

Patient-Reported Aesthetic Satisfaction with Breast Reconstruction during the Long-Term Survivorship Period

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Background: Expander/implant and autogenous tissue breast reconstructions have different aging processes, and the time when these processes stabilize is unclear. The authors' goal was to evaluate long-term patient-reported aesthetic satisfaction with expander/implant and autogenous breast reconstruction.

Methods: The authors surveyed a cross-section of University of Michigan women who underwent postmastectomy breast reconstruction (response rate, 73 percent) between 1988 and 2006 [110 expander/implant and 109 transverse rectus abdominis myocutaneous (TRAM) reconstructions]. Each group was stratified into three postreconstructive periods: short term (≤ 5 years), intermediate (6 to 8 years), and long term (> 8 years). Validated satisfaction items were scored on a 5-point Likert scale; scores were dichotomized into positive and negative responses. Logistic regression assessed satisfaction by procedure, while controlling for sociodemographic and clinical variables.

Results: Mean follow-up time after reconstruction was 6.5 years (range, 1 to 18 years). Procedure type had no effect on short-term aesthetic satisfaction. However, in the long term, reconstruction type considerably affected satisfaction. Although satisfaction with TRAM reconstruction remained relatively constant, satisfaction with expander/implants was significantly less among those patients in the long term. Patients who had undergone implant reconstruction more than 8 years earlier, compared with those who undergone implant reconstruction less than 5 years earlier, were significantly less satisfied with breast appearance (odds ratio, 0.10; 95% CI, 0.02 to 0.48), softness (odds ratio, 0.14; 95% CI, 0.03 to 0.64), and size (odds ratio, 0.13; 95% CI, 0.03 to 0.62).

Conclusions: In the long term, TRAM patients, compared with expander/implant patients, appear to have significantly greater aesthetic satisfaction. These long-term data have important implications for women's health in the survivorship period and will help women navigate the complex decision-making process of breast reconstruction. (*Plast. Reconstr. Surg.* 124: 1, 2009.)

More women are surviving breast cancer than ever before.¹ Outcomes data on the long-term impact of their treatment are becoming increasingly important and will help

patients make educated healthcare decisions. With the variety of surgical techniques available in breast surgery, choosing the "right" operation can be a daunting task, even for experienced surgeons and highly educated patients. Patient-reported outcomes measures, such as surgical satisfaction and quality of life, can provide patients and physicians with important information to assist in this decision-making process. These kinds of data can

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be used to provide new patients with a means of evaluating and comparing options based on previous patients' perspectives. As a result, patient-reported satisfaction data are becoming a greater driving force behind not only health policy-making but also the decision-making process for patients' own healthcare.

Previous studies have established that breast reconstruction after mastectomy is associated with "high levels of patient satisfaction." However, most studies used nonvalidated measures, had short follow-up periods (<5 years), and had limited comparison groups.²⁻¹⁰ In addition, evidence suggests that satisfaction with breast reconstruction changes, even over a short period of time.^{11,12} Both implant and autogenous tissue techniques are associated with different long-term complications and "aging" processes that can affect aesthetic appearance.¹³⁻¹⁶ The point at which patient satisfaction outcomes stabilize, if at all, is unclear.

To further examine these issues, we performed a cross-sectional survey of breast cancer patients who had received postmastectomy reconstruction. Our purpose was to use a well-developed and validated, surgery-specific patient-reported outcome measure to evaluate differences in patient-reported aesthetic satisfaction with transverse rectus abdominis myocutaneous (TRAM) and expander/implant procedures in the long-term survivorship period. We hypothesized that the differences in patient satisfaction between expander/implant and TRAM reconstructions would persist in the long term, with greater satisfaction among patients with TRAM procedures.

