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Implant-sparing Mastectomy: An Alternative for Women Undergoing Mastectomy With Retropectoral Implants

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Abstract

Implant-sparing mastectomy is a unique approach for patients pursuing mastectomy with equivalent oncologic outcomes and complication rates to mastectomy with reconstruction. Reconstruction for the majority was simplified by elimination of tissue expansion while maintaining a low flap reconstruction rate.

Introduction: Implant-sparing mastectomy (ISM) is a skin-sparing mastectomy that preserves a retropectoral implant and potentially eliminates the need for tissue expansion or complex reconstruction. This study aimed to determine oncologic and surgical outcomes and reconstructive patterns in patients undergoing ISM.

Patients and Methods: A single-institution, retrospective review of patients undergoing ISM from 2006 to 2018 was performed. Patient/tumor characteristics, stage, adjuvant therapy use, 90-day complication rates, reconstruction type, and disease recurrence were collected.

Results: A total of 121 ISMs in 73 women were performed. Seventy (57.9%) ISMs were for breast cancer (BC) treatment and 51 (42.1%) for prophylaxis. Among BC cases, 72.3% were cT1/cT2 and 73.8% were cN0; 72.3% received systemic therapy and 33.8% received radiation therapy. There were 3 deaths owing to BC at the median follow-up of 35 months. Among 5 recurrences, only 1 was local. There was no BC identified after prophylactic ISM. Total 90-day complication rate per ISM was 15.7%. Rates were 0.8% for both seroma and wound infection, 2.5% for wound dehiscence, 3.3% for hematoma, and 8.2% for skin necrosis. The majority (72.6%) of patients required only implant exchange for reconstruction. Overall use of autologous reconstruction was low (12.3%); 77.8% of flaps were performed in patients receiving radiation therapy.

Conclusion: ISM is a unique approach for patients pursuing mastectomy for BC treatment or prevention with equivalent oncologic outcomes and complication rates to mastectomy with

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Disclosure

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reconstruction. Reconstruction for the majority was markedly simplified by elimination of tissue expansion while maintaining a low rate of flap reconstruction.

Keywords

Breast augmentation; Breast reconstruction; Complications; Prophylactic mastectomy; Recurrence

Introduction

Breast cancer is the most commonly diagnosed cancer in women with an estimated 266,120 new cases diagnosed in 2018.¹ Concurrently, the frequency of breast augmentation with implants has continued to increase in the United States, with a total of 300,378 breast augmentation procedures performed in 2017, up just 3% from 2016.² Thus, the number of women with prior breast augmentation that develop either invasive breast cancer or ductal carcinoma in situ (DCIS) requiring surgical treatment will continue to increase. In those patients with retropectoral implant-based augmentation, one consideration for breast cancer surgery is implant-sparing mastectomy (ISM).

ISM is a novel surgical approach in which a skin-sparing mastectomy is performed that preserves the implant and its capsule, allowing for the implant to be left in place and the skin closed. As such, when the patient awakens from surgery, they do so with a breast mound. This surgical technique has been used at our institution and has been previously evaluated for safety and reconstructive outcomes. In the first study of 10 patients by Suber et al, the procedure was found to have minimal complications and good cosmetic outcomes in this small cohort.³ In another study by Prabhakaran et al, the reconstructive outcomes of ISM were compared with immediate tissue expander reconstruction in a total of 53 patients. This study showed the complication rates to actually be lower for the group undergoing ISM, with no differences in other reconstructive parameters, including final implant volume or time interval to final implant placement.⁴ In a study from Emory University, ISM with capsulotomy was performed with immediate exchange of the existing implant for a new implant. In this study of 20 patients, they found good aesthetic outcomes, appropriate complication rates, and no cancer recurrences.⁵

