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ORIGINAL ARTICLE – BREAST ONCOLOGY

Are Mastectomies on the Rise? A 13-Year Trend Analysis of the Selection of Mastectomy Versus Breast Conservation Therapy in 5865 Patients

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ABSTRACT

Background. The equivalency of survival between mastectomy and breast conservation therapy (BCT) has long been established, resulting in two decades of predominant BCT. Recently, surgeons have recognized a trend toward increasing mastectomy. Institutional trends of mastectomy and BCT were reviewed, confirming this perception in the surgical treatment of breast cancer. This report evaluates the factors that influence patient decisions to choose surgical therapies.

Methods. Patients who underwent mastectomy or BCT for invasive and in situ breast cancer were identified upon retrospective review of a prospectively accrued breast cancer database between 1994 and 2007. Univariate and multivariate logistic regression analysis were used to estimate the odds ratio (OR) of the association between mastectomy and patients' clinicopathologic characteristics.

Results. Of the 5,865 patients, 3,736 underwent BCT and 2,129 underwent mastectomy. The overall surgical volume decreased during the study period. Mastectomy rates during the periods of 1994–1998, 1999–2003, and 2004–2007 were 33%, 33%, and 44%, respectively ($P < 0.01$). Immediate reconstruction rates decreased during the same time periods from 16%, 5%, and 7%, respectively ($P < 0.01$). On logistic regression analysis, gender, age < 40 years, increase tumor size, and lymphovascular invasion were significant independent predictors of mastectomy. The mastectomy rate increased during the period 1999–2003 (OR 1.2) and during 2004–2007(OR 1.8).

Conclusions. The perception of an increasing choice toward mastectomy has been confirmed at this institution. Possible reasons are younger population with higher lifetime risk, higher stage disease, and more biologically aggressive or diffuse tumors. Patient preference, fear of genetic or recurrence risk, and "intangible" factors seem to shift decisions toward mastectomy.

At the end of the nineteenth century, William Halsted developed the Halsted Radical Mastectomy. Removal of the breast, pectoral muscles, and axillary lymph nodes, was effective, but left a physical and cosmetic defect.[1] Since that era, the detection and treatment of breast cancer has steadily improved and become less invasive, with modified radical mastectomy replacing radical mastectomy and breast conservation replacing the need for mastectomy for most patients. Nodal staging during the last decade has been supplanted by the sentinel node technology.

Breast conservation therapy (BCT) with radiation is equivalent treatment to mastectomy. Numerous randomized, prospective trials with long-term follow-up have examined the effect on overall survival and disease-free survival.[2–6] Despite a slightly higher local recurrence rate amongst those undergoing BCT, there is no statistical difference in overall survival. The most notable of these studies, NSABP-06, has recently published a 20-year follow-up, which shows an overall survival of 46% and 47% for BCT and mastectomy, respectively. Twenty-year local recurrence was 8.8% and 2.3%, respectively.[2] These findings have led to the use of BCT for the majority of patients treated at major centers worldwide during the past two decades.

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Recently, however, surgeons have recognized a trend toward increasing mastectomy. Many have hypothesized reasons for this change, i.e., the increased detection of real and supposed lesions on MRI, genetic testing, and the increased patient demand for surgeries, such as contralateral prophylactic mastectomy with immediate reconstruction.[7–15] Despite the hypothetical explanations for this perceived trend, demonstration of this trend has yet to be published.

In this study, trends in mastectomy and BCT at a high-volume comprehensive cancer center during a 13-year period were reviewed, confirming this perception in the surgical treatment of breast cancer. This report attempts to evaluate the factors that influence patient decisions to choose surgical therapies.

METHODS

An institutional review board (IRB)-approved Health Insurance Portability and Accountability Act (HIPAA)-compliant breast cancer database and electronic health record (IRB No. 102554) was searched under separate IRB approval (IRB# 106282) for patients who underwent mastectomy or BCT for invasive and in situ breast cancer between the years 1994 and 2007 at the Moffitt Cancer Center (MCC). Patient's demographic, clinical, and treatment variables were recorded, including date of treatment, age at time of treatment, race, sex, cancer laterality, clinical staging, type of surgery, surgeon performing surgery, and type of reconstruction. Clinicopathologic factors also were recorded, including tumor malignancy type, total tumor size, nodal status, metastatic status, tumor grade, margin status, and lymphovascular invasion.

