

Breast Reconstruction in an Underserved Population: A Retrospective Study

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ABSTRACT

Background. Breast reconstruction can help restore the shape and appearance of breasts after surgery. Studies have shown that minority and uninsured patients are less likely to receive breast reconstruction after mastectomy.

Objective. We sought to determine if post-mastectomy reconstruction varied by patient ethnicity and insurance status in a medically underserved population.

Methods. This was a retrospective study of mastectomy patients seen at Bellevue Hospital Center, a safety-net hospital in New York City, between January 2010 and December 2015. The Chi square test was used to compare patient characteristics versus type of reconstruction chosen and likelihood of reconstruction. Logistic regression was used to examine likelihood of reconstruction, controlling for patient insurance status, race, age, stage at presentation, and contralateral prophylactic mastectomy.

Results. Of the 750 patients included in the database, 220 underwent mastectomy. Overall, 73.6% of our patient population received breast reconstruction. Patients with Medicare insurance were less likely to get reconstruction compared with patients with other types of insurance (37.5%, $p = 0.04$). Hispanic patients were most likely to receive reconstruction (89.1%), followed by Black patients (80%) and Asian patients (66.7%) [$p = 0.03$]. There were no significant associations between patient race or stage at presentation and type of reconstruction. In a multivariate logistic regression, advancing age was associated with a decreased likelihood of reconstruction (adjusted odds ratio 0.91, $p < 0.001$).

Conclusions. In our underserved patient population, patients received breast reconstruction at rates higher than the national average. Institutional availability of patient navigators and preoperative counseling may contribute to more equal access to breast reconstruction.

INTRODUCTION

Disparities in health care have been demonstrated for minority and underserved patients in a variety of healthcare fields.^{1–4} Low socioeconomic status is associated with fewer immunizations, fewer screening tests for cancer, and lower-quality hospital care.¹ Disparities in care have also been demonstrated for women with breast cancer. For example, women without private insurance, and minorities, are less likely to have timely mammograms.⁵ Underserved women are also less likely to receive guideline-concordant care after diagnosis.⁶ Disparities in care may translate into poorer outcomes. For example, Hispanic women have a lower incidence of breast cancer compared with White women, yet they have been shown to experience higher mortality rates.⁷

Breast reconstruction can restore the shape and appearance of the breast after mastectomy. The decision for reconstruction is often multifactorial. Greater access to plastic surgeons, greater health literacy, and private insurance status are associated with a greater likelihood of receiving post-mastectomy reconstruction.^{8–11} Evidence suggests that racial and ethnic disparities may exist in the utilization of post-mastectomy reconstruction. Previous studies have suggested that minority patients are less likely to receive post-mastectomy reconstruction compared with White patients.^{12–15} Specifically, several studies suggest that Hispanic patients are less likely than African American patients or White patients to receive reconstruction.^{12,14}

The reported rates of reconstruction vary, and there is some evidence that racial and cultural background affects the type of breast reconstruction desired by patients.^{14,15}

The literature suggests that disparities in breast reconstruction among minority patients may not be secondary to decreased patient demand.¹² In fact, minority patients are most likely to desire information about reconstruction and are least likely to be satisfied without post-mastectomy reconstruction.¹² It appears that language barriers, surgeon input, insurance status, and other cultural factors contribute to these differences.^{8,10,12,14} However, it can be difficult to determine the contribution of these various factors across populations as patterns of reconstruction receipt vary. For example, in one study, privately and publicly insured minority women were less likely to receive reconstruction compared with White women, but, among uninsured patients, receipt of reconstruction did not differ significantly by race.¹¹

To examine possible disparities in post-mastectomy reconstruction, we focused on the patient population of a large public city hospital in New York—Bellevue Hospital Center (BHC). This patient population is diverse (predominantly Hispanic and Asian) and medically underserved.¹⁶ Overall, 41% of patients seen in Bellevue Hospital's breast surgery clinic had Medicaid insurance and 32.7% elected for self-pay.¹⁷ We sought to determine if, within this underserved population, rates of post-mastectomy reconstruction varied by patient ethnicity or insurance status. In addition, we wanted to examine whether the type of breast reconstruction chosen varied by race or insurance status. Finally, we sought to determine if patient ethnicity and insurance status were associated with the likelihood of complications post-reconstruction.