Although these initial studies suggest ISM to be a surgical technique with good aesthetic outcomes, possibly lower complication rates, and acceptable local recurrence rates, further evaluation with a focus on oncologic outcomes, surgical complications, and reconstruction patterns was warranted. As such, we aimed to study the oncologic outcomes, 90-day surgical complication rates, and factors associated with complications, as well as the patterns of reconstruction for patients receiving ISM at our institution from 2006 to 2018. We further sought to compare these outcomes with those from a contemporary group of patients from the same institution that had undergone either conventional unilateral mastectomy with immediate reconstruction or bilateral mastectomy with immediate reconstruction for the treatment of breast cancer or DCIS without prior implant placement. We also compared the outcomes for the cohort undergoing ISM with those outcomes established in the literature for patients undergoing mastectomy with immediate reconstruction.

Patients and Methods

After receiving Institutional Review Board approval, we performed a retrospective review of all patients undergoing ISM from a single institution from 2006 to 2018. For this study, ISM was defined as a skin-sparing mastectomy in which a pre-existing retropectoral implant and its capsule were left in place during the mastectomy, and then the skin was closed over the implant after removal of the breast. For this approach, violation of the capsule was generally repaired using interrupted vicryl sutures if needed. All patients were consented for possible intentional removal and immediate replacement of the implant after mastectomy was performed, should an immediate implant exchange be deemed necessary (for example, owing to the age of the implant). Except for those cases when tissue expander placement or implant exchange was preoperatively anticipated, cases were performed by a breast surgeon without a plastic surgeon present.

Patients included in the study had a unilateral or bilateral ISM as defined above for the treatment or prevention of primary breast cancer. After identification of the patient cohort, full chart abstraction was performed. Patient characteristics, tumor characteristics, stage of disease, receipt of adjuvant therapies, type of reconstruction performed, and 90-day complications of surgery, as well as survival and recurrence data were collected using a uniform abstraction tool. With regards to 90-day complication rates, 5 specific surgical complications were recorded: (1) seroma requiring aspiration, (2) infection requiring antibiotics, (3) hematoma requiring surgical intervention, (4) skin necrosis of the mastectomy flaps of any area greater than 1 cm, and (5) wound dehiscence of any area greater than 1 cm. From the data collection, descriptive statistics for this cohort were calculated.

A previously identified cohort of 90 patients undergoing either unilateral mastectomy with immediate reconstruction or bilateral mastectomy with immediate reconstruction (but without preservation of existing implants) from 1990 to 2013 was used as a comparator for the ISM cohort. This group was selected as patients undergoing mastectomy with immediate reconstruction awake from surgery with a breast mound in place similar to those patients undergoing ISM. Furthermore, this cohort of patients had data collected on similar variables including patient characteristics, tumor characteristics, stage of disease, type of reconstruction performed, and 90-day complications of surgery, as well as survival and recurrence data. As such, this cohort represents a contemporary group of patients at the same institution for comparison of surgical and oncologic outcomes.

Additionally, local recurrence rates as well as complication rates of patients undergoing mastectomy with immediate reconstruction were identified from the existing literature for general comparison between the groups. Finally, using the American Joint Committee on Cancer staging for breast cancer eighth edition, the expected number of deaths by stage was calculated for comparison with the breast cancer death rate observed in this cohort.

Descriptive statistics were used to summarize variables of interest, with mean or median used for continuous variables and percentages and counts used for categorical variables. Univariate generalized linear mixed modeling was used to predict associated complication

rates after ISM. All analysis was performed utilizing SAS version 9.4 (SAS Institute Inc, Cary, NC).

