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Hospital Setting Impact on Breast Cancer-Related Lymphedema and Quality-of-Life After Immediate Lymphatic Reconstruction

Abbas M. Hassan, MD PhD[1], **John P. Hajj, BS**[1], **John P. Lewis, BS**[1], **Shahnur Ahmed, MD**[1], **Carla S. Fisher, MD, MBA**[2], **Rachel M. Danforth, MD**[1], **R Jason VonDerHaar, MD**[1], **Ravinder Bamba, MD**[1], **Mary E. Lester, MD**[1], **Aladdin H. Hassanein, MD, MMSc**[1]

[1.]Division of Plastic Surgery, Indiana University School of Medicine, Indianapolis, Ind

[2.]Division of Breast Surgery, Indiana University School of Medicine, Indianapolis, Ind

Abstract

Background: Hospital setting may influence surgical outcomes, but its impact on immediate lymphatic reconstruction (ILR) for preventing breast cancer-related lymphedema (BCRL) after axillary lymph node dissection (ALND) is unknown. This study assesses BCRL incidence and related outcomes following ILR comparing academic and community hospitals within a multi-hospital network.

Methods: We retrospectively studied consecutive patients who underwent ILR following ALND between 2017 and 2024 across six hospitals. Hospitals were categorized as academic or community based. The primary outcome, BCRL incidence and secondary outcomes including complications and patient-reported outcomes (LYMPH-Q), were compared using multivariable regression models adjusting for patient and treatment factors.

Results: We identified 172 patients with a mean age 50.9±11.6 years, BMI of 29.5±6.9 kg/m^2, and follow-up time of 23.1±15.2 months. ILR occurred at academic hospitals for 88 patients (51.2%) and community hospitals for 84 patients (48.8%). BCRL incidence was comparable between academic (6.8%) and community (7.1%) settings (p=0.933). In multivariable regression, hospital setting was not significantly associated with the odds of developing BCRL (OR 0.80; p=0.730), surgical complications (OR, 1.21; p=0.642), unplanned reoperation (OR, 1.43; p=0.418) or LYMPH-Q symptoms (β, −11.20; p=0.063), function (β, −4.9; p=0.834), appearance (β, −7.16; p=0.413), or psychological well-being (β, −5.25; p=0.504) scales.

Conclusions: ILR demonstrated comparable outcomes for BCRL incidence, complications, and patient-reported quality of life between academic and community settings. These findings suggest ILR can be successfully implemented beyond traditional academic centers with appropriate surgeon expertise and institutional support, potentially improving access to preventative lymphedema surgery.

Corresponding Author: Aladdin H. Hassanein, MD, MMSc, Associate Professor, Division of Plastic Surgery, Indiana University School of Medicine, 545 Barnhill Drive, Suite 232 Indianapolis, IN 46202, Fax: (317) 968-1371, ahassane@iu.edu.

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Keywords

ILR; lympha; lymphedema; breast cancer; hospital setting

INTRODUCTION

Axillary lymph node dissection (ALND) carries a significant risk of breast cancer-related lymphedema (BCRL), profoundly impacting patient quality of life.[1–5] Immediate Lymphatic Reconstruction (ILR), a prophylactic lymphovenous anastomosis performed concurrently with ALND, has emerged as a promising microsurgical strategy to mitigate this risk.[6–9] Evidence suggests ILR can significantly reduce BCRL incidence compared to ALND alone, leading to its increasing adoption in specialized centers.[10–22]

The setting in which complex surgical procedures are performed—academic medical centers versus community-based hospitals—can potentially influence outcomes due to variations in available resources, case volume, surgeon specialization, patient populations, and adherence to specific protocols.[23–26] Studies have explored such variations for procedures ranging from major cancer resections to complex free tissue transfer, often highlighting the critical role of surgeon expertise and experience.[23–27]

Despite the growing interest in ILR and the known potential for setting-dependent outcome variations in surgery, the specific impact of hospital setting on the effectiveness and safety of ILR remains largely unknown. Given the technical demands of ILR and the resources it may require, understanding whether outcomes differ between academic and community settings is crucial. Such knowledge is essential for guiding the appropriate dissemination of this technique, ensuring equitable patient access to lymphedema prevention strategies, and optimizing quality of care across diverse healthcare settings. Therefore, the purpose of this study was to compare the incidence of BCRL and patient-reported outcomes following ILR performed at academic versus affiliated community-based hospitals within an integrated healthcare network.

