

Analysis of Satisfaction and Well-Being following Breast Reduction Using a Validated Survey Instrument: The BREAST-Q

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Background: Breast reduction surgery has been proven in the literature to have a high rate of patient satisfaction, with improvement in quality of life. However, few studies have used validated survey instruments. The BREAST-Q is the only questionnaire to evaluate breast reduction that meets international and federal standards for questionnaire development. Therefore, the aim of this study was to implement this survey to analyze patient-reported satisfaction and quality of life following breast reduction.

Methods: All patients seen in consultation for breast reduction between January of 2008 and May of 2009 were asked to fill out BREAST-Q surveys anonymously, both preoperatively and 6 weeks postoperatively. Statistical analysis was performed and a value of $p < 0.05$ was considered significant.

Results: Forty-nine patients underwent breast reduction performed by a single surgeon (A.T.) during the study period. Of these patients, 38 (78 percent) completed the prerelation survey and 38 (78 percent) completed the post-reduction survey. Statistically significant improvements were observed in satisfaction with breast appearance, psychosocial well-being, sexual well-being, and physical well-being. Satisfaction with overall outcomes most strongly correlated to satisfaction with breast appearance.

Conclusions: As the implementation of evidence-based medicine continues to grow in everyday practice, there is increasing pressure to use validated survey instruments to demonstrate patient-reported outcomes. In this study, we have shown that breast reduction significantly improves satisfaction with breast appearance and psychosocial, sexual, and physical well-being, and that overall patient satisfaction is most strongly correlated with satisfaction in appearance of their breasts (*Plast. Reconstr. Surg.* 132: 285, 2013.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

Breast reduction surgery is a popular procedure usually performed to decrease the symptoms of macromastia. There were over 83,000 operations performed in 2010, a 6 percent increase since 2009.¹ Symptoms of macromastia improved by breast reduction include intertriginous infections, back and shoulder pain, shoulder notching, physical inactivity, dissatisfaction with breast appearance, poor sexual well-being, and poor psychosocial well-being.²⁻⁸

Patients are very satisfied following breast reduction.^{2,9} However, dissatisfaction in a small

percentage of patients has also been noted.⁹ Dissatisfaction was correlated to two assessed variables: age younger than 40 years and postoperative soft-tissue necrosis.⁹ Surprisingly, surgeon experience was not found to correlate with satisfaction.⁹

Although a high degree of satisfaction and improvement in quality of life have been reported previously in the literature, few studies have used reliable and validated survey instruments. The BREAST-Q is the only questionnaire to assess breast reduction outcomes that meets international and federal standards for questionnaire development while measuring a variety of outcomes, including

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satisfaction with breasts and overall outcome, psychosocial well-being, sexual well-being, physical well-being, and satisfaction with care.^{10,11} Therefore, the aim of this study was twofold: first, to use the BREAST-Q survey to analyze patient satisfaction and quality-of-life improvement after breast reduction by comparing preoperative and postoperative surveys; and second, to determine whether overall satisfaction correlated with any other category included in the postoperative survey.

PATIENTS AND METHODS

With approval from the Institutional Review Board at Wexner Medical Center at The Ohio State University, all patients who were seen in consultation for breast reduction surgery between January of 2008 and May of 2009 performed by the senior author (A.T.) were asked to fill out BREAST-Q surveys prospectively for both the preoperative and postoperative periods. Questionnaires were filled out in an anonymous fashion. Preoperative surveys were completed during the initial consultation, and postoperative surveys were completed at the 6-week postoperative visit. This was a cross-sectional study and therefore the patients who filled out preoperative surveys may be different from those who filled out postoperative surveys. Because surveys were filled out anonymously, there was no way to identify those patients who filled out both the preoperative and postoperative surveys. Patient factors collected for all those undergoing breast reduction during this period included age, body mass index, incision pattern, pedicle used, amount of tissue resected, concurrent procedures, and complications.

Statistical analysis was performed using descriptive and summary statistics to identify a central tendency. The BREAST-Q score was calculated using the Q-score program, which converts raw survey scores of 1 through 4 or 5 to continuous scores of 0 to 100. Larger numbers signified that patients were more satisfied, had symptoms more often, or more strongly agreed with a specific statement. An unpaired *t* test was performed to examine the significance of changes in mean scores of satisfaction with breast appearance, psychosocial well-being, sexual well-being, and physical well-being between the preoperative and postoperative surveys. Fisher's exact test was used to detect any significant differences between preresection and postresection satisfaction for a dichotomous outcome. A value of $p < 0.05$ was considered significant. Pearson's correlation coefficient was calculated to determine whether satisfaction in the

overall outcomes section of the postoperative survey correlated with any other section.