PATIENTS AND METHODS

Study Population

A cross-sectional survey was administered between December of 2006 and February of 2007 to 342 mastectomy-treated University of Michigan breast cancer patients who received breast reconstruction. Patients with unilateral and bilateral along with immediate and delayed reconstructions were included. Our initial sample included all patients who had received reconstruction at our institution between 1988 and 2006. We then grouped the patients into three postreconstructive time periods: 5 years or less, 6 to 8 years, and more than 8 years. In order to contact an equal number of patients within each postreconstructive period, a random set of patients was selected. Within each group, patients were given an identifying number. Patients to be contacted were selected based on

random numbers generated by an online random number generator (Randomizer.org).

Patients were either contacted by mail or approached in person at our oncology clinics. A small cash incentive gift of \$2 was included with the questionnaire. The Dillman method was used to maximize response rates, which involved a postcard reminder and subsequent mailings to nonresponders.¹⁷ The survey took about 20 minutes to complete, and our protocol was approved by the University of Michigan's Institutional Review Board. The final response rate was 73 percent ($n = 250$). The percentage of patients in each postreconstructive time period was similar between those who were contacted in the clinic and those who were contacted via mail. Of the nonresponders, the mean age was 55.9 years, 75 percent were white, 57 percent had stage II disease, and the mean time from reconstruction was 7.2 years (range, 3 to 13 years). Fifty-five percent of the nonresponders had an expander/implant procedure, 38 percent had a TRAM flap, and in 7 percent the procedure was unknown. Of the eligible patients, we excluded those with a latissimus dorsi reconstruction due to small sample size and those with a combined reconstruction, such as those who had a TRAM flap on one side and an expander/implant on the other side ($n = 31$).

Measures

The primary outcome for this analysis was patient satisfaction with their breast reconstruction, measured using the BREAST-Q. The BREAST-Q is a new patient-reported outcome measure that examines the unique outcomes of breast surgery patients. It is conceptually grounded in patient perceptions and fulfills criteria for rigorous measurement.^{18,19} The overarching conceptual model for the measure addresses both quality of life (psychosocial, physical, and sexual well-being) and patient satisfaction (satisfaction with breasts, outcomes, and care). The BREAST-Q was designed with a modular, procedure-specific structure (reconstruction, reduction, and augmentation); each procedure-specific module has the same conceptual model.

The questionnaire content was developed based on in-depth patient interviews ($n = 48$), expert panels, and literature review. Member checking was performed through patient focus groups ($n = 18$). Cognitive debriefing and pretesting of the preliminary questionnaire (to clarify ambiguities and to confirm appropriateness, acceptability, and completion time) were performed

by telephone interview ($n = 45$).²⁰ The measure was then extensively field-tested (for item reduction and final scale development) at five centers in the United States and Canada ($n = 1950$; test-retest sample, $n = 491$; response rate, 72 percent). An additional series of cognitive debriefing patient interviews was then performed to provide additional feedback on the final measure, and minor modifications were made ($n = 30$).²⁰

For the Reconstruction Module, Cronbach's alphas range from 0.89 to 0.98. Item-total correlations range from 0.60 to 0.89. Test-retest reliability, as measured by intraclass correlation coefficients, ranges from 0.86 to 0.98. Examination of item response distributions revealed high acceptability with excellent targeting. Hypothesis testing for known group differences with respect to patient age, implant type, autogenous versus implant reconstruction, and radiation history confirmed construct validity of the scales. Multicenter validation studies to examine convergent and discriminant validity of the new measure relative to the European Organization for Research and Treatment of Cancer-BR23, the Body Image after Breast Cancer Questionnaire, the Body Image Scale, Short Form-12, and the Physician Achievement Review are currently being performed.

We used responses to the BREAST-Q to generate five subscales related to patient satisfaction with their reconstructed breast: appearance, shape, softness, size, and projection. For each scale, responses to aesthetic satisfaction were dichotomized into "satisfied" versus "not satisfied" using the following criteria: scores of "very satisfied" or "satisfied" (a 4 or 5 on the 5-point Likert scale) for all questions were considered "satisfied"; all other scores were considered "not satisfied."