METHODS

This was a retrospective study of mastectomy patients seen at BHC over a 5-years period. With Institutional Review Board approval, the BHC breast clinic database was used to identify women with breast cancer who were seen in the clinic and received surgery between 2010 and 2015. Only patients who underwent mastectomy were included in the analysis. Patient information, including age at diagnosis, ethnicity, insurance status, clinical stage, and type of reconstruction, was abstracted from the database by chart review. Post-mastectomy complications were ascertained by review of patient notes and operative reports. The Chi square test was used to compare patient characteristics with type of reconstruction chosen, and was used to analyze patient characteristics versus likelihood of reconstruction. Logistic regression was used to examine likelihood of reconstruction, controlling for patient

insurance status, race, age, stage at presentation, and contralateral prophylactic mastectomy (CPM) patients. SPSS version 23 (IBM Corporation, Armonk, NY, USA) was used to analyze data. A p -value < 0.05 was set for significance.

RESULTS

Of the 750 patients included in the database, 220 underwent mastectomy. The median age in this group was 48 years; most patients were Asian (63 patients, 28.6%), Hispanic (46 patients, 20.9%), or Black (45 patients, 20.5%); the majority of patients had Medicaid insurance (171 patients, 77.7%); and the most common stage at presentation was 2A (58 patients, 26.4%). Of 220 mastectomy patients, 43 underwent CPM. The most common type of initial reconstruction was tissue expanders (90, 40.9%). Of the 90 patients who received tissue expanders for initial reconstruction, 59 were locally advanced breast cancers, of whom 10 (11.1%) then received autologous reconstruction after TE. In these cases, tissue expanders were placed with the expectation that the patient would have adjuvant radiation. The overall complication rate was 10% (Table 1).

A comparison of initial reconstruction type versus insurance, race, and stage at presentation was performed. Patients with Medicare insurance were less likely to get reconstruction compared with patients with other types of insurance (rate of reconstruction 37.5%, $p = 0.04$). There were no significant associations between patient race or stage at presentation and type of reconstruction (Table 2). A separate analysis exploring patient race versus type of autologous reconstruction did not yield significant results. Patients with Medicaid insurance were most likely to receive some type of reconstruction (77.2%, $p = 0.04$) compared with patients with other types of insurance, and Hispanic patients were most likely to receive reconstruction (89.1%), followed by Black patients (80%) and Asian patients (66.7%) [$p = 0.03$] There was no significant association between stage at presentation and likelihood of reconstruction (Table 2).

In a logistic regression controlling for insurance type, patient ethnicity, stage at presentation, CPM, and age, reconstruction was significantly associated with stage and age. Advancing age was associated with a decreased likelihood of reconstruction (adjusted odds ratio [AOR] 0.91, $p < 0.001$). Patients with stage 2 cancer were less likely to receive reconstruction compared with the reference group (stage 0 cancer; AOR 0.32, $p = 0.05$) (Table 3).

White patients were most likely to experience post-surgical complications (20.6%) and Asian patients were least likely (1.6%) [$p = 0.03$], while patients who

TABLE 1 Patient characteristics ($n = 220$)

	No. of patients (%)
Median age at diagnosis, years (IQR)	48 (39–57)
Ethnicity	
Asian	63 (28.6)
Black	45 (20.5)
Hispanic	46 (20.9)
Unknown	32 (14.5)
White	34 (15.5)
Insurance status	
Private	25 (11.4)
Medicaid	171 (77.7)
Medicare	8 (3.6)
Other	16 (7.3)
Stage	
0	36 (16.4)
1A	45 (20.5)
1B	2 (0.9)
2A	58 (26.4)
2B	33 (15.0)
3A	27 (12.3)
3B	2 (0.9)
3C	17 (7.7)
Surgery	
MRM	60 (27.3)
Unilateral	34 (15.5)
Bilateral	26 (11.8)
TM	160 (72.7)
Unilateral	100 (45.5)
Bilateral	60 (27.3)
CPM	45 (20.4)
MRM/CPM	17 (7.7)
TM/CPM	28 (12.7)
Initial reconstruction	
None	58 (26.4)
TE	90 (40.9)
Autologous	72 (32.7)
Complication rate	22 (10.0)
Complication type	
Infection	5 (2.3)
Hematoma	4 (1.8)
Flap necrosis	11 (5.0)
Other	1 (0.4)
Donor site complication	2 (0.9)

IQR Interquartile range, MRM modified radical mastectomy, TM total mastectomy, CPM contralateral prophylactic mastectomy, TE tissue expander

patients who did not receive reconstruction or patients who received tissue expanders ($p < 0.01$). There was no significant association between stage at diagnosis and insurance status with likelihood of complications (Table 4). When controlling for other patient factors, Asian patients were approximately 16 times less likely to have a postoperative complication compared with White patients (AOR 0.06, $p = 0.01$). Hypertension was another independent risk factor for postoperative complication; patients with high blood pressure were over three times more likely to have a complication than those without hypertension (AOR 3.32, $p = 0.03$) (Table 5).