RESULTS

Forty-nine patients underwent breast reduction from January 1, 2008, to May 31, 2009. Of these patients, 38 (78 percent) completed the preresection survey and 38 (78 percent) completed the postresection survey. Those who filled out preoperative surveys were not necessarily the same as those that filled out postoperative surveys. Patient demographics are listed in Table 1. The average age of the patients was 36.3 ± 12.9 years and the average body mass index was 31.8 ± 6.3 . The average weight of tissue resected from the right was 650.1 ± 380 g, and the average weight of tissue resected from the left was 633.0 ± 379.3 g. The superomedial pedicle was used in 33 percent ($n = 16$) of cases, whereas the remainder, 67 percent ($n = 33$), used an inferior pedicle. A Wise pattern incision was used in 76 percent ($n = 37$) of cases, and a vertical incision was used in the other 24 percent ($n = 12$). Seven patients experienced a complication: four patients had small areas of wound dehiscence, two patients suffered partial nipple loss, and one patient experienced a wound infection requiring antibiotic treatment. No patient underwent concurrent procedures.

Statistically significant improvements were observed for the mean scores of all four categories present on both the preresection and postresection surveys: satisfaction with appearance of breasts, psychosocial well-being, sexual well-being, and physical well-being (Fig. 1 and Table 2). Satisfaction with breast appearance improved from a value of 19.8 ± 16.1 preoperatively to 82.6 ± 14.1 postoperatively ($p < 0.001$). Within this category, postoperatively, 82 percent were very satisfied with the size of their breast and 84 percent were very

Table 1. Patient Demographics

	Value (%)
No. of patients	49
Mean \pm SD age, yr	36.3 ± 12.9
Mean \pm SD BMI, kg/m ²	31.8 ± 6.3
Mean \pm SD tissue resected, g	
Right	650.1 ± 380.2
Left	633.0 ± 379.3
Superomedial pedicle	16 (33)
Inferior pedicle	33 (67)
Wise pattern incision	37 (76)
Vertical incision	12 (24)
Complications	
Wound dehiscence	4 (8)
Partial nipple loss	2 (4)
Wound infection	1 (2)

BMI, body mass index.

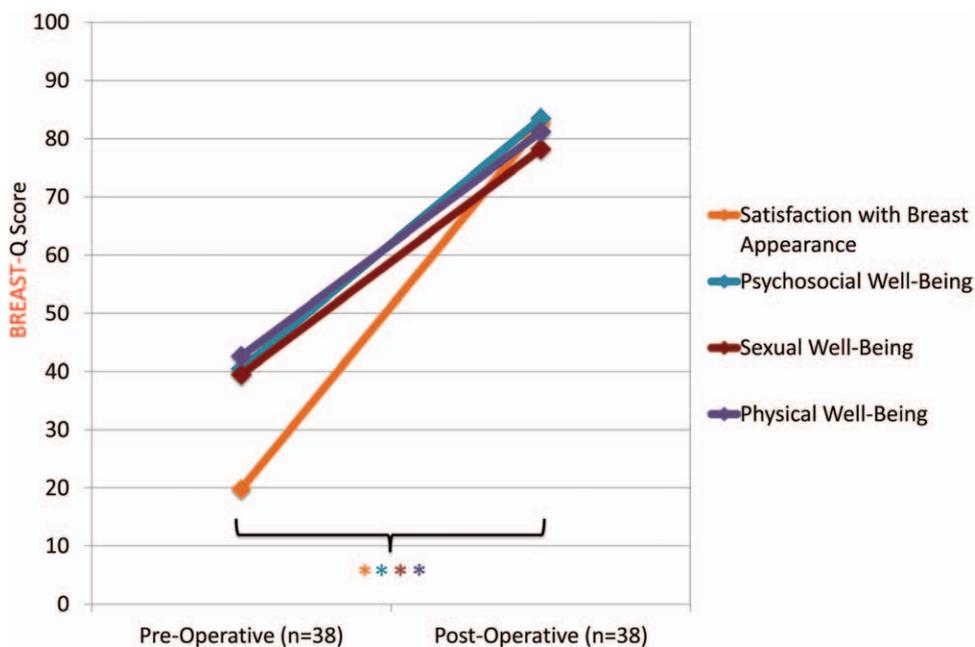


Fig. 1. Change in BREAST-Q categories from the preoperative survey to the postoperative survey. Satisfaction with breast appearance, psychosocial well-being, sexual well-being, and physical well-being significantly increased between the preoperative and postoperative surveys (* $p < 0.001$).

