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Receipt of Delayed Breast Reconstruction after Mastectomy: Do women revisit the decision?

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Abstract

Background—Post-mastectomy breast reconstruction is an important component of breast cancer care but few receive it at the time of the mastectomy. Virtually nothing is known about receipt of reconstruction after initial cancer therapy and why treatment might be delayed.

Methods—A five-year follow-up survey was mailed to a population-based cohort of mastectomy-treated breast cancer patients who were initially surveyed at time of diagnosis in 2002 and reported to the Los Angeles and Detroit SEER registries (N = 645, response rate 60%). Outcomes were receipt of reconstruction (immediate (IR), delayed (DR) or none) and patient appraisal of their treatment decisions.

Results—About one-third (35.9%) had IR; 11.5% had DR; and 52.6% had no reconstruction. One-third delayed reconstruction because they focused more on other cancer interventions; and nearly half was concerned about surgical complications and interference with cancer surveillance. Two-thirds of those with no reconstruction said that the procedure was not important to them. A large proportion of all patients were satisfied with their reconstruction decision-making (89.4% IR, 78.4% DR, 80.4% no reconstruction, p = NS). However, only 59.3% of those with no reconstruction felt that they were adequately informed about their reconstructive options (vs. 82.7% IR and 78.4% DR, p < 0.01).

Conclusions—There was modest uptake of breast reconstruction after initial cancer treatment. Factors associated with delayed reconstruction were primarily related to uncertainty about the procedure, concern about cancer surveillance, and low priority. Those without reconstruction demonstrated significant informational needs, which should be addressed with future research efforts.

Keywords

breast reconstruction; SEER; practice patterns; breast cancer

Post-mastectomy breast reconstruction is an important option for women with breast cancer.¹ Current evidence suggests that the use of post-mastectomy breast reconstruction at the time of the mastectomy (i.e. immediate reconstruction) is low, with national estimates around 16%.^{2, 3} In addition, significant disparities exist in the receipt of immediate breast reconstruction by patient race/ethnicity and socio-demographic factors.^{2, 4, 5} Limited knowledge, financial barriers, and inadequate referrals to reconstructive surgeons have contributed to the low use of immediate breast reconstruction for minority patients.⁴⁻⁶ The extent to which these disparities persist in the survivorship period is unclear.

Women who initially receive mastectomy without reconstruction may revisit this decision later. Yet, virtually nothing is known about the decision-making process for patients as they cope with the impact of their surgery on their body image, self-esteem and sexuality. Although there are clinical reasons to delay reconstruction, such as the need for adjuvant radiation therapy,⁷ there is virtually no information regarding the quality of life factors that motivate the decision for reconstruction and whether these factors differ by the timing of reconstruction. The impact of the timing of reconstruction on patients' satisfaction with their surgical decision is also poorly understood. Previous studies suggest that women who received immediate reconstruction were significantly more satisfied with their surgical treatment decision compared to those who had a mastectomy only,⁸ but the relationship between decision delay and patient appraisal of the decision process has not been well studied.

To address these issues, we performed a five-year follow-up survey to a population-based cohort of breast cancer patients and evaluated receipt of immediate and delayed post-mastectomy breast reconstruction. The research objectives were: 1) To describe the proportion of mastectomy-treated patients that undergo delayed breast reconstruction; 2) To evaluate the underlying factors that contribute to the decision to receive immediate, delayed or no breast reconstruction; and 3) To assess the association between receipt of immediate, delayed or no breast reconstruction with patients' satisfaction with their surgical decision.

Methods

Population Sample and Data Collection

Eligible patients were women age ≤ 79 years with ductal carcinoma in situ (DCIS) or invasive breast cancer diagnosed and reported to the Surveillance, Epidemiology and End Results (SEER) registries of the greater metropolitan areas of Detroit and Los Angeles during a 14 month period between December 2001 and January 2003. We have previously reported the population sampling and data collection from the initial survey performed at the time of diagnosis.⁴ Eligible patients underwent a definitive surgical procedure, resided in the SEER catchment area, and were able to complete a questionnaire in English or Spanish. We prospectively selected all patients meeting the study criteria and over-sampled African Americans ($N = 2,647$). Approximately 90% of all patients identified were eligible for the study ($N = 2,382$). A self-administered survey was completed about 9 months after diagnosis by 77.4% of eligible patients.