METHODS

Study Design and Participants

This retrospective cohort study included adult female patients (age > 18 years) who underwent breast cancer treatment between 2017 and 2024 at six affiliated hospitals within our healthcare network. All patients underwent ILR concurrently with ALND. Exclusion criteria included undergoing sentinel lymph node biopsy (SLNB) only, pre-existing lymphedema, limb swelling due to alternative causes (e.g., deep vein thrombosis, chronic venous insufficiency), or incomplete follow-up data. The University Institutional Review Board granted approval for the study protocol.

Covariables

Patients were categorized based on hospital setting as either academic or community based. Community hospital-based providers included microsurgery fellowship and non-fellowship trained plastic surgeons competent in microsurgery. All academic hospital surgeons were microsurgery fellowship trained. Data abstracted from electronic health records included patient demographics (age, self-identified race, body mass index (BMI), tobacco use, American Society of Anesthesiologists [ASA] physical status), oncologic characteristics (cancer type, nodal involvement including total nodes removed and number positive), key comorbidities (diabetes mellitus, hypertension, hyperlipidemia, chronic obstructive pulmonary disease), and treatment characteristics (timing/type of chemotherapy and radiotherapy, including radiation fields of axilla, chest wall/breast, supraclavicular, or internal mammary nodes). Surgical variables included breast surgery type, breast reconstruction modality (method/timing), and the number of lymphovenous bypasses performed during ILR. Tobacco use was defined as active consumption within eight weeks prior to the ALND, and obesity was defined as BMI greater than 30 kg/m^2.

Study Outcomes

The primary outcome measure was the incidence of breast cancer-related lymphedema (BCRL) after ILR. BCRL was defined by circumferential limb measurements, specifically a difference of ≥2 cm between the ipsilateral and contralateral limbs at two consecutive points.[28] This definition, utilizing measurements at two consecutive points, was chosen based on evidence suggesting its robustness and superior diagnostic performance compared to single-point measurements when validated against the gold standard of water displacement volumetry. Specifically, Furlan et al.[28] demonstrated that this two-point approach yielded higher accuracy (88.2% vs 85.9%) and better agreement (kappa=0.60 vs 0.58) with volume changes than single-point methods, while offering greater practicality than direct volumetry. Secondary outcomes comprised postoperative patient-reported outcomes (PROs), surgical complications, and unplanned reoperation. All outcomes were compared between academic and community hospital settings. Physical or occupational therapists obtained baseline and serial postoperative limb measurements during consultations and monitored for lymphedema development postoperatively.

Surgical Technique

A total of seven plastic surgeons performed the ILR procedures. Six of the seven surgeons were fellowship-trained in microsurgery; the non-fellowship-trained surgeon practiced exclusively at the community sites. All surgeons operating at the academic center were fellowship-trained, and two of the surgeons who performed procedures at the community hospitals also routinely operated at the academic hospitals. The procedures were performed based on previously described standardized protocols.[19,29,30] Lymphatic vessel identification was achieved using intraoperative dyes, including isosulfan blue, fluorescein, or indocyanine green injected into the brachial fascia prior to axillary dissection. The primary method for lymphovenous anastomosis was an end-to-side ‘sleeve’ technique.[29] For this, a suitable recipient vein branch adjacent to the transected lymphatics was stabilized to perilymphatic tissue with a tacking suture. The open ends of the lymphatic vessels were then telescoped into a venotomy and temporarily secured to the vein’s adventitia with 9-0 or 10-0 nylon U-stitches. These temporary sutures were removed following final stabilization. Alternatively, in cases of favorable size-match, an end-to-end anastomosis was performed to a vein branch draining into a larger vein to leverage the Venturi effect. Infrequently, if no suitable local recipient vein was available, a saphenous vein graft from the distal thigh was utilized.[30] The operative goal was to create as many anastomoses as feasible. Eight breast surgeons performed ALND procedures following standard oncologic surgical methods, using either primary mastectomy incisions or separate axillary incisions. Surgical drains were routinely placed postoperatively. [31]