satisfied with how their breasts sat/hang on their chests, as compared with preoperative values of 3 and 3 percent, respectively ($p < 0.001$) (Table 3). Psychosocial well-being improved from 40.5 ± 19.2 preoperatively to 83.5 ± 20.1 postoperatively ($p < 0.001$). Within this category, postoperatively, 82 percent were confident about their body, 92 percent felt self-assured, and 71 percent felt attractive, as compared with preoperative values of 11, 37, and 24 percent, respectively ($p < 0.001$) (Table 3). Sexual well-being improved from 39.5 ± 24.1 preoperatively to 78.2 ± 21.5 postoperatively ($p < 0.001$). Patients felt more confident sexually and sexy when unclothed postoperatively ($p = 0.003$ and $p < 0.001$) (Table 3). Physical well-being improved from 42.6 ± 17.3 preoperatively to 81.2 ± 9.5 postoperatively ($p < 0.001$). Pain in the breast, neck, back, and shoulders improved postoperatively ($p = 0.028$, $p < 0.001$, $p < 0.001$, and $p < 0.001$, respectively) (Table 3).

Results of the Pearson correlation coefficient calculation indicate that satisfaction with the outcome strongly correlated to satisfaction with

breast appearance ($r = 0.6$) (Table 4). Positive correlations, although less strong, were also noted regarding satisfaction with the overall outcome and sexual well-being ($r = 0.5$), psychosocial well-being ($r = 0.4$), satisfaction with information ($r = 0.4$), satisfaction with surgeon ($r = 0.3$), and physical well-being ($r = 0.3$).

DISCUSSION

Multiple patient-reported outcome measures regarding breast surgery exist in the literature. The Short Form-36,^{3,5} Rosenberg Self-Esteem Scale,⁴⁻⁶ Breast-Related Symptoms Questionnaire,¹² Brief Symptom Inventory,¹³ and others have been previously used to demonstrate patient-reported improvements in satisfaction and quality of life following breast reduction.⁹ However, most of these patient-reported outcome instruments are generic rather than condition-specific; as such, they cannot be expected to assess all important aspects of quality of life and satisfaction among breast reduction patients.¹¹ The BREAST-Q

Table 2. Change between Mean Preoperative Scores and Mean Postoperative Scores

Category	Preoperatively (n = 38)*	Postoperatively (n = 38)*	p
Satisfaction with appearance of breasts	19.8 ± 16.1	82.6 ± 14.1	<0.001
Psychosocial well-being	40.5 ± 19.2	83.5 ± 20.1	<0.001
Sexual well-being	39.5 ± 24.1	78.2 ± 21.5	<0.001
Physical well-being	42.6 ± 17.3	81.2 ± 9.5	<0.001

*Data are presented as mean score ± SD.

Table 3. Comparison of Preoperative and Postoperative Survey Responses

Question	Preoperatively (%)*	Postoperatively (%)*	<i>p</i>
No.	38	38	
With your breasts in mind, how satisfied or dissatisfied have you been with:			
How your breasts look in clothes?	1 (3)	35 (92)	<0.001†
How your breast size matches the rest of your body?	1 (3)	28 (74)	<0.001†
The size of your breasts?	1 (3)	31 (82)	<0.001†
How your breasts sit/hang on your chest?	1 (3)	32 (84)	<0.001†
How normal your breasts look?	2 (5)	29 (76)	<0.001†
With your breasts in mind, how often have you felt:			
Confident in a social setting?	10 (26)	37 (97)	<0.001†
Good about yourself?	14 (37)	35 (92)	<0.001†
Self-assured?	14 (37)	35 (92)	<0.001†
Confident about your body?	4 (11)	31 (82)	<0.001†
Attractive?	9 (24)	27 (71)	<0.001†
Thinking of your sexuality, how often do you generally feel:			
Comfortable/at ease during sexual activity?	15 (39)	24 (63)	0.066
Confident sexually?	14 (37)	28 (74)	0.003†
Sexy when unclothed?	4 (11)	24 (63)	<0.001†
In the past 2 weeks, how often have you experienced:			
Pain in your breast area?	8 (21)	1 (3)	0.028†
Back pain?	30 (79)	1 (3)	<0.001†
Neck pain?	30 (79)	1 (3)	<0.001†
Shoulder pain?	33 (87)	0 (0)	<0.001†
Difficulty doing vigorous physical activities?	24 (63)	1 (3)	<0.001†
Difficulty sleeping because of discomfort in your breast area?	17 (45)	0 (0)	<0.001†
Painful grooves in your shoulders from your bra straps?	33 (87)	0 (0)	<0.001†
Rashes under your breasts?	14 (37)	0 (0)	<0.001†

*Raw score ≥ 4 .