The sample selected for this follow-up study included the 638 respondents (298 Detroit and 340 Los Angeles patients) who underwent a mastectomy. An introductory letter, questionnaire and gift worth \$10 were mailed between July 2007 and November 2008. The

Dillman survey method was used to encourage response.⁹ The survey was completed by 384 patients (response rate 60.2%). Compared with survey respondents, non-respondents had a significantly higher proportion of blacks (30% vs. 20%, respectively, $p = 0.038$); lower incomes ($p < 0.001$); less education ($p < 0.001$); lower proportion of stage 0 disease (25% vs. 37%, $p < 0.001$); but did not differ significantly by age. The study protocol was approved by the Institutional Review Boards of the University of Michigan, the University of Southern California, and Wayne State University.

Measures

The patient questionnaire was developed based on a conceptual model, extensive pilot testing and prior work by our team surveying breast cancer patients.^{4, 10, 11}

Use of reconstruction—The primary dependent variable, receipt of reconstruction following mastectomy, had 3 categories: 1) the patient received reconstruction at the same time as the mastectomy (immediate reconstruction), 2) received reconstruction at any point after the mastectomy but before completion of the survey (delayed reconstruction), or 3) did not receive reconstruction at the time of the follow-up survey (no reconstruction). For delayed reconstruction, the time from mastectomy to reconstruction was recorded in months.

Factors associated with the reconstruction decision—We described three general psychosocial factors that we hypothesized would be associated with the decision for reconstruction: body image; pragmatic concerns; and sexuality (see Figure 2 for specific questions). A five-point Likert scale was used to measure responses, which ranged from strongly disagree to strongly agree, and dichotomized into low and moderate (≤ 3) or high (4-5) for analytical purposes. Applying different categorizations did not significantly alter the results.

We also evaluated four general reasons why patients delayed breast reconstruction or did not receive reconstruction: patient-reported physician concerns; patient concerns about reconstruction outcomes; patient treatment priorities; and access barriers to reconstruction (see Table 2 for specific questions). The items evaluating patient-reported physician concerns, patient priorities and access barriers were measured on five-point Likert scales (not at all to extremely concerned) which were dichotomized into low and moderate (≤ 3) or high (4-5) for analytical purposes. For patient concerns about reconstruction, respondents could check multiple items from a list of options.

Decision satisfaction—To evaluate patients' degree of satisfaction with their decision for immediate, delayed or no reconstruction, we used multiple items (described in Table 3) from Holmes-Rovner's decisional satisfaction scale and the O'Connor decisional regret scale.^{12, 13, 14} Five-point Likert responses (low to high) were dichotomized into low and moderate (≤ 3) or high (4-5) for analytical purposes.

Control variables: The independent variables included 1) patient socio-demographic characteristics (age, race, marital status, income, insurance status, and education) and 2) patients' clinical factors (presence of comorbid conditions, AJCC Stage, receipt of chemotherapy and receipt of radiation therapy). Age was self-reported and analyzed as a continuous variable. Race was categorized as white, black, other. Marital/ domestic partner status was determined by whether the patient was living with a spouse or partner at the time of cancer diagnosis (yes/no). Income was grouped as 1) $< \$30,000$, 2) $\$30,000 - \$69,999$, 3) $\geq \$70,000$ and 4) missing. Insurance status was grouped as 1) private insurance/other, 2) Medicaid/Medi-Cal, 3) Medicare, and 4) none. Education was collapsed into a three-level categorical variable: 1) high school graduate or less, 2) some college, and 3) college

graduate. Patient body-mass index was described as <25, 25-30, and >30. The number of comorbidities was obtained from the patient survey from a list of seven common medical comorbidities and subsequently collapsed into a two-level variable (0 or ≥ 1). The summary cancer stage was obtained from SEER and was classified using the AJCC staging system for breast carcinoma (DCIS (Stage 0) or invasive carcinoma of Stages 1-3).¹⁵ Receipt of chemotherapy and radiation therapy were both analyzed as two-level categorical variables (yes/no).