Results

Characteristics of the Patient Cohorts

A total of 121 ISMs were performed in 73 women with a median follow-up of 35 months (range, 0.5–140 months). The median age of the cohort was 48.4 years (range, 26.6–79.1 years). The median body mass index of the cohort was 24 kg/m² (range, 17.4–38.0 kg/m²). Bilateral mastectomy was performed in 48 (65.8%) patients. Sixty-five (89.0%) patients had a diagnosis of invasive breast cancer or DCIS in either one or both breasts. Of the 121 ISMs performed, 70 (57.9%) of them were performed in a breast with breast cancer, and 51 (42.1%) were performed for prophylaxis. Both the implant and the nipple were spared in 19 (15.7%) of the ISMs performed. The median weight of the mastectomy specimen was 408 g (range, 81–1373 g). Reconstruction of any kind was performed in 67 (91.8%) of patients (Table 1).

A total of 135 mastectomies with immediate reconstruction were performed in the 90 women in the comparator group. The median follow-up time for this group was longer, at 86.4 months. The median age was slightly higher at 53.9 years (range, 21.5–74.9 years) compared with the ISM cohort. The median body mass index was very similar to the ISM group at 24.8 kg/m² (range, 18.3–47.3 kg/m²). All of the patients in this cohort had a diagnosis of either breast cancer or DCIS. However, of the mastectomies performed, 45 (33.3%) were prophylactic in nature. In 31 (23%) of the mastectomies performed, the nipple was spared. Finally, all of the patients underwent reconstruction by definition of the inclusion criteria of this cohort (Table 1).

Tumor Characteristics and Treatment Patterns

The majority of patients presented with early stage breast cancer in both cohorts. The vast majority of patients had a T-stage of T2 or less; for the ISM cohort 23.1% were cT0/cTis and 72.3% were cT1/cT2 and for the mastectomy with reconstruction cohort 15.6% were cT0/cTis and 80.0% were cT1/cT2. In the ISM cohort, 26.2% had any clinically evident lymph node disease versus 30.0% in the mastectomy with reconstruction cohort. In the ISM cohort, 51 (78.5%) of patients were estrogen receptor/progesterone receptor-positive, and 4 (6.2%) had a triple negative breast cancer (Table 2). Data on receptor status was not collected for the comparator cohort of mastectomy with reconstruction.

In the ISM cohort, 51 (78.5%) women underwent a sentinel lymph node biopsy and 21 (32.3%) required axillary lymph node dissection for node positive disease. In the mastectomy with reconstruction cohort, 78 (86.7%) women underwent sentinel lymph node biopsy, and 18 (20.0%) underwent axillary lymph node dissection. The majority (72.3%) of those undergoing ISM received some form of adjuvant therapy. Ten (15.4%) of the patients in the ISM cohort received neoadjuvant therapy. A total of 22 (33.8%) patients in the ISM cohort received post mastectomy radiation therapy (Table 2). Data on only neoadjuvant

chemotherapy use was collected for the mastectomy with reconstruction cohort, and of this cohort, only 4.4% received neoadjuvant chemotherapy as part of their treatment (Table 2).

Oncologic and Surgical Outcomes

For the ISM cohort, the median follow-up time was 35 months (range, 0.5–140 months). During follow-up, there were 3 (4.1%) deaths owing to breast cancer and 5 (7.7%) recurrences, with only 1 (1.5%) local recurrence occurring within the mastectomy flap and the other 4 (6.2%) recurrences occurring at distant sites. In those patients undergoing prophylactic ISM, there were no new diagnoses of breast cancer (Table 3).

For the mastectomy with reconstruction cohort, the median follow-up time was longer, at 86.4 months. During follow-up, there were 2 (2.2%) deaths owing to breast cancer. There were a total of 12 (13.3%) recurrences, with 5 (5.6%) being local recurrences and 7 (7.8%) being distant recurrences. In those patients that underwent a contralateral prophylactic mastectomy, there were no new diagnoses of breast cancer (Table 3).