†Statistically significant.

conceptual framework was formed from patient interviews, focus groups, expert panels, and a literature review.¹⁰ The reduction module is a comprehensive tool that examines psychosocial well-being; sexual well-being; physical well-being; and satisfaction with breast appearance, overall outcomes, nipples, surgeon, information, office staff, and medical staff. During its development, questionnaires were tested and retested and underwent psychometric analysis.¹⁰ Therefore, in our prospective study analyzing affects of breast reduction surgery, we chose to implement the BREAST-Q as our survey tool.

Breast reduction surgery is commonly performed for improvement in symptoms of macromastia, which include intertriginous infections, pain, physical inactivity, dissatisfaction with breast appearance, poor sexual well-being, and poor psychosocial well-being.²⁻⁸ Scott et al. showed in their study of 518 patients that complete resolution of preoperative symptoms and satisfaction with their results was achieved in 97 percent of patients.² Furthermore, Behmand et al. showed that at 9 months after reduction, patients originally suffering symptoms of macromastia had physical functioning similar to nonpatient controls.¹³ Our prospective study confirms what has been previously reported in the literature: there is a statistically significant improvement in physical and

psychosocial well-being after breast reduction. In addition, this improvement is seen soon after surgery, as our postoperative survey was administered at only 6 weeks after reduction.

The improvement in physical well-being is important for justification of insurance coverage. Although our survey indicates that patients are happier with the appearance of their breasts after breast reduction, there was also a marked decrease in the physical symptoms of macromastia (pain in the breast, neck, back, and shoulders; shoulder grooving; difficulty sleeping; difficulty exercising; and rashes). The improvement in physical activity, decrease in costly chronic medical complaints, and improvement in overall quality of life indicated by this survey study validates insurance coverage for this procedure. Notably, the majority of patients in this study had reductions of approximately 640 g and yet still experienced significant improvements in physical well-being, indicating that symptom relief occurs even in relatively small reductions. In the review of the literature by Nguyen et al. regarding insurance coverage for breast reduction, the authors conclude that “above 205 grams per breast, the weight of reduction is independent of symptom relief for patients with symptomatic macromastia.”¹⁴ Our data support the conclusions of Nguyen et al. and thus call into question the rationalization and morality

Table 4. Correlation with Satisfaction with Overall Outcomes

Category	<i>r</i>
Satisfaction with breast appearance	0.6
Sexual well-being	0.5
Psychosocial well-being	0.4
Satisfaction with information	0.4
Satisfaction with surgeon	0.3
Physical well-being	0.3
Satisfaction with medical staff	-0.1
Satisfaction with office staff	-0.1

of requiring a minimum amount of tissue to be removed to qualify for breast reduction coverage.

Aside from improvement in physical symptoms of macromastia, breast reduction has been shown to improve psychosocial and sexual well-being. Our study confirms these findings. Patients are more confident and feel more attractive and self-assured after undergoing breast reduction.

Breasts that are hypertrophic have an appearance that is frequently disliked by patients. Aside from a large size, breasts can have a flat upper pole and varying degrees of ptosis because of the weight. After reduction, patients are generally satisfied with the new appearance of their breasts, which are smaller and lifted. This likely accounts for our finding that patients were significantly more satisfied with breast appearance after reduction.

Dissatisfaction in a small number of patients following breast reduction has been reported in the literature. Carty et al. showed in their study of 279 patients that lower satisfaction was found to correlate to age younger than 40 years and experiencing postoperative soft-tissue necrosis.⁹ Surgeon experience, which was previously thought to be of possible influence, was not found to correlate to satisfaction.⁹ Therefore, in our study, we sought to determine what most strongly influences overall patient satisfaction to improve an already high satisfaction rate. We found that satisfaction with breast appearance correlated most strongly to satisfaction with overall outcomes. This emphasizes the importance of preoperative counseling. Surgeons should discuss and establish an idea of the patient's ideal postoperative breast shape and size. In turn, patients should have realistic expectations as to their postoperative breast appearance.