Our major end point was the difference between mastectomy and lumpectomy rates. Our criteria for recommending mastectomy versus lumpectomy included: multifocal or multicentric tumors that involve more than one quadrant of the breast, inflammatory carcinoma, tumors that are large enough in comparison to the size of the breast that partial mastectomy would leave a cosmetically unacceptable defect, Paget's disease and subareolar tumors or tumors involving the nipple if the patient is unwilling to undergo central lumpectomy, tumor in a patient who is medically unable or unwilling to undergo radiation. If none of these criteria are met, the patient may elect either treatment, depending on their preference.

Statistical analysis was performed by Wilcoxon rank-sum test, χ^2 test, and t test, and ANOVA when appropriate. Age was treated as a categorical variable and five age groups were identified: < 40 years, 40–49 years, 50–59 years, 60–69 years, and ≥ 70 years. Postmenopausal women were defined as age 55 years and older. Staging was done using the American Joint Committee on Cancer classification system. Univariate and multivariate logistic regression analysis were used to estimate the association between demographic and clinicopathologic variables and choice of primary surgical therapy for breast cancer (mastectomy or BCS). Predictive factors with $P < 0.1$ in the univariate analyses were included in the multivariate analysis. A two-tailed $P < 0.05$ was considered statistically significant. All statistical analysis was performed using *Stata 9* (*StataCorp*, College Station, TX).

RESULTS

During the study period from 1994 to 2007, 5865 patients underwent breast cancer surgery at our institution for invasive breast cancer or in situ disease. Of the 5,865 patients, 3,736 (63.7%) underwent BCT and 2,129 (36.3%) underwent mastectomy. The majority of patients were women and white. Median age at time of surgery was 57 years. Median tumor size was 1.5 cm. The most common histologic subtype was invasive ductal carcinoma. These variables did not change significantly over time (Table 1).

Overall surgical volume increased during the 13-year study period. After an initial steep increase, surgical volume decreased somewhat from a high of 587 cases per year (2002) to 416 cases per year in 2007 (Fig. 1). Number of mastectomies per year slowly increased during the study period (Fig. 2). Number of lumpectomies (BCT) initially increased dramatically and then decreased in 2007 (Table 2; Fig. 3). The rate of mastectomy compared with total surgical volume initially decreased, and then increased dramatically to a high of 64% in 2007. The BCT rate demonstrated a mirror-image trend with an initial rate increase and then decreased steeply to a low of 36% in 2007 (Fig. 4).

Mastectomy rates during the periods of 1994–1998, 1999–2003, and 2004–2007 were 33%, 33%, and 44%, respectively ($P < 0.01$). Immediate reconstruction rates during the same time periods were 16%, 5%, and 7% respectively ($P < 0.01$) (Table 1).

On logistic regression analysis, sex, age < 40 years, increase tumor size, and lymphovascular invasion were significant independent predictors of mastectomy. Using the period of 1994–1998 as the reference group, the mastectomy rate increased greatly from 1999 to 2003 (OR 1.2) and from 2004 to 2007 (OR 1.8; Table 4).

DISCUSSION

In this large series of patients who underwent surgical breast cancer treatment during the last 13 years, the perceived increase in the rate of mastectomy has been

TABLE 1 Clinicopathologic characteristics among 5,865 patients with breast cancer