The total 90-day complication rate per ISM was 15.7%. The most common complication was skin necrosis of any area greater than 1 cm, and this occurred in 8.2% of the ISMs performed. The rate of wound dehiscence was 2.5% and often occurred in conjunction with skin necrosis or infection. The rate of hematoma that required operative intervention was 3.3%. The rate for seroma requiring aspiration and infection requiring antibiotics were both 0.8%, respectively (Table 3). Of the 121 ISMs performed, 12 surgical sites experienced a complication requiring return to the operating room, of which 3 (2.5%) resulted in implant loss or implant exchange owing to the complication itself. There were no patient-, tumor-, or treatment-related factors that were found to be significantly associated with any of the reported complications in the ISM cohort.

The total 90-day complication rate per mastectomy with reconstruction was 20.7%. Similar to the ISM cohort, the most common complication was skin necrosis at 7.4%. The rate of wound dehiscence was 3.0%, the rate of hematoma requiring operative intervention was 1.5%, and the rate of seroma requiring at least aspiration was 3.0%. The rate of infection was notably higher in this cohort, at 5.9%, compared with the rate of infection in the ISM cohort. Of the 135 mastectomies with reconstruction performed, 15 surgical sites experienced a complication requiring return to the operating room, of which 10 (7.4%) resulted in implant loss or exchange owing to the specific complication (Table 3).

Reconstruction Patterns

Of the 73 women in the ISM cohort, 6 (8.2%) had no additional surgery after ISM. Four women (5.5%) had immediate reconstruction, of which 3 had an implant exchange and 1 had a latissimus dorsi flap with implant left in place and the flap placed anteriorly. Forty-eight (65.8%) women had delayed reconstruction, of which 41 had implant exchange and 7 had flap reconstruction. Finally, 15 (20.5%) patients underwent immediate reconstruction followed by delayed reconstruction. Within this group, 1 patient had deep inferior epigastric perforator flap reconstruction followed by latissimus dorsi flap owing to loss of the deep inferior epigastric perforator flap, 5 had tissue expander placement followed by exchange to implant, and 9 had implant exchange followed by another implant exchange (Figure 1). Thus

in total, the majority (72.6%) of patients required only implant exchange for reconstruction. Furthermore, the overall use of autologous flap reconstruction was low at 12.3%, with 7 (77.8%) of the 9 flaps being performed after those patients received radiation therapy.

Of the 90 women in the comparator group, all patients underwent immediate reconstruction by definition. Of the 90 patients, 68 (75.6%) underwent immediate reconstruction with a tissue expander, and 4 (4.4%) underwent immediate reconstruction with an implant. The remaining 18 (20.0%) patients underwent autologous flap reconstruction either with or without tissue expander placement at the same time.

Discussion

The number of women undergoing implant based breast augmentation has continued to increase in the United States at least through 2017; and while breast cancer remains the most common cancer diagnosis in women, the number of patients that will need to undergo surgical management of breast cancer after augmentation is likely to continue to rise. For those women with retropectoral implant-based augmentation who pursue mastectomy for breast cancer prophylaxis or treatment, one novel approach is that of ISM. Currently there are only a small number of studies that have looked at this surgical approach, and these studies focus primarily on reconstruction outcomes and complication rates. This study aimed to further evaluate this surgical technique with regards to oncologic outcomes, surgical complication rates at 90 days, factors influencing complications, and reconstruction patterns.

With regards to oncologic outcomes during the follow-up period, there was only 1 local recurrence, for a local recurrence rate of 1.5% in the ISM cohort compared with 5.6% in the mastectomy with reconstruction cohort. Certainly some of this difference can be attributed to the longer follow-up period in the mastectomy with reconstruction cohort; however, it does suggest that the ISM local recurrence rate is within the expected range based on a follow-up of 35 months, which should be a time period long enough to capture most local recurrences, as median time to recurrence is 3 years.⁶ Similarly, in the literature, local recurrence rates for mastectomy have been reported to range from 2% to 11%.⁷⁻⁹ A meta-analysis evaluating local recurrence rates specifically after skin-sparing mastectomy, the most similar procedure to ISM, demonstrated a local recurrence rate of 6.2%.⁸ Thus, the local recurrence rate in this study was within the expected range for a skin-sparing mastectomy based on both a contemporary cohort at the same institution as well as the existing literature.