Future studies with larger sample sizes are needed to verify these findings. Fortunately, secondary to the standardized scoring system used by the BREAST-Q, this tool lends itself well to multisurgeon and multiinstitution studies. We also plan to collect BREAST-Q surveys from

patients in a nonanonymous fashion to be able to perform a longitudinal paired analysis and also examine patient demographics in relation to satisfaction before and after breast reduction. The cross-sectional nature of this study is a limitation. Lastly, future studies administering the postoperative survey later than 6 weeks after reduction will be necessary to evaluate long-term outcomes. We have pending institutional review board approval to collect surveys from 6 weeks to 1 year postoperatively, and plan to conduct a follow-up study.

CONCLUSIONS

As the implementation of evidence-based medicine continues to grow in everyday practice, there is increasing pressure to use validated survey instruments to demonstrate patient-reported outcomes. In this study, we have shown that breast reduction significantly improves satisfaction with breast appearance, psychosocial well-being, sexual well-being, and physical well-being. Furthermore, satisfaction with overall outcomes is correlated to satisfaction with breast appearance, sexual well-being, psychosocial well-being, satisfaction with information, satisfaction with surgeon, and physical well-being. In addition, there is preliminary evidence that small-volume breast reduction provides the same physical and psychosocial benefits, calling into question the current practice of insurance-mandated body mass index–based sliding scales for tissue resection. Using a validated survey tool, we have confirmed that, following breast reduction, patients are very satisfied and have improved quality of life.

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REFERENCES

1. American Society of Plastic Surgeons. 2010 Reconstructive Plastic Surgery Statistics. Available at: <http://www.plasticsurgery.org/Documents/news-resources/statistics/2010-statistics/Overall-Trends/2010-reconstructive-trends-statistics-trends.pdf>. Accessed June 16, 2013.
2. Scott GR, Carson CL, Borah GL. Maximizing outcomes in breast reduction surgery: A review of 518 consecutive patients. *Plast Reconstr Surg*. 2005;116:1633–1639; discussion 1640.
3. Saarniemi K, Luukkala T, Kuokkanen H. The outcome of reduction mammoplasty is affected more by psychosocial factors than by changes in breast dimensions. *Scand J Surg*. 2011;100:105–109.

4. Mello AA, Domingos NA, Miyazaki MC. Improvement in quality of life and self-esteem after breast reduction surgery. *Aesthetic Plast Surg.* 2010;34:59–64.
5. Hermans BJ, Boeckx WD, De Lorenzi F, van der Hulst RR. Quality of life after breast reduction. *Ann Plast Surg.* 2005;55:227–231.
6. Sabino Neto M, Demattê MF, Freire M, Garcia EB, Quaresma M, Ferreira LM. Self-esteem and functional capacity outcomes following reduction mammoplasty. *Aesthet Surg J.* 2008;28:417–420.
7. Blomqvist L, Eriksson A, Brandberg Y. Reduction mammoplasty provides long-term improvement in health status and quality of life. *Plast Reconstr Surg.* 2000;106:991–997.
8. Chao JD, Memmel HC, Redding JF, Egan L, Odom LC, Casas LA. Reduction mammoplasty is a functional operation, improving quality of life in symptomatic women: A prospective, single-center breast reduction outcome study. *Plast Reconstr Surg.* 2002;110:1644–1652; discussion 1653.
9. Carty MJ, Duclos A, Gu X, Elele N, Orgill D. Patient satisfaction and surgeon experience: A follow-up to the reduction mammoplasty learning curve study. *Eplasty* 2012; 12:e22.
10. Pusic AL, Klassen AF, Scott AM, Klok JA, Cordeiro PG, Cano SJ. Development of a new patient-reported outcome measure for breast surgery: The BREAST-Q. *Plast Reconstr Surg.* 2009;124:345–353.
11. Pusic AL, Chen CM, Cano S, et al. Measuring quality of life in cosmetic and reconstructive breast surgery: A systematic review of patient-reported outcomes instruments. *Plast Reconstr Surg.* 2007;120:823–837; discussion 838.
12. Anderson RC, Cunningham B, Tafesse E, Lenderking WR. Validation of the breast evaluation questionnaire for use with breast surgery patients. *Plast Reconstr Surg.* 2006;118:597–602.
13. Behmand RA, Tang DH, Smith DJ Jr. Outcomes in breast reduction surgery. *Ann Plast Surg.* 2000;45:575–580.
14. Nguyen JT, Wheatley MJ, Schnur PL, Nguyen TA, Winn SR. Reduction mammoplasty: A review of managed care medical policy coverage criteria. *Plast Reconstr Surg.* 2008;121:1092–1100.

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