Patient-reported Outcomes

PROs were evaluated using the LYMPH-Q, a validated patient-reported outcome measure (PROM) specifically designed for assessing quality of life related to upper extremity lymphedema after breast cancer treatment.[32] Four scales from the LYMPH-Q Upper Extremity Module (Symptoms, Function, Psychological, Appearance) were administered to participants in March 2025. Scale items were converted to an overall score (0-100) via appropriate conversion tables, with higher scores indicating better outcomes (e.g., fewer symptoms, improved function). Three electronic reminders were sent for nonresponse, and participants received no monetary or other incentives.

Statistical Analysis

Categorical data were presented as frequencies and percentages, analyzed with chi-squared or Fisher's exact tests. The distribution of continuous data was assessed using the Shapiro-Wilk test. Continuous data were subsequently reported as means (standard deviations) or medians (interquartile ranges) based on distribution and analyzed using independent t-tests or Mann–Whitney U tests, respectively. Odds ratios (ORs) and beta coefficients (β) assessing the effect of hospital setting on outcomes were calculated using mixed-effects logistic and linear regression models, adjusting for patient and hospital setting random effects. Multivariable regression models were developed using a stepwise selection process using the lowest Akaike information criterion (AIC). The goodness-of-fit and discriminatory power of the final logistic regression model for BCRL were assessed using the Hosmer-Lemeshow test and by calculating the area under the Receiver Operating Characteristic (ROC) curve, respectively. All statistical tests were two-tailed, with $p<0.05$ considered significant. Analyses were performed using SAS Enterprise Guide, version 9.4 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Patient Demographics and Characteristics

We identified 172 consecutive patients treated at six hospital (3 academic and 3 community based) who met the inclusion criteria. Their mean age was 50.9±11.6 years, mean BMI was 29.5±6.9 kg/m^2, and mean follow-up was 23.1±15.2 months. Eight-eight patients (51.2%) were treated at academic hospitals, whereas 84 patients (48.8%) were treated in community-based hospitals. Patients who had surgery in community hospital were more likely to be White (81.0% vs. 75.0%) or Asian (7.1% vs.2.8%) and less likely to be African American or Black (11.9% vs. 25.0%) compared to those in academic hospitals (p=0.005). No significant differences were found between the groups in terms of age, BMI, ASA classification, follow-up time, tobacco use, medical comorbidities, or cancer type. Patient demographics are presented in Table 1.

Surgical Characteristics

Table 2 shows surgical characteristics stratified by hospital setting. Most patients (57.7%, n=97) underwent mastectomy and ALND with breast reconstruction. Mastectomy and ALND without reconstruction were performed in 44 patients (26.2%), and lumpectomy with ALND without reconstruction was performed in 27 patients (16.1%). Tissue expander reconstruction was the most common reconstruction modality (44.8%, n=77). Patients treated at community hospitals had a significantly higher mean number of lymph nodes removed (18.3 ± 9.3 vs. 13.9 ± 7.5, p=0.001) compared to those treated at academic hospitals. No significant differences were identified between groups regarding surgery type, receipt of neoadjuvant chemotherapy, adjuvant chemotherapy, or postoperative radiotherapy. Furthermore, no significant differences were observed in reconstruction modality, timing of reconstruction, or the number of lymphovenous bypasses performed.

Surgical Outcomes

Surgical outcomes categorized by hospital setting are shown in Table 3. There were no significant differences between study groups in the rates of BCRL (community, 7.1% vs. academic, 6.8%; p=0.933), surgical complications (community, 29.8% vs. academic, 30.7%; p=0.896), or unplanned reoperation (community, 26.0% vs. academic, 29.2%; p=0.633). Additionally, there were no significant differences in rates of extremity cellulitis (p=0.501) or time to significant limb swelling (p=0.360). Furthermore, in an analysis stratifying the cohort by surgeon, there was no statistically significant difference in BCRL rates among the operating surgeons (p=0.619).