Analyses

We first described receipt of breast reconstruction (immediate, delayed, and no reconstruction) across all socio-demographic and clinical factors. We described the cumulative proportion of patients who underwent delayed breast reconstruction after the mastectomy. Pearson chi-square was used for the bivariate analyses between outcomes and categorical independent variables, and the Student's t-test was used for continuous variables.

Next we described factors underlying breast reconstruction decisions, such as body image and sexuality concerns, by receipt of immediate, delayed reconstruction or no reconstruction. We also described patient-reported reasons for delaying the decision for reconstruction or choosing not to have reconstruction that were related to patient priorities and barriers. Pearson chi-square was used to compare differences in response by receipt of reconstruction.

Last, we evaluated patients' satisfaction and regret with the breast reconstruction decision according to whether the patient received immediate, delayed or reconstruction. Pearson chi-square was used to compare differences in decisional outcomes by receipt of reconstruction. Values were adjusted for age, stage, education and race using logistic regression. All analyses were performed with STATA version 8.0.

Results

Use of reconstruction

Of the 384 mastectomy-treated breast cancer patients in the study, 138 (35.9%) received immediate reconstruction, 44 (11.5%) received delayed reconstruction and 202 (52.6%) did not receive reconstruction. Figure 1 shows that mean time to delayed reconstruction was 21.6 months, and all of the sample patients who received reconstruction did so by 4.5 years post-mastectomy.

We observed few significant differences in the socio-demographic characteristics between those who received immediate and delayed breast reconstruction (Table 1). Most of the statistically significant findings reflected differences between those with reconstruction (immediate or delayed) and those without reconstruction. For example, patients who did not receive reconstruction compared to those with immediate or delayed reconstruction were significantly older (67 yrs vs. 57 yrs and 58 yrs, respectively, $p < 0.001$); and were significantly more likely to be African American (29% vs. 12% and 18%, respectively, $p < 0.001$). One-third of patients without reconstruction were in the lowest income group compared to only 12% of those with immediate reconstruction and 14% of those with delayed procedures ($p < 0.001$).

Women who received immediate breast reconstruction did differ from those who received delayed or no reconstruction by several clinical factors. Women who underwent immediate reconstruction compared to those with delayed or no reconstruction were significantly more likely to have had DCIS (51% vs. 35% and 30%, respectively p for Stage < 0.001); and significantly less likely to have received chemotherapy or radiation therapy (chemotherapy:

23% vs. 44% and 32%, respectively, $p = 0.036$; radiation therapy: 10% vs. 30% and 25%, respectively, $p = 0.002$). Of note, receipt of reconstruction did not vary significantly by patient body-mass index.

Factors associated with the reconstruction decision

Most of the differences in factors associated with the reconstruction decision (body image and pragmatic concerns) were found between those with reconstruction (immediate or delayed) and those without reconstruction (Figure 2). For example, a higher proportion of women with immediate and delayed reconstruction compared to those without reconstruction expressed that their decision about reconstruction was motivated by body image concerns (90% and 98% vs. 71%, respectively, wanted to feel whole again, $p < 0.001$) and pragmatic reasons (97% and 100% vs. 72%, respectively, wanted to avoid wearing a prosthesis, $p < 0.001$). However, women who received immediate reconstruction compared to those with delayed or no reconstruction appeared significantly more motivated to have surgery for sexuality reasons (94% vs. 81% and 74%, respectively, reported wanting to feel less self-conscious during sexual activity, $p < 0.001$).

We found very few patients who had delayed or no reconstruction report that their physician expressed concern about reconstruction; however, a large proportion of patients had concerns about the outcomes of reconstruction (Table 2). For example, patients who received delayed or no reconstruction were concerned about surgical complications (48.8% and 60.3%) and interference with the detection of cancer recurrence (48.8% and 60.5%), respectively. Those with no reconstruction compared to those who received delayed reconstruction expressed significantly more concern regarding the length of post-operative recovery (59.4% vs. 41.9%, respectively, $p = 0.04$); and the long-term health problems related to reconstruction (59.5% vs. 41.9%, respectively, $p = 0.038$). Patients from both groups expressed a low priority for breast reconstruction compared to other cancer treatments. Approximately one-third of those who received delayed reconstruction and almost half of those with no reconstruction reported that they did not pursue reconstruction at the time of the mastectomy because they were focused on treating the cancer. Patients without reconstruction compared to those who received delayed breast reconstruction were more likely to express that reconstruction was a low priority: 63.4% vs. 11.4% said reconstruction was not important to them, respectively, $p < 0.001$; and 63.4% vs. 18.2% said that they did not want more surgery, respectively, $p < 0.001$. Very few patients reported an access barrier to reconstruction.