In the ISM cohort, there were a total of 3 (4.1%) deaths owing to breast cancer compared with 2 (2.2%) in the mastectomy with reconstruction cohort. Given the shorter follow-up time in the ISM cohort, this could be a difference that becomes more prominent with further follow-up. However, given the low local recurrence rates in the ISM cohort (even lower than the comparator cohort), it seems unlikely that this difference is related to inadequate local control after ISM. Using the American Joint Committee on Cancer eighth edition for Breast Cancer Staging, the expected number of breast cancer deaths by stage at 5 years for the ISM patient cohort was calculated to be 6; in the ISM cohort this number was 3 at the current median follow-up time of 35 months; thus, the number of cancer deaths in this population also lie within this expected range. Given that the median time to first breast cancer

recurrence is 3 years, with the greatest risk arising in year 2, we would expect to have captured the vast majority of recurrences and deaths with a median follow-up of 35 months.⁶ Additionally, it would be unlikely for the number of breast cancer deaths in the ISM cohort to more than double in the next 2 years of follow-up. Overall, the deaths owing to breast cancer in the ISM cohort seem to fall within the range for both a similar cohort of women as well as the literature.

With regard to complication rates, there have been a number of studies evaluating complication rates for skin-sparing mastectomy with reconstruction. Despite this, quantifying the complication rate for this procedure is still difficult owing to differences in the classification of postoperative complications. Complication rates for skin-sparing mastectomy range from 6% to 42%, and have been found to be as high as 69.1% if including patients undergoing bilateral mastectomy with immediate reconstruction.^{10,11} Differences in complication rates also vary by the data source used, with the National Surgical Quality Improvement Program often reporting complication rates for breast surgery that are lower than those reported in retrospective institutional reviews or claims-based data.^{11–15} We report an overall complication rate of 15.7% per ISM, generally in line with the accepted ranges in the literature and also in line with a contemporary institutional cohort complication rate of 20.7%. The skin necrosis rate of 8.2% in the ISM cohort was also similar to that of the mastectomy with reconstruction cohort of 7.4% and is consistent with a reported rate of 13% for patients undergoing mastectomy with immediate reconstruction by Petersen et al.¹⁰ The infection rate of 0.8% in the ISM cohort was lower than the 5.9% in the mastectomy with reconstruction cohort. It is also lower than the infection rates reported for mastectomy with immediate reconstruction in the literature, which range from 2.8% to 20.5%.^{10,12,16,17} However, there was one complication in which the ISM cohort had a higher rate than expected, and this was for hematoma requiring reoperation (3.3% in the ISM cohort). This was higher than the 1.5% rate in the mastectomy with reconstruction cohort and is also higher than expected, based on prior publications reporting a hematoma rate of 1%.¹³ Other factors, such as the use of neoadjuvant chemotherapy or disease stage, were not associated with postoperative hematoma in the ISM cohort; thus, the cause remains unclear. One possible reason for the higher rate is a lower threshold for early operative investigation in the setting of a more novel surgical approach. Additionally, patients undergoing ISM may not be optimal candidates for more conventional reconstructive approaches owing to comorbidities, and potentially have a higher risk of postoperative complications such as bleeding. Overall, however, the complication rates seen in the ISM cohort are consistent or better than both a contemporary cohort undergoing mastectomy with immediate reconstruction at the same institution and the previously published complication rates for patients undergoing mastectomy with reconstruction.

With regards to reconstruction patterns in the ISM cohort, the majority (53 patients; 72.6%) required only implant exchange for reconstruction, which is an outpatient procedure. Thus, most of the women in this cohort were spared the cumbersome and time-consuming tissue expansion process, which is a significant benefit to the patient. Furthermore, in the majority of the ISM cases, a plastic surgeon was not present for the operation, simplifying scheduling compared with cases with immediate reconstruction where a plastic surgeon is present at time of mastectomy. Additionally, the overall usage of autologous flap reconstruction

remained low for ISM at 12.3%, with 7 (77.8%) of the 9 flaps being performed for patients that had received radiation therapy.