Multivariable models evaluating the impact of hospital setting on study outcomes are presented in Table 4. After adjustment for number of nodes removed, race, postoperative radiotherapy, and reconstruction type, ILR performed in community hospitals was not associated with a higher risk of BCRL (OR, 0.80; 95%CI, 0.22–2.90; p=0.730). The model demonstrated good fit and discrimination, with a non-significant Hosmer-Lemeshow test (p = 0.438) and an area under the ROC curve of 0.757. Likewise, in adjusted models, ILR performed in community hospitals was not associated with a higher risk of surgical complications (OR, 1.21; 95%CI, 0.54-2.73, p=0.642) or unplanned reoperation (OR, 1.43; 95%CI, 0.60-3.43, p=0.418).

Patient-reported Outcomes

Among the 153 patients with available email addresses who were sent questionnaires, 71 completed them, yielding a 46.4% response rate. PROs based on hospital setting are detailed in Table 5. We observed no significant difference in mean scores across the LYMPH-Q symptom (community, 73.0 ± 27.2 vs. academic, 81.0 ± 19.8; p=0.177), function (community, 80.7 ± 24.5 vs. academic, 84.9 ± 25.0; p=0.476), appearance (community, 78.8 ± 31.4 vs. academic, 78.9 ± 31.2; p=0.177), or psychological well-being scales (community, 78.7 ± 24.9 vs. academic, 79.0 ± 34.7; p=0.988). There were also no significant differences in the median [IQR] time from surgery to survey completion between the groups (community, 38.5 [26.8-54.0] vs. academic, 46.0 [31.0-55.0]; p=0.395).

Multivariable models assessing the impact of hospital setting on PROs are shown in The Supplemental Digital Content (Table S1). In adjusted models, ILR in community settings was not associated with significantly different scores across the LYMPH-Q symptom (β, −11.20; 95%CI, −23.0 to 0.63; p=0.063), function (β, −4.9; 95%CI, −18.37 to 8.47; p=0.834), appearance (β, −7.16; 95%CI, −24.48 to 10.15; p=0.413), or psychological well-being (β, −5.25; 95%CI, −20.85 to 10.35; p=0.504) scales.

DISCUSSION

This study sought to evaluate the impact of hospital setting on BCRL incidence and other key outcomes following ILR within a multi-hospital network encompassing both academic and community hospitals. Our findings demonstrate that the incidence of BCRL following ILR was comparable between academic (6.9%) and community (7.1%) hospital settings (p=0.933). Notably, these findings persisted in multivariable regression despite baseline demographic differences, particularly in patient race, and observing a significantly higher lymph node yield in the community setting. We also observed no significant differences in risk of postoperative surgical complication rates, unplanned reoperations, or PROs as measured by the LYMPH-Q between the two settings. These findings suggest that ILR can be implemented effectively, achieving similar BCRL prevention rates and overall safety profiles, in both academic centers and appropriately equipped community hospitals with surgeons competent in microsurgery. This potentially broadens patient access to this prophylactic procedure.

Our finding of comparable BCRL rates and overall outcomes following ILR between academic and community hospitals contrasts with concerns often raised about potential disparities in complex surgical care across different settings. While direct comparisons for ILR have not been reported, our results align with studies evaluating analogous complex microsurgical procedures.[23–26] Specifically, studies by Nelson et al.[25] and Gusenoff et al.[26], which compared free flap reconstructions performed by the same surgeons in both university and community hospitals, found no significant differences in overall major complication rates or flap loss. These studies strongly concluded that surgeon expertise and experience, rather than the hospital setting itself, were the key determinants of successful outcomes. The comparable results observed in our study further support this paradigm, suggesting that the proficiency and experience of the surgeons performing ILR—explicitly noted as competent in microsurgery across both settings in our network—are likely the most critical factors driving outcomes, potentially outweighing generalized differences between academic and community settings. However, it is also important to acknowledge that nuances may exist; Gabrick et al.[27], comparing academic and community surgeons within the same hospital system for breast reconstruction, found that while overall complication rates were similar, differences emerged in patient comorbidities, specific practice patterns (e.g., type of reconstruction favored), and rates of certain complications like infection or wound healing issues. This suggests that while major endpoints like BCRL incidence after ILR may be similar, underlying differences in patient populations or specific procedural choices between settings might still influence other aspects of care. The literature on free flap reconstruction offers a relevant framework for examining the influence of hospital setting. The success of free flaps is critically dependent on intensive postoperative monitoring protocols, which may vary significantly between academic and community centers and represent a key variable. In contrast, ILR is an outpatient procedure where success is determined intraoperatively and is not reliant on such postoperative surveillance. Our findings reinforce that surgeon expertise is paramount for ILR and can achieve consistent results in different hospital settings, precisely because the intensive postoperative monitoring that often distinguishes these settings is not a confounding factor for this specific procedure.