Decision satisfaction

Overall, a high proportion of patients with immediate, delayed and no reconstruction were satisfied with their decision about breast reconstruction (89%, 78% and 80%, respectively, $p = \text{NS}$) (Table 3). However, those who received immediate breast reconstruction were less likely to regret the choice about whether or not to have reconstruction compared to those with delayed or no reconstruction (7% vs. 24% and 17%, respectively, $p = 0.054$); and those who had no breast reconstruction were significantly less likely to feel that they were adequately informed about the decision compared to those with immediate and delayed reconstruction (59% vs. 83% and 78%, respectively, $p = 0.002$).

Discussion

This is one of the first studies to describe the use of delayed breast reconstruction using a population-based sample of breast cancer patients. We found modest uptake of breast reconstruction after initial cancer therapy: 12% had delayed reconstruction; about one-third had immediate reconstruction; and about half of patients ultimately did not receive

reconstruction. Factors associated with delayed reconstruction were primarily related to uncertainty about the procedure, concern about cancer surveillance, and low priority. This is also one of the first studies to our knowledge to evaluate differences in socio-demographic and motivating factors among women receiving reconstruction at different time points and women choosing not to undergo reconstruction. We found some significant differences between these three groups according to socio-demographic and motivating factors. Women without reconstruction tended to be more socio-economically disadvantaged compared to those who received either immediate or delayed breast reconstruction; and those with delayed or no reconstruction had more advanced disease requiring adjuvant therapy compared to those who received immediate reconstruction. Women who received immediate or delayed reconstruction had similar factors motivating the decision for reconstruction related to body image and pragmatic concerns. However, women with immediate reconstruction had significantly more sexuality concerns driving the decision for surgery compared to those with delayed or no reconstruction. Overall, all women were highly satisfied regarding their decision about whether to have breast reconstruction. However, those who had not received reconstruction at the time of our survey demonstrated significant informational needs related to their surgical reconstructive decision-making.

Breast reconstruction is a treatment decision that can be revisited over time. Ensuring patient access to breast reconstruction in both the immediate and delayed setting has important implications for women's quality of life¹⁶⁻²⁰ in the survivorship period. In our study, about half of women who received delayed breast reconstruction did so within the first year after mastectomy. This suggests a high demand for the procedure by these patients, but they may not have been adequately informed or encouraged to consider reconstruction at the time of the mastectomy. Furthermore, many of the clinical contraindications for immediate breast reconstruction^{7, 21-24} do not persist in the survivorship period, therefore allowing uptake of delayed reconstruction for those with more advanced disease. However, it appears that some of the socio-economic disparities associated with receipt of immediate reconstruction^{2, 8} persist after initial cancer treatment. The association between patient socioeconomic status and surgical breast cancer care has been well-documented over the past 15 years.²⁵⁻³² Socio-economically disadvantaged patients are less likely to be counseled by the general surgeon about reconstructive options,³³ and now appear to be less likely to receive breast reconstruction in the immediate and delayed treatment setting.

Our study suggests that three primary factors drive the decision to delay or not have breast reconstruction. For many, breast reconstruction is a *low priority*. One-third of those with delayed reconstruction and nearly half of those with no reconstruction were focused on treating the cancer and therefore did not undergo immediate breast reconstruction. Breast reconstruction continued to be a low priority in the survivorship period for almost two-thirds of women who never received it. Many patients also expressed *uncertainty* about the reconstructive procedure. Nearly half of those who delayed and 60% of those who did not receive reconstruction were concerned about the possible complications of reconstruction and concerned that reconstruction would interfere with cancer surveillance. While a detailed discussion of the complications associated with reconstruction is the domain of the plastic surgeon, general surgeons treating breast cancer patients should be able to reassure them that performance of reconstruction does not impact the risk of cancer recurrence or its detection. In addition, patients who did not receive reconstruction were significantly *less informed* about reconstruction compared to those who received it.

