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## Surgical outcomes in women $\geq 70$ years undergoing mastectomy with and without reconstruction for breast cancer

Simone Mays, MD, Hanan Alabdulkareem, MD<sup>\*</sup>, Paul Christos, D.Ph., Rache Simmons, MD, Tracy-Ann Moo, MD

New York Presbyterian Hospital, Weill Cornell Medicine, United States

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### ABSTRACT

**Background:** Approximately 4% of women age 70 will develop breast cancer during the next ten years. Reconstruction has become a standard option for young women undergoing mastectomy for breast cancer, however may not be offered to older women due to the presence of co-morbidities. There is limited data on the outcomes of mastectomy with reconstruction in patients  $\geq 70$ . This study examines comorbidities and 30-day complication rates in patients  $\geq 70$  undergoing mastectomy for breast cancer.

**Methods:** The American College of Surgeons National Surgery Quality Improvement Program database was used to examine co-morbidities and 30-day complication rates in breast cancer patients undergoing mastectomy from 2007 to 2012. Patients were grouped based on age and procedure. Complication rates were characterized using descriptive statistics and Wilcoxon rank sum-test. Variable frequencies were compared using Chi-square or Fisher's exact test.

**Results:** 54,821 patients underwent mastectomy. Among patients  $\geq 70$ , 11,927 did not have reconstruction, 109 had reconstruction. Among patients  $<70$ , 40,755 did not have reconstruction and 2040 had reconstruction. Patients without reconstruction had a significantly higher number of co-morbidities compared to those having reconstruction ( $P = 0.001$ ). The 30-day complication rate for patients without reconstruction was 4.2% in patients  $\geq 70$  compared to 4.4% for those  $<70$  ( $p = 0.4$ ). In patients with reconstruction, the 30-day complication rate was 6.4% in patients  $\geq 70$  compared to 5.6% for those  $<70$  ( $p = 0.7$ ).

**Conclusion:** There was no difference in 30-day complication rate between patients  $\geq 70$  and  $<70$  having mastectomy with and without reconstruction. Similar outcomes among women  $\geq 70$  years and younger patients undergoing reconstruction may reflect patient selection based on co-morbidities. With appropriate risk stratification, breast reconstruction may be a safe surgical option for women  $\geq 70$  year patients undergoing treatment for breast cancer.

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### 1. Introduction

Breast cancer is the most common cancer affecting women in the United States.<sup>1</sup> As the women over 70 year population continues to grow an increasing number of patients over the age of 70 will be diagnosed with breast cancer. Women who are 70 years old have an approximate 4% risk of developing breast cancer within the next 10 years.<sup>2</sup> Currently there are limited studies examining the surgical outcomes of women older than 70 year with breast cancer

undergoing mastectomy with and without reconstruction.

Mastectomy for breast cancer is a relatively low risk procedure with reported 30-day mortality rates of less than 1% and 30-day morbidity rates of approximately 6%.<sup>3</sup> Breast reconstruction has the potential to increase that risk given the prolonged operative time and increased complexity of the procedure, however, multiple studies have shown breast reconstruction to be a safe viable surgical option for breast cancer patients.<sup>4</sup> Additionally, those patients who do get reconstructed score higher on a self-reported questionnaire (SF-36) addressing health-related quality of life, body image, and physical functioning than age-matched general population patients and previously reported mastectomy-only patients.<sup>4</sup> Although breast reconstruction has become a standard surgical option for young breast cancer patients, the rate of breast

<sup>\*</sup> Corresponding author.

E-mail addresses: [hma2008@med.cornell.edu](mailto:hma2008@med.cornell.edu), [dr\\_surgery@hotmail.com](mailto:dr_surgery@hotmail.com) (H. Alabdulkareem).

reconstruction after mastectomy is lower in women over 70 years.<sup>5,6</sup> This may be explained by the greater number of comorbidities in this group of women.

There is, however, a subset of women over 70 years with breast cancer that pursue breast reconstruction and may not be at an increased risk of complications. The objective of this study is to examine the 30-day morbidity rate in women over 70 years undergoing mastectomy with and without reconstruction and to determine whether breast reconstruction increases the risk of postoperative complications in women over 70 years.

## 2. Methods

An analysis of the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) database was performed. ACS-NSQIP is an outcome-based database of morbidity and mortality during the 30-day postoperative period with over 400 hospitals participating throughout North America, Europe, and Australia.<sup>7,8</sup> Patients with a diagnosis of invasive breast cancer who underwent mastectomy were selected using the International Classification of Diseases, Ninth Revision (ICD-9) code and the American Medical Association Current Procedural Terminology (CPT) codes. Those patients were then grouped based on age,  $\geq 70$  and  $< 70$ . Patients were further subdivided into mastectomy with and without breast reconstruction. Complication rates were characterized using descriptive statistics and Wilcoxon rank sum-test. Variable frequencies were compared using Chi-square or Fisher's exact test with a statistically significant p-value set at  $< 0.05$ .