DISCUSSION

In this study, we examined the rates of post-mastectomy breast reconstruction in a traditionally underserved population at a large public city hospital in New York City. Overall, 73.6% of our patient population received breast reconstruction, a rate higher than in previously reported studies of breast reconstruction in cancer patients.^{7,8,11}

In addition, we did not find a significant difference in rates of reconstruction based on race, which is in contrast to previous data showing that minority patients receive reconstruction at rates lower than White patients.^{12–15} In our patient population, Hispanic patients were in fact more likely than White patients to receive reconstruction; this approached significance (AOR 3.4, $p = 0.06$). Compared with the general population, the BHC population consists of predominantly non-White patients, with a majority of patients receiving Medicaid insurance (77.7%). Patients with Medicaid insurance were most likely to receive reconstruction (77.2%, $p = 0.04$) compared with patients with other types of insurance. Of note, the state of New York offers emergency Medicaid for all documented patients with a diagnosis of breast cancer; this covers all cancer-related treatment.

These results are consistent with some evidence that institutions designated as safety-net hospitals (SNHs) may mediate certain racial disparities.¹⁸ It is possible that primarily caring for otherwise underserved populations necessitates infrastructure that targets sources of disparities in healthcare delivery. For example, at BHC, patients in this population are managed by board-certified surgical breast oncologists, and patients receive consultation from dedicated plastic surgeons preoperatively.¹⁹ Our interdisciplinary faculty comprises of two breast surgeon oncologists, two plastic surgeons, and two microsurgery fellows, as well as medical oncologists and radiation oncologists, among other specialists.¹⁹ Patients are

underwent autologous reconstruction were most likely to experience post-surgical complications compared with

TABLE 2 Reconstruction rate and initial reconstruction type by insurance, race, and stage

	Reconstruction rate		Initial reconstruction type			<i>P</i> -Value
	Reconstruction rate [<i>n</i> (%)]	<i>P</i> -Value	No reconstruction [<i>n</i> (%)]	Tissue expander [<i>n</i> (%)]	Autologous tissue [<i>n</i> (%)]	
Insurance		0.04				0.04
Private	17 (68)		8 (32)	9 (36)	8 (32)	
Medicaid	132 (77.2)		39 (22.8)	77 (45)	55 (32.2)	
Medicare	3 (37.5)		5 (62.5)	2 (25)	1 (12.5)	
Other	10 (62.5)		6 (37.5)	2 (12.5)	8 (50)	
Race		0.03				0.07
Asian	42 (66.7)		21 (33.3)	22 (34.9)	20 (31.7)	
Black	36 (80)		9 (20)	16 (35.6)	20 (44.4)	
Hispanic	41 (89.1)		5 (10.9)	25 (54.3)	16 (34.8)	
Unknown	21 (65.6)		11 (34.4)	13 (40.6)	8 (25)	
White	22 (64.7)		12 (35.3)	15 (41.2)	8 (23.5)	
Stage		0.29				0.21
0	31 (86.1)		5 (13.9)	13 (36.1)	18 (50)	
1	33 (70.2)		14 (29.8)	17 (36.2)	16 (34)	
2	64 (70.3)		27 (29.7)	41 (45.1)	23 (25.3)	
3	34 (73.9)		12 (26.1)	19 (41.3)	15 (32.7)	

TABLE 3 Logistic regression: likelihood of reconstruction

	Adjusted odds ratios (<i>p</i> -value)
Insurance	
Private	Reference
Non-private	1.8 (0.23)
Race	
White	Reference
Asian	0.16 (0.46)
Black	1.1 (0.77)
Hispanic	3.4 (0.06)
Unknown	0.53 (0.32)
Stage	
0	Reference
1	0.41 (0.16)
2	0.32 (0.05)
3	0.37 (0.12)
CPM	
No CPM	Reference
CPM	1.06 (0.91)
Age	0.91 (<0.001)

CPM Contralateral prophylactic mastectomy

counseled by both breast surgeons and plastic surgeons in their native language, either in person or via telephone interpreting services.