The demonstration of comparable ILR outcomes between academic and community hospitals within our network carries significant implications for the broader applicability of this procedure and patient access to care. Given the specialized microsurgical skills required, ILR has predominantly been performed at larger academic institutions or specialized centers, potentially creating geographic and access disparities for patients treated elsewhere. This is similar to patterns observed for complex breast reconstruction. Our findings challenge the assumption that such advanced preventative surgeries must be restricted to traditional academic hubs, suggesting instead that with appropriate expertise and infrastructure, ILR can be successfully integrated into diverse practice settings. The experience reported by Roldan-Vasquez et al.[33] with their Axillary Surgery Referral Program (ASRP) underscores both the need and a potential mechanism for expanding access; their program was initiated specifically because ILR availability remains limited outside specialized centers and serves patients referred from multiple states lacking local access. The success and growth of their referral program highlight patient demand and the feasibility of coordinated care models to bridge access gaps. While our results support the potential for wider dissemination of ILR, this is contingent upon ensuring the necessary components for success are present in any setting – namely, surgeons adequately trained and proficient in lymphatic microsurgery, appropriate institutional resources including necessary equipment and potentially specialized support staff, and established clinical pathways for perioperative care and lymphedema surveillance. Expanding the availability of ILR to appropriately resourced community centers could significantly mitigate lymphedema risk for a larger population of breast cancer patients undergoing necessary axillary surgery. While the current study did not include a concurrent non-ILR control group, our prior work compared this cohort's outcomes to historical pooled estimates from over 10,000 patients who underwent ALND alone.[22] In that analysis, the lymphedema rate at >24 months was 7.0% in our ILR group versus 23.6% in the ALND-alone cohort from pooled estimated. This comparison provides strong context for the clinical value of ILR and underscores the importance of investigating its successful implementation across different practice settings.

We also noted significant differences in the racial composition of patients treated at academic versus community sites. While other studies have highlighted potential racial disparities in baseline lymphedema risk[22], our study found that overall BCRL incidence and other outcomes following ILR were comparable across settings despite these demographic variations. Furthermore, the lack of significant difference in PROs via the LYMPH-Q is noteworthy, suggesting a consistent patient experience with lymphedema-specific quality of life regardless of treatment setting. This contrasts somewhat with studies like Berlin et al.[23], which found significant institutional variation in patient satisfaction after breast reconstruction, perhaps indicating that lymphedema-specific outcomes post-ILR are more uniform, or alternatively, reflecting limitations in statistical power for detecting subtle

PRO differences in our cohort. Nonetheless, the convergence of similar clinical and patient-reported outcomes across settings strengthens our main conclusion.