The unmet information needs about reconstruction found in this study are supported by our previous work that focused on African-American and Latina breast cancer patients.⁸ Minority patients compared to whites are significantly less likely to see a plastic surgeon prior to the mastectomy and are significantly more likely to desire additional information

about reconstruction.⁸ However, our previous work suggests that meeting with a plastic surgeon prior to surgical treatment lessens concern about reconstruction and significantly motivates patients to consider reconstruction as a treatment priority.³³

Limitations

These results are limited to two metropolitan areas, Detroit and Los Angeles, and may not reflect national trends in breast cancer care. However, the large racial/ethnic diversity of this population-based study and the high response rate suggest that we have a sample that is well-representative of breast cancer patients in the U.S. We were also limited by the self-reported nature of our variables, which may be subject to recall bias. However, we expect that women's report of receipt of reconstruction is highly accurate. The modest response rate to the follow-up survey may have introduced response bias. Non-responders were significantly more socio-economically disadvantaged, which may have attenuated associations between socio-economic status and receipt of delayed reconstruction.

Policy Implications

Our findings have important implications for breast cancer care and policy. The strong educational gradients in receipt of reconstruction, the unmet information needs and the decisional uncertainty about reconstruction outcomes motivates an initiative to improve the decision-making process at the time of cancer diagnosis. The American Society of Plastic Surgeons has recognized the importance of education and has initiated a campaign called "Choices" aimed at informing breast cancer patients of their reconstructive options and promoting multidisciplinary breast cancer care that includes access to plastic surgeons.³⁴ Another approach is to develop and deploy decision tools that general surgeons can use at the time of cancer diagnosis and oncologists and internists can use in the survivorship period to educate patients about the risks and benefits of reconstructive surgery. Decision tools are well-established techniques associated with improved decisional quality for breast cancer care.³⁵

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Figure 1. Cumulative proportion of patients who underwent delayed breast reconstruction. Of the sample, 35.9% underwent reconstruction at the time of the mastectomy (immediate reconstruction) and 11.5% underwent delayed reconstruction (i.e. any time after the mastectomy).

Figure 2.

The figure displays factors associated with breast cancer patients' decision about post-mastectomy breast reconstruction. Respondents were asked, "When decisions were being made about breast reconstruction, how much did the following concerns influence your decisions?" Responses displayed indicate those that chose agree or strongly agree on a 5-point Likert scale. Pearson chi-square was used for the analyses, and an asterisk (*) indicates p value < 0.001 .

Table 1

Study Sample Characteristics (N = 384)

	Total [N = 384] N (%)	Immediate Reconstruction [N = 138] N (%)	Delayed Reconstruction [N = 44] N (%)	No Reconstruction [N = 202] N (%)	P value**
Age (mean)	(62.4)	(56.8)	(57.5)	(67.4)	<0.001
Race					<0.001
White	249 (64.8)	105 (76.1)	26 (59.1)	118 (58.4)	
Black	83 (21.6)	16 (11.6)	8 (18.2)	59 (29.2)	
Other	52 (13.5)	17 (12.3)	10 (22.7)	25 (12.4)	
Married/Domestic Partner					<0.001
Yes	232 (60.4)	106 (76.8)	22 (50.0)	104 (51.5)	
Income					<0.001
<\$30,000	89 (23.20)	17 (12.3)	6 (13.6)	66 (32.7)	
\$30-\$69,000	122 (31.8)	45 (32.6)	18 (40.9)	59 (29.2)	
>\$70,000	110 (28.7)	64 (46.4)	12 (27.3)	34 (16.8)	
missing	63 (16.4)	12 (8.7)	8 (18.2)	43 (21.3)	
Insurance status					<0.001
Private Insurance/Other	265 (69.9)	122 (89.1)	35 (79.6)	108 (54.6)	
Medicaid/Medi-Cal	19 (5.0)	3 (2.2)	3 (6.8)	13 (6.6)	
Medicare	92 (24.3)	12 (8.8)	6 (13.6)	74 (37.4)	
None	3 (0.8)	0 (0.0)	0 (0.0)	3 (1.5)	
Level of Education					<0.001
High School Graduate or less	115 (31.2)	23 (17.0)	11 (27.5)	81 (41.8)	
Some College	130 (35.2)	48 (35.6)	12 (30.0)	70 (36.1)	
College Graduate	124 (33.6)	64 (47.4)	17 (42.5)	43 (22.2)	
Body-Mass Index					0.431
< 25	137 (36.6)	51 (39.0)	18 (13.7)	62 (47.3)	
25-30	118 (31.6)	46 (40.0)	9 (7.8)	60 (52.2)	
>30	119 (31.8)	38 (32.5)	15 (12.8)	64 (54.7)	
# Comorbidities					<0.001
0	162 (42.2)	68 (49.3)	26 (59.1)	68 (33.7)	