This study supports the oncologic and surgical safety of ISM, with the added potential benefit of lower risk and simplified reconstruction for many patients. However, it does have its limitations. First, this study includes a relatively small number of patients. Although it is the largest series published to date, it remains limited by its sample size of 73 patients and 121 procedures. For example, this small size and the limited number of complications may be why there was no relationship seen between patient, tumor, and treatment characteristics and complication rates. Had this population been larger, one would expect to find an association between wound complications and radiation therapy, as previously demonstrated in the literature.^{18,19}

Second, this is a retrospective review, and as such is subject to the inherent selection bias of this type of study. For one, the patients included in this study were selected for this operation based on their history of retropectoral implant reconstruction and surgeon preference; they were not randomly assigned to ISM. Furthermore, the retrospective nature of the chart review likely favors the under-reporting of overall complications, with a focus on the most severe complications, as those are the ones most identifiable in the medical record. Similarly, any complication managed at an outside hospital and not reported to the primary surgeon would also be missed.

Third, there is no perfect comparator for this group of patients. Although we employed a contemporary cohort of patients from the same institution, there are some differences between the cohorts. For example, the mastectomy with reconstruction cohort has a higher median age, which may impact oncologic outcomes. Furthermore, the mastectomy with reconstruction cohort includes patients over a broader time frame, which may have affected adjuvant therapy use and oncologic outcomes.

Finally, this study provides data from only one institution, and as such has yet to be proven as generalizable, though many of our patient characteristics are generally in line with the type of patients with breast cancer that are seen at other centers.

In conclusion, this study found ISM to have equivalent oncologic outcomes and similar complication rates with skin-sparing mastectomy with reconstruction. Furthermore, for a majority of patients, reconstruction required only an implant exchange, simplifying the overall reconstruction process. Further work, including continued follow-up of this cohort and prospective collection of outcomes of those who will undergo ISM in the future, and comparison of outcomes for patients undergoing ISM at multiple institutions is warranted.

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Clinical Practice Points

- In those patients with retropectoral implant based augmentation, one consideration for breast cancer surgery is ISM. ISM is a surgical approach in which a skin-sparing mastectomy is performed that preserves the implant and its capsule allowing for the implant to be left in place. This approach has previously been studied with regards to its safety and reconstructive outcomes.
- In this study, we evaluated the oncologic outcomes, 90-day complication rates, and reconstructive patterns for patients undergoing ISM. A total of 121 ISMs in 73 women were performed with a median follow-up of 35 months.
- The local recurrence rate in this cohort was 1.5%, in line with the local recurrence rate in a contemporary cohort of patients undergoing mastectomy with reconstruction. The total 90-day complication rate per ISM was 15.7%. This was similarly in line with the complication rate in the contemporary cohort undergoing mastectomy with reconstruction. Finally, of the patients undergoing ISMs, the majority (72.6%) of patients required only implant exchange for reconstruction, thus eliminating the cumbersome and time-consuming tissue expansion process that patients undergoing mastectomy with immediate reconstruction face.
- This study supports the use of ISM in patients with previously placed retropectoral implants needing mastectomy for the treatment or prevention of breast cancer given the equivalent oncologic outcomes and surgical safety of ISM. Being able to offer this option to this select group of patients has the added potential benefit of simplified reconstruction for the majority of patients.

Figure 1.

Breakdown of Timing and Type of Reconstruction Performed for the Implant-sparing Mastectomy (ISM) Cohort. Immediate Reconstruction Performed at Time of ISM. Delayed Reconstruction Performed at Any Time After ISM

Abbreviations: DIEP Flap = deep inferior epigastric perforator flap, implant left in place; IE = implant exchange; Lat Flap = latissimus dorsi flap, implant removed; TE = tissue expander.