## 3. Results

The final study cohort consisted of 54,831 patients who underwent mastectomy for breast cancer. Of these, 12,036 were  $\geq 70$  years old and 42,795 were  $< 70$ . Among patients  $\geq 70$ , 11,927 did not have reconstruction and 109 underwent reconstruction. In the patients  $< 70$ , 40,755 had mastectomy alone while 2040 underwent reconstruction.

Patients  $\geq 70$  years old who underwent mastectomy alone had a significantly higher frequency of co-morbid conditions when compared to those  $< 70$  (Table 1). Individual complications varied among patients undergoing mastectomy alone (Table 3). Patients  $\geq 70$  had a significantly higher rate of serious complications such as cardiac arrest, myocardial infarction, CVA/stroke, and septic shock. Patients  $< 70$  had more wound related and bleeding complications. Among all patients having mastectomy alone, the 30-day complication rate was 4.2% for the  $\geq 70$  group and 4.4% for the  $< 70$  group (p-value 0.4).

**Table 1**  
Comparison of comorbidities among patients undergoing reconstruction.

Variable	$< 70$ years n = 2040	$\geq 70$ years n = 109	p-Value
Bleeding Disorder (%)	11 (0.5)	3 (2.9)	0.03
CVA/Stroke (%)	1 (0.05)	0	1.0
History of TIA (%)	10 (0.6)	3 (3.3)	0.025
Diabetes (%)	75 (3.7)	16 (14.7)	$< 0.0001$
Hypertension (%)	435 (21.3)	64 (58.7)	$< 0.0001$
Previous PCI (%)	9 (0.5)	4 (4.4)	0.003
Congestive Heart Failure (%)	1 (0.05)	0	1.0
History of COPD (%)	17 (0.8)	2 (1.8)	0.25
Steroid Use for Chronic Condition (%)	17 (0.8)	3 (2.8)	0.077

CVA cerebral vascular accident, TIA transient ischemic attack, PCI percutaneous coronary intervention, COPD chronic obstructive pulmonary disease.  
Comorbidities excluded (n = 0): History of myocardial infarction, history of revascularization for peripheral vascular disease.

**Table 2**  
Comparison of complications among patients undergoing reconstruction.

Variable	$< 70$ years n = 2040	$\geq 70$ years n = 109	p-Value
CVA/Stroke (%)	1 (0.05)	0	NS
Pneumonia (%)	3 (0.15)	1 (0.9)	NS
Renal Complication (%)	9 (0.45)	1 (0.9)	NS
Surgical site related complications (%)	73 (3.6)	4 (3.6)	NS
Bleeding Transfusions	34 (1.7)	1 (0.9)	NS
DVT/Thrombophlebitis (%)	5 (0.25)	1 (0.9)	NS
Pulmonary Embolism (%)	3 (0.15)	0	NS
Sepsis (%)	6 (0.3)	0	NS
30-day Complication Rate (%)	115 (5.6)	7 (6.4)	NS

CVA cerebral vascular accident, DVT deep venous thrombosis. NS not significant.  
Complications excluded (n = 0): Cardiac arrest, myocardial infarction, unplanned intubation, intraoperative transfusion, septic shock.

**Table 3**  
Comparison of complications among patients undergoing mastectomy alone.

Variable	$< 70$ years n = 40,755	$\geq 70$ years n = 11,927	p-Value
Cardiac Arrest (%)	11 (0.03)	13 (0.1)	0.0002
Myocardial Infarction (%)	12 (0.03)	19 (0.2)	$< 0.0001$
CVA/Stroke (%)	11 (0.03)	25 (0.2)	$< 0.0001$
Pneumonia (%)	46 (0.1)	36 (0.3)	$< 0.0001$
Acute Renal Failure (%)	13 (0.03)	7 (0.06)	0.18
Urinary Tract Infection (%)	129 (0.3)	97 (0.8)	$< 0.0001$
Unplanned Intubation (%)	33 (0.1)	27 (0.2)	$< 0.0001$
Wound Disruption (%)	205 (0.5)	37 (0.3)	0.0063
Organ/Space Surgical Site Infection (%)	206 (0.5)	42 (0.4)	0.0318
Deep Incisional Surgical Site Infection (%)	376 (0.9)	65 (0.6)	$< 0.0001$
Graft/Prosthesis/Flap Failure (%)	244 (0.6)	16 (0.1)	$< 0.0001$
Bleeding Transfusion (%)	459 (1.1)	105 (0.9)	0.02
Intraoperative Transfusion (%) <sup>a</sup>	138 (0.7)	16 (0.3)	0.0002
DVT/Thrombophlebitis (%)	85 (0.2)	39 (0.3)	0.0187
Pulmonary Embolism (%)	61 (0.2)	24 (0.2)	0.21
Septic Shock (%)	25 (0.06)	19 (0.2)	0.001
Sepsis (%)	184 (0.5)	58 (0.5)	0.61
30-day Complication Rate (%)	1779 (4.4)	500 (4.2)	0.42

CVA cerebral vascular accident, DVT deep venous thrombosis.