	N (%)
Surgical procedure	
Breast conservation	3,736 (64)
Mastectomy	2,129 (36)
Sex	
Female	5,833 (99)
Male	32 (1)
Age (mean, years)	57.9 (SD ± 12.8)
Menopausal (years)	
<55	2,529 (43)
≥55	3,336 (57)
Age group (years)	
<30	42 (1)
30–39	418 (7)
40–49	1,248 (21)
50–59	1,641 (28)
60–69	1,339 (23)
70–79	917 (16)
>80	260 (4)
Race	
White	5,152 (88)
Black	245 (4)
Asian	63 (1)
Hispanic	298 (5)
Other	81 (1)
Unknown	26 (1)
Size (mean, cm)	1.84 (SD ± 1.69)
Size group (cm)	
≤2	4,102 (70)
2–5	1,463 (25)
>5	229 (4)
Unknown	71 (1)
Histology (%)	
DCIS	1,163 (20)
LCIS	73 (1)
ILC	442 (8)
IDC	3,630 (62)
Other	557 (9)
Lymphovascular invasion (%)	
Present	1,822 (31)
Absent	3,687 (63)
Unknown	356 (6)
Stage	
0	1,309 (22)
I	2,048 (35)
II	1,865 (32)
III	472 (8)
IV	52 (1)
Unknown	119 (2)
N stage	
Nx	40 (1)
N0	3,989 (68)
N1	1,463 (25)
N2	153 (3)
N3	101 (1)
Unknown	119 (2)
Procedures per year	
1994–1998	1,457 (25)
1999–2003	2,632 (45)
2004–2007	1,776 (30)
Reconstruction	
Yes	492 (8)
No	5,373 (92)

DCIS ductal carcinoma in situ; *LCIS* lobular carcinoma in situ; *ILC* invasive lobular carcinoma; *IDC* invasive ductal carcinoma

confirmed with respect to BCT and overall surgical volume. Although overall surgical volume and BCT initially increased dramatically, they both began to decrease after 2002. Conversely, mastectomy rates slowly, but consistently, increased during the study period.

Several factors were strong predictors of mastectomy, suggesting that they influence the trend of increased mastectomy rates. First, women younger than aged 40 years were much more likely to choose mastectomy. This finding has been confirmed in several other studies. Hiotis et al. reported their results of a study of women who underwent breast cancer surgery in Los Angeles county. In this study, they found that women younger than aged 40 years were less likely to choose BCT than those aged 40–60 years (46.7% versus 49.3% respectively).[16] However, in a retrospective analysis of a multi-institutional prospective study that included >4,000 patients, Chagpar et al. found that women aged 55 years and older chose mastectomy 34% of the time versus those younger than aged 55 years who chose mastectomy 29.3% of the time.[17] This difference may be attributable to patient population, geography, or difference in reference age (40 versus 55 years).

One factor that contributed to this difference in age-based preference may be the increased risk of local recurrence after BCT in younger women. At 5-year follow-up, patients younger than aged 40 years were found to be at increased risk of local recurrence, with a recurrence rate of 24% for women younger than aged 40 years versus a rate of only 6% in those aged 40 years or older.[18] These findings are supported by a study of patients younger than aged 35 years who were treated by lumpectomy. These patients had a 10-year local recurrence rate of 46% compared with 27% in those treated by mastectomy.[12]