TABLE 4 Complication rate by insurance, race, and stage

	Complication rate [<i>n</i> (%)]	<i>P</i> -Value
Insurance		
Private	1 (4)	0.67
Medicaid	19 (11.1)	
Medicare	1 (12.5)	
Other	1 (6.3)	
Race		
Asian	1 (1.6)	0.03
Black	6 (13.3)	
Hispanic	6 (13)	
Unknown	2 (6.3)	
White	7 (20.6)	
Stage		
0	5 (13.9)	0.82
1	4 (8.5)	
2	8 (8.8)	
3	5 (10.9)	

Furthermore, patients at BHC have access to one of 15 multilingual patient navigators, who receive specialized training and work with patients to anticipate and overcome barriers to care. Our patient navigators work in-person in the community and in the BHC breast oncology clinic, guiding patients to appointments; facilitating

TABLE 5 Logistic regression: likelihood of complications

	Adjusted odds ratio (<i>p</i> -value)
Insurance	
Private	Reference
Non-private	2.9 (0.32)
Race	
White	Reference
Asian	0.06 (0.01)
Black	0.33 (0.11)
Hispanic	0.34 (0.12)
Unknown	0.23 (0.11)
Initial reconstruction type	
None	Reference
TE	NS (0.99)
Autologous	NS (0.99)
Obesity	
BMI < 25	Reference
BMI ≥ 25	1.15 (0.8)
Smoking	
Non-smoker	Reference
History of smoking	1.7 (0.3)
Hypertension	
No hypertension	Reference
Hypertension	3.32 (0.03)
Diabetes	
No diabetes	Reference
Diabetes	1.03 (0.97)

TE Tissue expander, BMI body mass index

communication with their care team in Spanish, Mandarin, and Cantonese, as well as additional languages; and assist our patients with transportation, housing, and insurance barriers to ensure access to high-level care.²⁰ Patient navigation has been associated with increased rates of screening and faster time to diagnosis and treatment in minority cancer patients.^{21–24} However, some caution should be exercised in concluding that SNHs are able to eliminate racial disparities. Published data suggest that even at SNHs, racial disparities in cancer diagnosis and treatment may persist, attributable to a combination of patient factors such as travel burden, as well as existing hospital system and treatment factors.^{25–28}

In this study, Hispanic (54.3%) and White patients (41.2%) were more likely to receive tissue expanders, while African American patients (44.4%) were more likely to receive autologous reconstruction, although this difference did not reach statistical significance ($p = 0.07$). This pattern is similar to that reported in previous studies.^{13,15} Racial differences in receipt of type of reconstruction depend on a complex interaction of cultural and personal

factors,¹⁵ and it remains difficult to conclude to what degree these differences are a reflection of differing cultural preferences versus racial disparity.

In our patient population, complications occurred at a rate of 10%. Asian patients were least likely to experience complications compared with other race groups (AOR 0.062, $p = 0.01$), although it is important to note that Asian patients were less likely to receive reconstruction compared with other groups. Insurance type and type of reconstruction were not associated with an increased risk of surgical complications. Given that White patients were overall less likely to receive reconstruction in our population, the reason for this observed difference in complications is unclear. Published data suggest that many factors influence post-reconstruction complications, including patient factors, medical comorbidities, and surgical factors such as free flap choice and timing of reconstruction.²⁹

Our study had several limitations. Given the observational nature of this study, causal relationships could not be assessed. Second, we examined a relatively small sample size compared with analyses of regional or national registries of breast cancer patients. It is possible that given a larger sample size, racial differences in reconstruction rates or types of reconstruction might have reached significance. Additionally, qualitative data such as patient attitudes towards reconstruction, the nature of patient–surgeon interactions, and topics of counseling by surgeons were unavailable to us. Reconstructive decision making remains a complicated topic of study; the role of these cultural differences regarding breast reconstruction merit further investigation.

CONCLUSIONS

High-quality decisions about reconstruction are necessarily patient-centric.⁹ We believe the current data represent a valuable description of reconstruction trends in an underserved urban population, and suggest that in this healthcare system that regularly cares for minority patients, the rates of reconstruction do not differ among racial groups. However, systemic factors such as insurance coverage of reconstruction appear to be important determinants of reconstruction. Thus, in order to minimize healthcare disparities in already vulnerable populations, efforts should be made by healthcare providers to maximize patient access to resources such as patient navigation, preoperative plastic surgery counseling, interpretation services, and comprehensive insurance coverage.

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