The independent clinical variables, obtained by patient self-report, were: patient age, stage of disease, laterality of procedure (unilateral versus bilateral), receipt of radiation, receipt of nipple reconstruction, receipt of a symmetry procedure, and time from reconstruction. Age was analyzed as a continuous variable. The number of years since reconstruction was grouped into "short term" (≤ 5 years), "intermediate" (6 to 8 years), and "long term" (≥ 8 years). All other measures were analyzed as categorical variables. Medical chart review augmented any missing survey data. Surgical complications were self-reported and included bleeding or wound dehiscence that required additional surgery, thromboembolic events, infection requiring antibiotics, skin or flap necrosis, removal of the TRAM flap, implant removal or replacement, poor scar result, persistent pain, capsular contrac-

ture, abdominal bulge or hernia, and problems with nipple reconstruction.

Patient-reported demographic variables included race, marital status, level of education, and income. Race was categorized into white, black, and other. Marital status was dichotomized into married/partnered or single. Level of education was categorized into high school graduate or less, some college or college graduate, and some graduate school or graduate degree (master/doctoral). Main activity was dichotomized into employed or unemployed. Annual gross household income was categorized into less than \$60,000, \$60,000 to \$100,000, and greater than \$100,000.

Analysis

Descriptive statistics were performed to understand the demographic and clinical characteristics of our patient sample. We then stratified the sample by the type of reconstruction and regressed patient aesthetic satisfaction for each satisfaction scale on selected covariates using logistic regression. Student's *t* tests, Pearson chi-square tests, or Fisher exact tests were used to determine associations between our dependent and independent variables. Wald test and the likelihood ratio test were used to test the significance of individual predictive variables, and the model χ^2 statistic was applied to test the overall significance of the model. A *p* value of less than 0.05 was considered statistically significant. All analyses were performed using Stata 9.0 software (Statacorp, Texas).

RESULTS

Table 1 shows the study sample characteristics. There were 110 patients with an expander/implant reconstruction and 109 patients with a free or pedicle TRAM flap. Of the expander/implant group, 92 percent were reconstructed with saline implants. Of the TRAM group, 90 percent received a pedicle flap. No significant differences were found in the sociodemographic characteristics between the two surgical groups (expander/implants and TRAM flaps).

Table 2 shows the clinical characteristics of our study sample. There was a significant difference in the stage of disease between the two reconstruction groups. Patients with a TRAM procedure had more advanced disease and were more likely to have received radiation therapy. The mean overall follow-up time after reconstruction was 6.5 years (range, 1 to 18 years). There was no statistical difference between the two groups by

Table 1. Study Sample Demographics

Variable	Expander/ Implant (%) (n = 110)	TRAM (%) (n = 109)	<i>p</i>
Mean age, years (range)	52.9 (19–79)	52.3 (34–72)	0.76*
Race			
White	94	95	0.73†
Black	3	1	
Other	3	4	
Marital status			
Married/partnered	79	80	0.87†
Last level of education			0.32†
High school	11	10	
College	65	57	
Master/doctoral	24	33	
Main activity			
Employed	60	64	0.49†
Annual household income			
<\$60,000	32	36	0.78†
\$60,000 to \$99,000	28	30	
≥\$100,000	40	34	

*Wilcoxon sum of ranks test.

†Pearson chi-square or Fisher exact test.

Table 2. Study Sample Clinical Characteristics

	Expander/ Implant (%) (n = 110)	TRAM (%) (n = 109)	<i>p</i> *
Stage			0.01
0	24	30	
I	40	22	
II	32	34	
III/IV	4	14	
Years after reconstruction			0.09
≤5 years	43	31	
6–8 years	39	39	
≥8 years	18	30	
Laterality			0.07
Unilateral	60	71	
Bilateral	40	29	
Timing			0.47
Immediate	78	74	
Delayed	22	26	
Complications	55	60	0.45
Radiation	21	44	<0.01
Chemotherapy	58	60	0.85
Tamoxifen	58	50	0.24
Aromatase inhibitor	24	23	0.97
Recurrence	17	20	0.55
Nipple reconstruction	48	77	<0.01
Symmetry procedure	44	18	<0.01
Comorbid conditions	30	22	0.18

*Pearson chi-square or Fisher exact test.

time periods after reconstruction. The TRAM group was more likely to have had nipple reconstruction (77 percent versus 48 percent, $p < 0.01$), and the expander/implant group was more likely to have had a symmetry procedure (44 percent versus 18 percent, $p < 0.01$). There were no significant differences between the two groups as to the timing of the surgery (immediate versus delayed), complications, presence of comorbid conditions, or receipt

of chemotherapy, tamoxifen, or an aromatase inhibitor.