The findings of this study should be interpreted while considering several limitations. The retrospective design introduces the potential for selection bias and reliance on the accuracy and completeness of medical record documentation, although multivariable regression was used to adjust for known confounders. A limitation of the study is the definition of hospital setting. All hospitals were part of a single, integrated university network, and our "community" sites were university-affiliated facilities, not independent or rural hospitals. This design was intentional to control for system-wide confounders but inherently limits the generalizability of our findings to non-affiliated community settings. While we accounted for known differences (e.g., academic sites had exclusively fellowship-trained microsurgeons and a tertiary referral mix, while community sites had a broader surgeon-training background and served a local population), the shared infrastructure blurs the traditional academic-community distinction. Therefore, our results demonstrate that ILR can be successful in affiliated community sites with access to appropriate resources and skilled surgeons, but these findings should not be extrapolated to all community practice models. Furthermore, despite efforts to control confounders, we did not quantitatively assess for variations in ancillary operating room staff experience, which could differ between sites. Other unmeasured factors, such as granular surgeon experience beyond basic competency, variations in postoperative physiotherapy protocols, or patient adherence could still influence the results. Beyond the specifics of our network, lack of specialized microsurgical training or experience may represent a significant barrier to the successful implementation of ILR in many independent community settings. The definition of BCRL was based on standardized circumferential measurements. While this two-point method has been validated against water displacement and shown superior diagnostic performance compared to single-point measurements, offering a practical clinical alternative to direct volumetry, the lack of a universally accepted gold standard for lymphedema diagnosis indicate results might differ if alternative metrics like bioimpedance spectroscopy or routine volumetry were used. However, our chosen method represents a validated and clinically applicable approach shown to effectively identify patients at risk for developing persistent lymphedema.[28] While this is the largest comparative study on this topic to our knowledge, statistical power warrants consideration. Post-hoc analysis was performed to better contextualize our non-significant primary finding. For this analysis, we used the observed 7% BCRL rate as a baseline to determine what magnitude of difference our study could detect. The analysis indicated the study had approximately 75-80% power to detect a large effect size. Therefore, while our findings suggest the absence of a large disparity between settings, a more modest difference cannot be definitively excluded due to this limitation. With a mean of follow-up time of 23.1 months, our study may underestimate the true incidence of BCRL, particularly cases with very late onset. However, this follow-up period captures the timeframe when the majority of cases are expected to develop. Previous studies indicate that the mean time to lymphedema development is approximately one year, with up to 80% of cases occurring within the first three years post-surgery.[34,35] Furthermore, our follow-up extends beyond the period identified by Furlan et al. as most predictive for persistent lymphedema at two years.[28] Therefore, while longer-term prospective data are needed to capture all late-onset cases, our study provides a meaningful comparison of outcomes within this critical development window. Additionally, the response rate for the patient-reported outcome surveys was modest, potentially limiting the statistical power to detect subtle differences in quality-of-life metrics between the groups. Despite these limitations, the study possesses notable strengths, including its comparison of ILR outcomes across both academic and community settings within the same regional network, the application of standardized surgical techniques by experienced surgeons, the inclusion of patient-reported outcomes using the validated LYMPH-Q instrument, and the use of multivariable analysis to account for significant patient and treatment factors. Future prospective studies are needed to address these limitations.

CONCLUSION

In this multi-hospital comparative study, ILR performed concurrently with ALND demonstrated comparable outcomes in BCRL incidence, surgical complications, and patient-reported quality of life between academic and community hospital settings. These findings suggest that with appropriate surgeon expertise and institutional support, ILR can be successfully implemented beyond traditional academic centers. Wider adoption of ILR in diverse settings holds the potential to improve access to preventative lymphedema surgery for a broader population of breast cancer patients undergoing necessary axillary staging or treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Patient demographics based on hospital setting

Variable	Hospital Setting		p Value
	Community	Academic	
Patients, n (%)	84 (48.8)	88 (51.2)	
Age, y, mean ± SD	50.7 ± 10.8	51.1 ± 12.3	0.821
Body mass index, mean ± SD	29.3 ± 6.30	28.6 ± 5.6	
Race, n (%)			**0.005**
White or Caucasian	68 (81.0)	66 (75.0)	
Black or African American	10 (11.9)	22 (25.0)	
Asian	6 (7.1)	2 (2.8)	
ASA classification, n (%)			0.298
2	41 (48.8)	36 (40.9)	
3	43 (51.2)	52 (59.1)	
Length of follow up, mo, mean ± SD	21.5 ± 12.9	24.5 ± 17.1	0.202
Tobacco use, n (%)	9 (10.7)	9 (10.2)	0.917
Medical comorbidity, n (%)			
Hypertension	28 (33.3)	22 (25.0)	0.229
Diabetes mellitus	15 (17.9)	11(12.5)	0.327
Hyperlipidemia	23 (27.4)	19 (21.6)	0.377
Chronic obstructive pulmonary disease	1 (1.2)	4 (4.6)	0.190
Cancer type, n (%)			0.058
Infiltrating ductal carcinoma	66 (78.6)	61 (69.3)	
Infiltrating lobular carcinoma	4 (4.8)	14 (15.9)	
Other	14 (16.7)	13 (14.8)	

Table 2.