Table 1

Characteristics of Patient Cohorts at Patient and Breast Level

	Implant Sparing Mastectomy N = 73 Women n (%)	Mastectomy and Reconstruction N = 90 Women n (%)
Patient-level data		
Median age (range), y	48.4 (26.6–79.1)	53.9 (21.5–74.9)
Median BMI (range), kg/m ²	24.0 (17.4–38.0)	24.8 (18.3–47.3)
Bilateral ISM	48 (65.8%)	45 (50%)
Unilateral ISM	25 (34.2%)	45 (50%)
Breast cancer or DCIS	65 (89.0%)	90 (100%)
Reconstruction performed	67 (91.8%)	90 (100%)
Breast-level data	N = 121 ISMs	N = 135 mastectomies
ISM for cancer or DCIS	70 (57.9%)	90 (66.7%)
Prophylactic ISM	51 (42.1%)	45 (33.3%)
Nipple spared	19 (15.7%)	31 (23.0%)
Median breast weight (range), median, g	408 (81–1373)	Not Collected

Abbreviations: BMI = body mass index; DCIS = ductal carcinoma in situ; ISM = implant-sparing mastectomy.

Table 2

Tumor Characteristics and Treatment Received for Patients Undergoing ISM for Diagnosis of Breast Cancer or DCIS (N = 65) and for Patients Undergoing Mastectomy with Immediate Reconstruction for Diagnosis of Breast Cancer or DCIS (N = 90)

	ISM Cohort N (%)	Mastectomy and Reconstruction Cohort N (%)
Tumor characteristics		
cT0 or cTis	15 (23.1)	14 (15.6)
cT1 or cT2	47 (72.3)	72 (80.0)
cT3 or cT4	3 (4.6)	4 (4.4)
cN0	48 (73.8)	63 (70.0)
cN1, cN2, or cN3	17 (26.2)	27 (30.0)
ER/PR-positive	51 (78.5)	Not collected
HER2-positive	9 (13.8)	Not collected
Triple negative	4 (6.2)	Not collected
Treatment received		
Sentinel lymph node biopsy	51 (78.5)	78 (86.7)
Axillary lymph node dissection	21 (32.3)	18 (20.0)
Systemic therapy received	47 (72.3)	Not collected
Adjuvant therapy	47 (72.3)	Not collected
Neoadjuvant therapy	10 (15.4)	6 (4.4)
Radiation therapy	22 (33.8)	Not collected

Abbreviations: DCIS = ductal carcinoma in situ; ER = estrogen receptor; HER2 = human epidermal growth factor receptor 2; ISM = implant-sparing mastectomy; PR = progesterone receptor.

Table 3

Oncologic and Surgical Outcomes After Implant-sparing Mastectomy Versus Mastectomy With Immediate Reconstruction

	ISM Cohort N (%)	Mastectomy and Reconstruction Cohort N (%)
Oncologic outcomes		
Local recurrence	1 (1.5)	5 (5.6)
Distant recurrence	4 (6.2)	7 (7.8)
Breast cancer after prophylactic ISM	0(0)	0 (0)
Breast cancer deaths	3 (4.1)	2 (2.2)
90-day complications		
All complications	19 (15.7)	28 (20.7)
Seroma	1 (0.8)	4 (3.0)
Infection	1 (0.8)	8 (5.9)
Hematoma	4 (3.3)	2 (1.5)
Wound dehiscence	3 (2.5)	4 (3.0)
Skin necrosis	10 (8.2)	10 (7.4)
Return to OR owing to complication	12 (9.9)	15 (11.1)
Implant loss or change needed owing to complication	3 (2.5%)	10 (7.4%)

Abbreviations: ISM = implant sparing mastectomy; OR = operating room.