Table 3 displays patient-reported aesthetic satisfaction across five measures (appearance, shape, softness, size, and projection) with expander/implant and TRAM flap reconstructions by time from surgery while controlling for age, stage, radiation, laterality, receipt of nipple reconstruction, and receipt of a symmetry procedure. The p value represents the comparison of patient-reported satisfaction by procedure type (expander/implant versus TRAM) across the time periods. The adjusted odds ratio shows the odds of a patient reporting satisfaction within either the expander/implant or TRAM procedure, across each postreconstructive time period.

In the short term (≤ 5 years), aesthetic satisfaction across the five measures was similar for patients with expander/implant and TRAM procedures. For example, 71 percent of patients with expander/implants and TRAM flaps were satisfied with their reconstructed breast shape; 82 percent versus 74 percent, respectively, were satisfied with breast appearance; 67 percent versus 76 percent, respectively, were satisfied with breast softness; 84 percent versus 71 percent, respectively, were satisfied with breast size; and 62 percent versus 59 percent were satisfied with breast projection. However, for patients in the longer postreconstructive periods, satisfaction across all five measures appeared to be greater among patients with TRAM compared with expander/implant procedures. For example, comparing outcomes among patients in the more than 8 years postreconstructive period, 45 percent of those with an expander/implant versus 81 percent of those with a TRAM flap were satisfied with breast appearance; 35 percent versus 81 percent, respectively, were satisfied with breast shape; 35 percent versus 78 percent, respectively, were satisfied with breast softness; 45 percent versus 80 percent, respectively, were satisfied with breast size; and 47 percent versus 77 percent, respectively, were satisfied with breast projection.

Figure 1 is a cross-sectional graph displaying the adjusted percent satisfaction with reconstructed breast appearance by procedure type and time from reconstruction. We determined the predicted rates of patient satisfaction with breast appearance through logistic regression, adjusting for clinically and statistically significant covariates. Of the women who had undergone reconstruction 1 to 3 years earlier, similar proportions of patients were aesthetically satisfied in each group. However, of the women in the longer postreconstructive

Table 3. Aesthetic Satisfaction with Breast Reconstruction by Procedure Type and Time from Surgery

Satisfaction with Breast	Expander/Implant (n = 110)			TRAM (n = 109)			Overall <i>p</i> Comparing Implant vs. TRAM‡
	% Satisfied*	Adjusted OR†	95% CI	% Satisfied*	Adjusted OR†	95% CI	
Appearance							
≤5 years§	82	1.0	—	74	1.0	—	—
6–8 years	59	0.21	(0.06–0.73)	86	2.57	(0.68–9.78)	0.33
>8 years	45	0.10	(0.02–0.48)	81	1.92	(0.44–8.39)	0.15
Shape							
≤5 years§	71	1.0	—	71	1.0	—	—
6–8 years	50	0.45	(0.15–1.34)	76	1.26	(0.38–4.10)	0.40
>8 years	35	0.25	(0.06–1.13)	81	1.83	(0.47–7.17)	0.54
Softness							
≤5 years§	67	1.0	—	76	1.0	—	—
6–8 years	28	0.12	(0.04–0.39)	81	1.21	(0.35–4.18)	.01
>8 years	35	0.14	(0.03–0.64)	78	1.3	(0.33–5.19)	.09
Size							
≤5 years§	84	1.0	—	71	1.0	—	—
6–8 years	50	0.17	(0.05–0.58)	81	1.57	(0.46–5.42)	0.09
>8 years	45	0.13	(0.03–0.62)	80	1.76	(0.42–7.41)	0.19
Projection							
≤5 years§	62	1.0	—	59	1.0	—	—
6–8 years	40	0.31	(0.11–0.93)	69	1.04	(0.35–3.06)	0.14
>8 years	47	0.39	(0.09–1.67)	77	2.13	(0.56–8.17)	0.93

TRAM, transverse rectus abdominis myocutaneous; OR, odds ratio; CI, confidence interval.