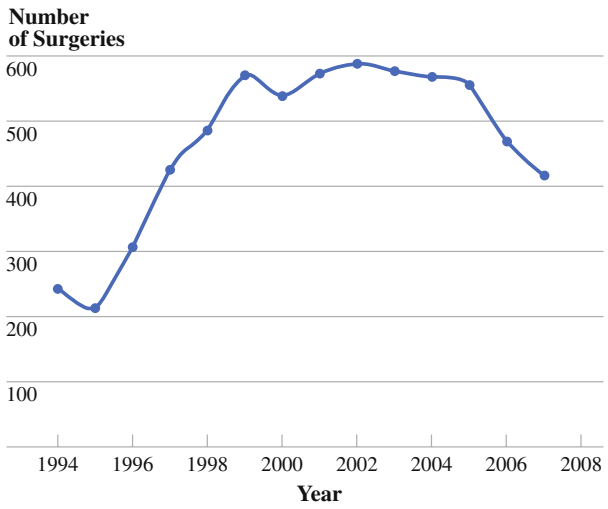

FIG. 1 Overall surgical volume, 1994–2007

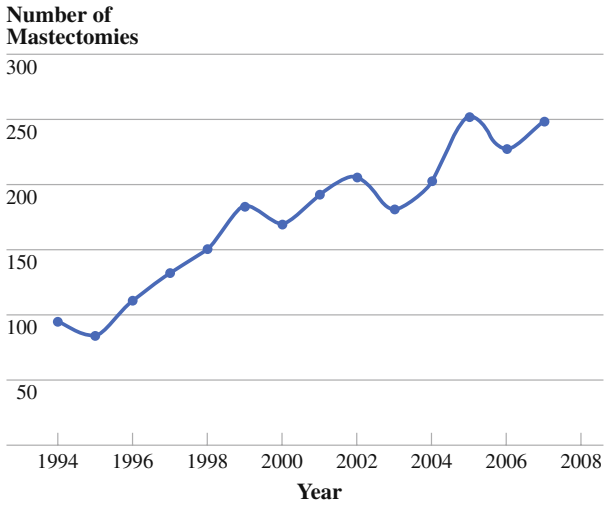

FIG. 2 Number of mastectomies, 1994–2007

TABLE 2 Number of lumpectomies and mastectomies, 1994–2007

Year	Lumpectomy	Mastectomy	Total
1994	148 (61.2%)	94 (38.8%)	242
1995	131 (60.9%)	84 (39.1%)	215
1996	196 (63.8%)	111 (36.2%)	307
1997	293 (68.9%)	132 (31.1%)	425
1998	334 (69.0%)	150 (31.0%)	484
1999	387 (67.9%)	183 (32.1%)	570
2000	368 (68.5%)	169 (31.5%)	537
2001	382 (66.7%)	191 (33.3%)	573
2002	382 (65.1%)	205 (34.9%)	587
2003	396 (68.8%)	180 (31.2%)	576
2004	366 (64.6%)	201 (35.4%)	567
2005	306 (54.9%)	251 (45.1%)	557
2006	241 (51.5%)	227 (48.5%)	468
2007	168 (40.4%)	248 (59.6%)	416

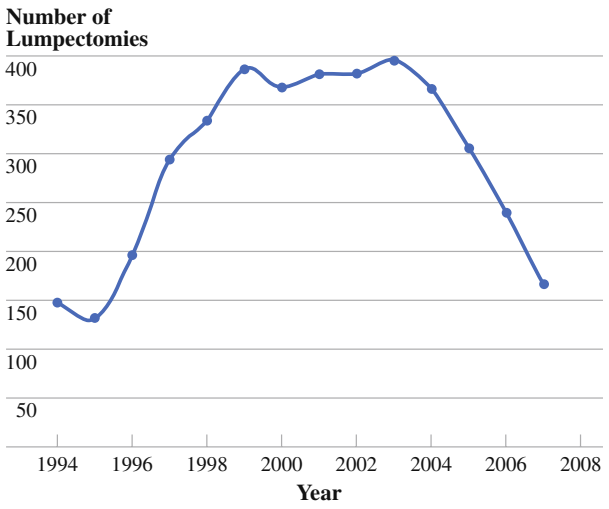

FIG. 3 Number of lumpectomies, 1994–2007

At 20 years, these differences can still be seen, with a local recurrence rate of 36% in women younger than aged 40 years at diagnosis who underwent BCT versus a 12% recurrence rate in those who underwent mastectomy.[6] In a 2005 consensus conference in Milan, Schwartz et al. noted the younger the patient, the greater the likelihood of a local recurrence after BCT.[19] Younger age at diagnosis also has been associated with a higher likelihood of association with a BRCA mutation. BRCA-positive patients typically choose mastectomy compared with BCT due to the greater likelihood of recurrence with a genetic mutation.[12,20]

In fact, many women choose mastectomy because of the fear of recurrence. In a study of women's choice of therapy by Fancher et al., many women reported a feeling of relief because of their belief that their risk of recurrence was