	Total [N = 384] N (%)**	Immediate Reconstruction [N=138] N (%)*	Delayed Reconstruction [N= 44] N (%)*	No Reconstruction [N= 202] N (%)*	P value**
≥1	222 (57.8)	70 (50.7)	18 (40.9)	134 (66.3)	
AJCC Stage at Diagnosis					
DCIS	146 (38.1)	70 (50.7)	15 (34.9)	61 (30.2)	<0.001
1	94 (24.5)	33 (23.9)	5 (11.6)	56 (27.7)	
2	95 (24.8)	27 (19.6)	15 (34.9)	53 (26.2)	
3	48 (12.5)	8 (5.8)	8 (18.6)	32 (15.8)	
Receipt of Chemotherapy	106 (30.1)	30 (23.4)	18 (43.9)	58 (31.7)	0.036
Receipt of Radiation	75 (20.0)	14 (10.4)	13 (29.6)	48 (24.5)	0.002

* Data represent column totals and percentages

** Pearson chi-square was used for the analyses except for the Student's t-test that was used to compare differences in patient age

Table 2
Patient-Reported Reasons for Delaying Breast Reconstruction or Not Having Breast Reconstruction

	Reasons for Delayed Reconstruction %	Reasons for No Reconstruction %	P value *
<i>Physician Concerns about Reconstruction</i> ^			
• Difficulty with cancer recurrence	2.3	2.5	0.937
• Cancer too advanced	2.3	2.5	0.937
• Too many other medical problems	0.0	4.5	0.154
• Too overweight	0.0	2.0	0.347
• Poor cosmetic results	4.6	1.5	0.192
• Need for radiation	2.3	1.5	0.708
• Need for chemotherapy	2.3	1.0	0.482
<i>Patient Concerns about Reconstruction</i> ^^			
• Concerned about possible complications	48.8	60.3	0.171
• Concerned about length of recovery	41.9	59.4	0.040
• Concerned about pain	52.3	50.0	0.789
• Concerned about surgical scars	41.9	30.0	0.138
• Concerned it would interfere with cancer surveillance	48.8	60.5	0.169
• Concerned about long-term health problems related to reconstruction	41.9	59.5	0.038
<i>Patient Priorities</i> ^			
• Focused on treating the breast cancer	34.1	47.0	0.118
• Not important	11.4	63.4	<0.001
• Did not want more surgery	18.2	63.4	<0.001
<i>Access Barriers</i> ^			
• No available reconstructive surgeons	4.6	0.5	0.027
• Did not know it was an option	2.3	5.9	0.324

* Pearson chi-square

^ Respondents could check multiple items from a list of options

^^ Five-point Likert responses from not at all concerned to extremely concerned. Percentages represent the proportion who selected moderately or extremely concerned.

Table 3
Patient-Reported Satisfaction with the Decision for Post-Mastectomy Breast Reconstruction

	Immediate Reconstruction (N=138) %*	Delayed Reconstruction (N=44) %*	No Reconstruction (N=202) %*	P value**
<i>The following pertain to patients' satisfaction about whether or not to have breast reconstruction:</i>				
Satisfied with decision	89.4	78.4	80.4	0.163
The decision was a wise one	88.5	81.1	81.7	0.470
I would make same choice	82.7	73.0	78.9	0.567
I regret the choice I made	7.2	24.3	17.2	0.054
I was adequately informed	82.7	78.4	59.3	0.002
Satisfied it was my decision to make	95.5	97.3	88.4	0.156

* Agree or strongly agree on 5-point Likert scale

** Pearson chi square. Values are adjusted for age, stage, education and race.