Surgical characteristics based on hospital setting

Variable	Hospital Setting		p Value
	Community	Academic	
Patients, n (%)	84 (48.8)	88 (51.2)	
Surgery type, n (%)			0.422
Lumpectomy and ALND	14 (16.9)	13 (15.3)	
Mastectomy and ALND	18 (21.7)	26 (30.6)	
Mastectomy, ALND and breast reconstruction	51 (61.5)	46 (54.1)	
Chemotherapy, n (%)			
Preoperative	40 (48.8)	52 (59.8)	0.152
Postoperative	21 (25.6)	20 (23.0)	0.691
Postoperative radiotherapy, n (%)	70 (85.4)	75 (85.2)	0.980
Radiation location, n (%)			0.054
Axillary and breast/chest wall	14 (20.6)	26 (35.1)	
Axillary, breast/chest wall with supraclavicular and/or internal mammary radiation	54 (79.4)	48 (64.9)	
No. lymph nodes removed during ALND, mean ± SD	18.3 ± 9.3	13.9 ± 7.50	**0.001**
No. positive lymph nodes removed during ALND, mean ± SD	3.2 ± 3.9	3.0 ± 3.6	0.692
No. lymphovenous bypasses performed, Median (IQR)	1 (1.0-2.0)	1 (1.0-2.0)	0.079
Breast reconstruction type, n (%)			0.402
None	33 (39.3)	42 (47.7)	
Prosthetic	42 (50.0)	35 (39.8)	
Autologous	9 (10.7)	11 (12.5)	
Timing of reconstruction, n (%)			0.730
Immediate	8 (15.7)	5 (10.9)	
Delayed	8 (15.7)	9 (19.6)	
Staged	35 (68.6)	32 (69.6)	

Table 3.

Surgical outcomes based on hospital setting

Variable	Hospital Setting		p Value
	Community	Academic	
Patients, n (%)	84 (48.8)	88 (51.2)	
Lymphedema	6 (7.1)	6 (6.8)	0.933
Time to significant limb swelling, months, mean ± SD	5.9 ± 7.3	7.9 ± 9.3	0.360
Extremity cellulitis, n (%)	3 (3.6)	5 (5.8)	0.501
Any breast-related complication, n (%)	25 (29.8)	27 (30.7)	0.896
Any expander-related complication, n (%)	12 (14.3)	9 (10.2)	0.709
Any donor-site complication, n (%)	1 (1.2)	0 (0.0)	0.488
Unplanned reoperation, n (%)	20 (26.0)	21 (29.2)	0.663

Table 4.

Multivariable logistic regression models for the impact of hospital setting on outcomes

Hospital setting	Lymphedema		Surgical Complications		Reoperation	
	OR (95% CI)	p[a]	OR (95% CI)	p[b]	OR (95% CI)	p[c]
Academic	Reference		Reference		Reference	
Community	0.80 (0.22–2.90)	0.730	1.21 (0.54–2.73)	0.642	1.43 (0.60–3.43)	0.418

[a:] The model was adjusted for number of nodes removed, race, postoperative radiotherapy, and reconstruction type

[b:] The model was adjusted for number of lymph nodes removed, number of positive lymph nodes removed, ASA status, race, hyperlipidemia, and reconstruction type

[c:] The model was adjusted for number of lymph nodes removed, hyperlipidemia, postoperative chemotherapy and reconstruction type

Table 5.

Patient-reported outcomes (LYMPH-Q) based on hospital setting

Outcomes	Community (n = 30)	Academic (n = 41)	Difference (95%CI)	p-value
Symptoms, mean ± SD	73.0 ± 27.2	81.0 ± 19.8	−8.0 (−19.70 to −3.74)	0.177
Function, mean ± SD	80.7 ± 24.5	84.9 ± 25.0	−4.3 (−16.12 to 7.61)	0.476
Appearance, mean ± SD	73.9 ± 37.0	81.3 ± 31.2	−7.41 (−24.10 to 9.28)	0.377
Psychological well-being, mean ± SD	78.8 ± 31.4	78.9 ± 31.2	−0.11 (−15.14 to 14.92)	0.988
Time from surgery to survey completion, mo, median (IQR)	38.5 (26.8-54.0)	46.0 (31.0-55.0)	-	0.395