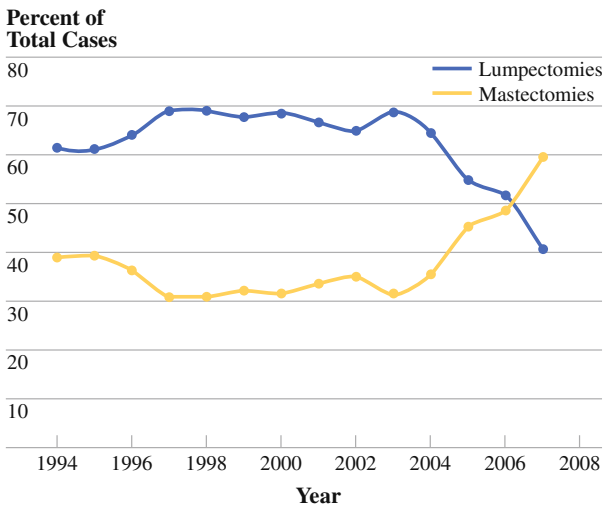

FIG. 4 Rate of mastectomy versus lumpectomy compared with overall surgical volume, 1994–2007

TABLE 3 Clinicopathologic characteristics according to surgical procedure in breast cancer

	Breast conservation *N* (%)	Mastectomy *N* (%)	Odds ratio (95% CI)	*P* value
Sex				
Female	3,733 (99)	2,100 (98)	1.0	<0.001
Male	3 (1)	29 (2)	17.1 (5.2–56.5)	
Race				
White	3,233 (90)	1,829 (86)	1.0	<0.01
African-American	146 (4)	99 (5)	1.2 (0.9–1.6)	
Hispanic	165 (4)	133 (6)	1.5 (1.2–1.9)	
Other	84 (2)	60 (3)	1.3 (0.9–1.8)	
Menopausal status (years)				
<55	1,487 (40)	1,042 (49)	1.0	<0.001
≥55	2,249 (60)	1,087 (51)	0.7 (0.6–0.8)	
Age group (years)				
<40	224 (6)	236 (11)	1.0	<0.001
40–59	1,818 (49)	1,071 (50)	0.6 (0.5–0.7)	
60–79	1,539 (41)	717 (34)	0.4 (0.3–0.5)	
≥80	155 (4)	105 (5)	0.6 (0.5–0.9)	
Year of surgery				
1994–1998	977 (26)	477 (22)	1.0	<0.001
1999–2003	1,763 (47)	868 (41)	1.0 (0.9–1.1)	
2004–2007	988 (27)	780 (37)	1.6 (1.4–1.9)	
Size (cm)				
≤2	2,875 (78)	1,227 (58)	1.0	<0.001
2–5	778 (21)	685 (33)	2.1 (1.8–2.3)	
>5	47 (1)	182 (9)	9.1 (6.5–12.6)	
Histology				
DCIS	778 (24)	385 (20)	1.0	<0.001
IDC	2,273 (69)	1,357 (70)	1.2 (1.1–1.4)	
ILC	239 (7)	203 (10)	1.7 (1.4–2.1)	
Lymphovascular invasion				
Absent	2,624 (74)	1,063 (54)	1.0	<0.001
Present	925 (26)	897 (46)	2.4 (2.1–2.7)	
Stage				
0	860 (23)	449 (22)	1.0	<0.001
I	1,558 (42)	490 (24)	0.6 (0.5–07)	
II	1,119 (30)	746 (36)	1.3 (1.1–1.5)	
III	141 (4)	331 (16)	4.5 (3.6–5.6)	
IV	13 (1)	39 (2)	5.7 (3–10.8)	
Lymph node status				
N0	2,818 (77)	1,171 (58)	1.0	<0.001
N1	777 (21)	686 (34)	2.1 (1.9–2.4)	
N2	54 (1)	99 (5)	4.4 (3.1–6.1)	
N3	33 (1)	68 (3)	4.9 (3.2–7.6)	
Distant metastasis				
Absent	3,680 (99)	2,020 (98)	1.0	<0.001
Present	13 (1)	40 (2)	5.6 (2.9–10.5)	

minimized after mastectomy.[21] Fear of recurrence was noted as one of the major reasons for choosing mastectomy in a study by Tate et al.[22] The results of quality-of-life surveys have shown that women who underwent BCT experience little change in quality of life over time, whereas women who underwent a mastectomy experienced

