 7.3 years; P-value = 0.002) in comparison to patients who had mammograms which showed no lymph nodes in the axilla. This could be explained by the fact that fat-infiltrated nodes are larger than normal lymph nodes and therefore are more likely to be visualized on mammogram. Additionally, fat-infiltration of the lymph node hilum would theoretically diminish efferent lymphatic flow, raising hydrostatic pressure in the axillary lymphatics, leading to lymphedema.