*Represents percent satisfied on Likert scale (4 or 5 equals satisfied).

†Represents the odds of a patient reporting satisfaction within each procedure group while controlling for age, stage, radiation, laterality, receipt of nipple reconstruction, and receipt of a symmetry procedure.

‡Represents the comparison by procedure type (expander/implant versus TRAM). The *p* value is from our logistic regression model controlling for the same variables noted above.

§Reference group.

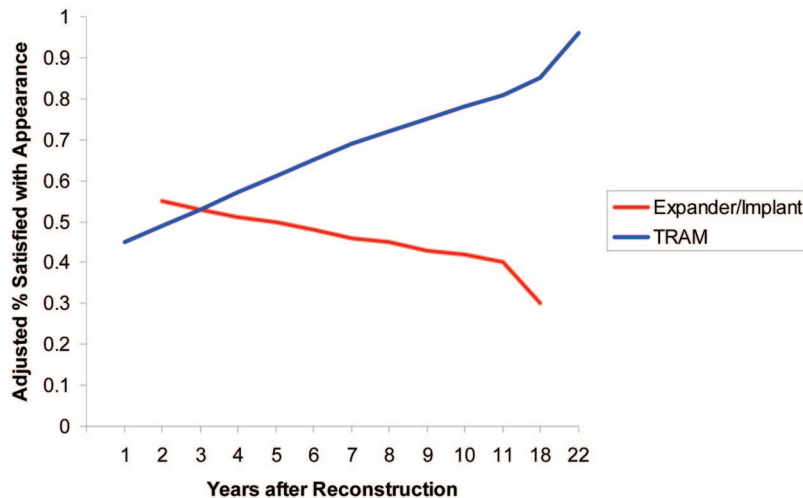


Fig. 1. Cross-sectional graph of percentage of satisfaction with reconstructed breast appearance over time, adjusted for age, stage, radiation, unilateral or bilateral procedure, nipple reconstruction, and symmetry procedure.

tive period, there was a significant divergence, with a greater proportion of TRAM patients reporting aesthetic satisfaction compared with expander/implant patients.

Table 4 displays patients' satisfaction with the firmness, rippling, and size of saline implant reconstruction within the three postreconstructive periods. Satisfaction with implant firmness and

rippling did not change significantly within the time periods, although few patients in the long-term group reported satisfaction with these outcomes. Specifically, only 40 percent were satisfied with implant firmness, and only 33 percent of patients were satisfied with implant rippling in the more than 8 years postreconstructive group. Satisfaction with implant size did significantly dimin-

Table 4. Patient-Reported Satisfaction with Expander/Implant Breast Reconstruction over Time

Breast Outcome	Years after Reconstruction, % Satisfied*			<i>p</i> †
	≤5 Years	6–8 Years	>8 Years	
Firmness	56	43	40	0.31
Rippling	38	39	33	0.91
Size	82	57	42	<0.01

*Percent satisfied on Likert scale (4 or 5 equals satisfied).

†Pearson chi-square test.

ish for patients in the longer postreconstructive periods, with 82 percent of patients who had undergone surgery 5 or more years earlier satisfied compared with only 42 percent of those who had undergone surgery more than 8 years earlier ($p < 0.01$). Of note, within the entire expander/implant group, 21 percent self-reported capsular contracture. Of those women who reported capsular contracture, 50 percent reported dissatisfaction with their implant size.

Table 5 displays TRAM patients' satisfaction with different aspects of abdominal appearance in the different postreconstruction time periods. Satisfaction outcomes appeared stable within each time period, with no significant differences found among the patients in the early and longer postreconstructive time periods.