TABLE 4 Multivariate analysis of preoperative clinicopathologic predictors of mastectomy

	Odds ratio	95% CI	*P* value
Sex			
Female	1.0		
Male	56	7.8–421.7	<0.01
Race			
White	1.0		
African-American	0.9	0.6–1.2	0.31
Hispanic	1.2	0.9–1.6	0.18
Other	1.2	0.8–1.8	0.37
Age group (years)			
<40	1.0		
40–59	0.6	0.5–0.7	<0.01
60–79	0.6	0.5–0.8	<0.01
≥80	0.9	0.7–1.4	0.86
Year of surgery			
1994–1998	1.0		
1999–2003	1.2	1.1–1.5	<0.01
2004–2007	1.8	1.5–2.1	<0.01
Size (cm)			
≤2	1.0		
2–5	1.7	1.5–2.0	<0.01
>5	8.6	5.9–12.5	<0.01
Histology			
DCIS	1.0		
IDC	1.2	0.9–1.5	0.29
ILC	0.9	0.8–1.1	0.23
Lymphovascular invasion			
Absent	1.0		
Present	1.9	1.7–2.2	<0.01

DCIS ductal carcinoma in situ; *LCIS* lobular carcinoma in situ; *ILC* invasive lobular carcinoma; *IDC* invasive ductal carcinoma

a marginally better quality of life over time. This difference can be attributed to a greater feeling of security and decreased fear of recurrence over time in the mastectomy group.[23]

The current study demonstrated that increased tumor size was significantly associated with mastectomy. Hiotis et al. noted that patients with tumors ≤2 cm had breast conservation rates of 58% compared with 35% for tumors between 2 and 5 cm and 11% for tumors >5 cm. They also found that patients with local disease were much more likely to have BCT (50%) than patients with regional disease (16%).[16] In a similar manner to younger age, this correlation is likely related to the greater risk of local recurrence after BCT with larger tumors. In a study by van Dongen et al., including patients with T1 and T2 tumors, the BCT group had almost double the risk of locoregional recurrence compared with the mastectomy group (20% versus 12%, respectively).[24] However, the Milan consensus conference noted that tumors to 5 cm have been successfully treated by BCT in both randomized trials and retrospective studies.[19] Not only tumor size but also tumor multicentricity/multifocality leads to an increased risk of recurrence, which can preclude BCT. In a study by McCahill et al., 18 of 55 patients had multifocal or multicentric disease, which contraindicated BCT and thus led to mastectomy.[20]

The current study demonstrated that lymphovascular invasion (LVI) had a significant impact on mastectomy rate. LVI denotes a more aggressive or diffuse tumor type, which would likely correlate with BCT failure. Lobular histology has long been held as a more diffuse tumor type, less amenable to local control with BCT. The results of the study by Chagpar et al. showed that patients with a lobular histology were much more likely to undergo mastectomy than those with a ductal subtype (43.4% versus 31.1%, respectively).[17] Many studies have confirmed the notion that invasive lobular carcinoma is much more frequently associated with positive margins after lumpectomy than invasive ductal carcinoma. Rates of margin involvement for invasive lobular range from 17.5% to 59% versus 6.9% to 43% for invasive ductal.[25–27] LVI also is associated with lymph node involvement/regional disease. Many patients with regional or distant lymph node metastasis choose mastectomy as their surgical therapy. A recent report noted that patients with all lymph nodes negative for metastatic disease underwent BCT 55% of the time, whereas patients with regional and distant lymph node metastasis underwent BCT 32% and 36% of the time, respectively.[16]