<sup>a</sup> Frequency missing 28,619.

In terms of co-morbid conditions among patients undergoing mastectomy alone, the incidences of all comorbidities examined were significantly higher in the  $> 70$  group ( $p < 0.0001$ ). In the other hand, comorbidities among patients who underwent breast reconstruction, those  $\geq 70$  years old had a higher frequency of bleeding disorder, diabetes, and hypertension compared to those  $< 70$ . In addition, patients  $\geq 70$  years old were more likely to have a history of TIA and PCI in comparison to those  $< 70$  (Table 2). With respect to complications among patients who underwent breast reconstruction, there was no difference in the frequency of the identified complications when comparing the  $\geq 70$  group to the  $< 70$  group. The overall complication rate in patients who underwent reconstruction was 6.4% for those  $\geq 70$  and 5.6% for those  $< 70$  (p-value 0.7).

Among patients  $\geq 70$ , those undergoing mastectomy alone had a significantly higher overall co-morbidity rate than those who underwent breast reconstruction (p-value 0.001). In spite of the higher co-morbidity rate, there was no significant difference in the 30-day complication rate between patients who did not undergo breast reconstruction and those who underwent breast reconstruction (Table 4).

## 4. Discussion

Breast reconstruction has become an important part of the

**Table 4**Overall morbidity rate and 30-day complication rate for patients'  $\geq 70$  years old.

Variable	Without reconstruction n = 11,927	With reconstruction n = 109	p-Value
Overall Morbidity Rate (%)	8920 (74.9)	67 (61.5)	0.0014
30-day Complication Rate (%)	500 (4.2)	7 (6.4)	0.22

treatment of breast cancer. Improved cosmetic results are desired by both young and older breast cancer patients. We examined comorbid conditions and 30-day complication rates in patients undergoing mastectomy for breast cancer with and without reconstruction. We found that patients'  $\geq 70$  who underwent breast reconstruction did not have an increased 30-day complication rate in comparison to their counterparts who underwent mastectomy alone. An explanation for this finding is that patients'  $\geq 70$  undergoing reconstructions were less likely to have serious co-morbid conditions compared to those not having reconstruction. Women over 70 years undergoing breast reconstruction, in spite of having a higher co-morbidity rate when compared to their  $< 70$  counterparts had similar outcomes to younger patients undergoing reconstruction. The comparable surgical complication rate between women over 70 years and younger breast cancer patients found in our study corroborates the findings of Selber et al. who looked at the complication rates following breast reconstruction in women age less than 65 years compared to women age 65 years and over and found no difference in the medical or surgical complication rates.<sup>9</sup> Furthermore, this study found that the older patients had higher ASA grades, a higher prevalence of hypertension and a higher average body mass index (BMI) than women in the younger group which did not translate into higher complication rates in the older patients. Chang and colleagues stratified patients undergoing free-flap procedures into four age groups:  $< 50$ , 50–59, 60–69, and  $\geq 70$  years old.<sup>10</sup> They found no significant differences between the four groups in rates of surgical complications, flap loss or length of stay.

Studies have shown that age alone is an independent risk factor for less than optimal treatment for breast cancer.<sup>11,12</sup> The results of the National Mastectomy and Breast Reconstruction Audit demonstrated that older women are far less likely to be offered reconstruction than their younger counterparts.<sup>13</sup> Poor adherence to standard cancer management reflects the lack of level 1 evidence regarding optimal treatments for women over 70 years.<sup>14</sup> Our study, in conjunction with other studies, has shown women over 70 years are not at an increased risk of poor surgical outcomes in comparison to women  $< 70$  years when risk stratified according to co-morbid conditions.

A limitation of the data set used for this study is the relatively small number of women over 70 years that underwent reconstruction. There is also an inherent selection bias as patients with comorbidities may be dissuaded from seeking reconstruction by their surgeon.

## 5. Conclusion

Patients  $\geq 70$  who underwent mastectomy with breast reconstruction did not have an increased risk of postoperative complications. This may reflect the lower co-morbidity rate among patients  $\geq 70$  undergoing reconstruction compared to those not

undergoing reconstruction. Women over 70 years had a similar outcome when compared to women  $< 70$  years irrespective of whether or not breast reconstruction was performed. These data can be used to appropriately counsel women over 70 years with breast cancer regarding the risks and benefits of breast reconstruction. When women over 70 years are selected appropriately according to their co-morbid conditions their outcomes following breast reconstruction are comparable to younger group of patients.

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