Other than the above-noted associations of the current study, there are numerous other factors that could be associated with an increase in mastectomy rates. One of the factors most frequently noted in recent literature to change surgical treatment from BCT to mastectomy is the use of MRI. Numerous studies, including one from this institution, have shown a change in surgical management based on MRI findings, including changing therapy from lumpectomy to mastectomy. Several studies performed during the last decade have found a significant change in surgical management based on MRI findings. The percentage of patients and surgeons changing surgical treatment after an MRI varied between 6.5% and 48% (Table 5).[7–10,29,37,38] A study performed at our own institution found that 13.2% of patients changed their surgical management based on MRI findings.[28] The most commonly noted findings that lead to a change in management from BCT to mastectomy were multifocal and multicentric cancer. Also noted were larger lesions, contralateral foci, and pectoral muscle infiltration.[7,11,29,30]

Based on this institution's previous study, frequent use of MRI at MCC began in approximately 2002. At that time, approximately 10–20% of patients received MRI. The

TABLE 5 Studies evaluating MRI findings and surgical choice

	Year	*n*	% Change in surgical treatment based on MRI
Crowe et al.[37]	2009	327	11
Mameri et al.[7]	2008	99	26.8
Bilimoria et al.[9]	2007	155	6.45
Pediconi et al.[29]	2007	164	19.5
Bagley et al.[8]	2004	27	48
Bedrosian et al.[10]	2003	267	16.5
Gatzemeier et al.[38]	1999	125	14.3

criteria for performing MRI at our institution include dense breasts, multiple densities seen on mammogram, patients with infiltrating lobular carcinoma, and patients who were believed to be at an increased risk (genetic predisposition or strong family history, previous history of breast cancer).[28] A total of 3,278 patients underwent breast cancer surgery during or after 2002 at MCC. If 10–20% of these patients underwent MRI and approximately 14% of those who had MRI changed their surgical management based on MRI findings, then only between 46 and 92 patients would have any change in management based on MRI. We are currently reviewing our MRI data for this time period to confirm these calculations; however, this certainly does not account for the dramatic increase of the mastectomy rate seen in the current study.

Some hypothesize that surgeon's preference guides surgical treatment. No correlation was found in the current study between the individual surgeon performing procedures and the proportion of BCT versus mastectomy. However, all MCC surgeons were trained surgical oncologists or breast surgical oncologists working at the same institution. Other studies have found more surgeon influence on therapeutic choice. Fancher et al.'s survey of 680 patients who underwent mastectomy found that a surgeon's recommendation was a primary influencing factor on the women's treatment choice.[21] It was noted in the study by Hiotis et al. that patients who were treated by a surgical oncologist were more likely to undergo BCT (59%) than those who were not (46%). Conversely, patients treated at an NCI designated cancer center were less likely to undergo BCT (40%) than those treated at nonspecialized hospitals (48%).[16] However, this difference is likely explained by a more advanced stage of disease seen at specialty centers [32,33] and not reflected in the data presented in this review from the MCC, an NCI designated cancer center. Katz et al. found mastectomy rates of 27% in women who reported that they made the treatment decision compared with 16.8% who described a joint decision with their surgeon and 5.3% in patients who stated that their surgeon made their decision.[33]

Of course, the most important part of the decision-making process is the often difficult to quantify aspect of patient choice. Several factors may influence patient choice, including those mentioned earlier, i.e., fear of recurrence and surgeon preference. The availability of high-quality reconstructive surgery may sway patients to consider mastectomy over BCT. However, studies on outcomes of reconstructive surgery are mixed. Some studies have found an overall (75%) satisfaction with treatment and reconstruction choices, whereas others have questioned the long-term effect of reconstruction on body image and quality of life.[21] Rowland et al. noted in their survey of breast cancer survivors 1 to 5 years after diagnosis who had undergone lumpectomy, mastectomy alone, or mastectomy with reconstruction that the benefit to body image of reconstruction for women who had undergone mastectomy was less than expected. The groups did not differ in emotional, social, or role function. Beyond the first year after diagnosis, a woman's quality of life is more likely influenced by her age or exposure to adjuvant therapy than by her breast surgery.[34] Our study has shown a counterintuitive decrease in the rate of immediate reconstruction after mastectomy during the study period. It is likely that this is due to a more conservative approach to reconstruction in recent years at our institution, resulting in more delayed reconstruction with autologous tissue transfer, rather than immediate tissue expander or implant reconstruction.

Fear of radiation or inability to be compliant with the whole breast irradiation schedule (typically 5 days per week during 6 weeks) also may affect a patient's decision regarding surgical therapy. A study by Tate et al. noted patient choice as the main reason for their high mastectomy rate (90%). The most commonly cited reasons for choosing mastectomy were patients' fear of radiation (63%), the whole breast irradiation schedule (44%), and, as noted earlier, fear of recurrence.[22] This is likely due to a misperception within the patient population that BCT and radiation somehow lead to a higher recurrence rate, which we know to be untrue.[2]

Li et al. noted that the indigent population is less likely to comply with postoperative radiotherapy (independent of insurance status).[35] This finding brings into question the effect of race and socioeconomic status (SES). The current study found no statistically significant difference in therapeutic choice based on race. However, irrespective of race, the currently reported patient population tends to be of a more homogenous SES. When examining a more heterogeneous population, non-Hispanic white patients were most likely to undergo BCT (51%) compared with black patients (43%), Hispanic patients (39.8%), and Asian or others (32.7%). BCT rates also decreased with decreasing SES. A 55% BCT rate was found amongst patients within

the highest SES, as opposed to a 35% BCT rate amongst those in the lowest SES.[16] Regional difference also may affect choice of surgery. A query of the SEER database found that BCT rates were highest in Connecticut (56%), followed closely by Seattle-Puget Sound. Iowa had the lowest BCT rates at 27%.[36] Whether this represents a difference of SES or simply a regional variance in therapy on our nation's coasts versus the Midwest region is unclear. The highest rate of BCT noted in the current study was approximately 69%, which would echo the greater likelihood of BCT choice based on coastal location.

CONCLUSIONS

It is clear from this review of a single institutional experience during the last 13 years that the tide is changing in regards to the surgical management of breast cancer. The push toward BCT after establishing its equivalency in overall survival led to great popularity during the late 1990s and early 2000s. However, it seems that younger patients and patients with larger, more aggressive tumors are more frequently choosing mastectomy as their treatment of choice. There may be numerous other reasons for this change in the preferred management of breast cancer. Imaging techniques, such as MRI, surgeon preference, and patient preference, whether due to popular media, socioeconomic, or regional differences, also may contribute to this dramatic change in surgical therapy.

One clearly influential part of the decision-making process is the peer-to-peer interaction of patients. Since 1984, the author's foundation, FACTORS (Fighting Against Cancer Together), a Florida regional-based breast cancer support group, established for the first time peer consultations in an organized fashion. Parenthetically, its development was for the purpose of educating the population about the relative benefits of BCT, which, at the time, was practiced less than 20% of the time in the state of Florida. Indeed, this may now be one reason why many women are choosing mastectomy. There are now enough women in the population who have had BCT and can voice their positive and negative feelings about that choice to their current peers who are trying to make informed decisions. The newly diagnosed patient can now learn from a peer group that BCT has excellent survival and low recurrence rates but that when there is a recurrence the reconstructive options often involve major rotational or free flaps and extensive surgery with possible scaring. Long-term, they learn that radiation can result in a reduction in breast size and often unremitting costochondral chest wall discomfort. Despite the fact that this information may lack validity in medical literature and practice, patients often are more swayed by peer opinion than by physician input. Also, they can see the results and how it looks long-term from patients who privately demonstrate their results to patients who are trying to make a decision. These peer-to-peer interactions extend to internet chat rooms that are replete with current and informed advice from patients who have experienced the benefits and the ravages of the disease and its treatments. These interactions are neither trivial nor for that matter easily measurable in their effect yet the data presented in this study demonstrate the huge effect that it has had on the decisions of women from the early 1980s to the recent turn of the century in choosing BCT over mastectomy. There is an ever-changing social dynamic that flows in through the network of women in making these crucial and informed decisions about their care, their appearance, and their lives. Further study is required to follow this trend and elucidate more clearly the numerous reasons that may lay behind the change.

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