DISCUSSION

In this cross-sectional sample of postmastectomy reconstruction patients, patient-reported satisfaction with breast outcomes appeared similar among patients less than 5 years out from surgery with expander/implant and TRAM flap procedures. However, in the expander/implant population, satisfaction with the reconstructed breast's appearance, shape, softness, size, and projection significantly diminished among patients in the longer postreconstructive time periods. Patient-reported satisfaction with TRAM flap procedures

Table 5. Patient Satisfaction with TRAM Breast Reconstruction Donor Site over Time

	Years after Reconstruction, % Satisfied*			<i>p</i> †
	≤5 Years	6–8 Years	>8 Years	
Abdominal appearance	69	69	58	0.57
Abdominal scarring	47	55	41	0.48
Navel position	78	79	75	0.93

*Percent satisfied on Likert scale (4 or 5 equals satisfied).

†Pearson chi-square test.

appeared relatively stable across all three postreconstruction time periods.

Our results are consistent with those of others who have evaluated this issue from the surgeons' perspective. Clough et al. performed a prospective, single-center cohort study evaluating physician perceived aesthetic outcomes in patients with TRAM and expander/implant reconstructions over an 8-year time period.^{14,16} The proportion of patients satisfied with implant reconstruction diminished from 86 percent at postreconstructive year 2 to 54 percent at postreconstructive year 5. However, the proportion of patients satisfied with TRAM reconstruction was 96 percent at year 2 and remained at 94 percent at year 5.^{14,16} Our data echo their results but complement that work by providing patient-perceived, not physician-perceived, aesthetic outcomes. While the opinion of providers is important for newly diagnosed patients considering reconstruction, the reported satisfaction of patients who have been through the different surgical procedures may have more value in their decision making.

We have strong evidence that autogenous tissue reconstructions provide the most stable aesthetic results long term. The reasons are clear. Implants do not become naturally ptotic with age. Implants are prone to capsular contracture, which leads to visual distortion of the breast mound. In addition, implants will not change in size as a patient gains or loses weight over time. This is an important issue for women, since most do not remain the same size throughout their lifetime. In our study, 82 percent of patients 5 years or less past surgery were satisfied with the size of their implant; this rate dropped to only 42 percent satisfied among those more than 8 years past surgery. However, implant technology has changed over the past 20 years and could contribute to the differences we found in this cross-sectional study. These large differences in patient-reported outcomes by procedure type highlight the need for a large, prospective, multicenter study.

Nevertheless, the benefits of autogenous tissue reconstruction for mastectomy defects are well established. However, TRAM and other types of autogenous tissue procedures appear to be underutilized. In 2006, only 18 percent of breast reconstructions involved TRAM flaps, according to the American Society of Plastic Surgeons.²¹ It is unclear what the "right" proportion of breast cancer patients to undergo an autogenous tissue procedure is. The type of breast reconstruction is a preference-sensitive decision, similar to the choice between mastectomy and breast conservation for

early-stage breast cancer. Ensuring that women receive the type of reconstruction that is best for them depends on engaging patients in shared medical decision-making with their plastic surgeon. All else being equal clinically, the choice of type of reconstruction should be a joint decision between patient and provider. Surgeons can help to elicit the best choice for a particular patient by accounting for patients' long-term aesthetic goals, functional goals, and risk aversion. Feedback from patients who have been through the decision and received reconstruction may be useful for new patients as well.

Limitations

This study had limitations that are worth noting. Our survey was cross-sectional and is limited in its ability to assess causality of associations and actual changes in satisfaction over time. This would require a prospective, longitudinal study design. However, we note that our two treatment groups were very similar in their clinical and demographic characteristics. Furthermore, we controlled for those variables that we thought might have a significant impact on patient satisfaction, such as radiation therapy and receipt of a symmetry procedure. Another limitation relates to the generalizability of our data. Our study sample was from a single academic medical institution, and the results cannot be generalized to patients in other settings. Our patient sample was also relatively homogenous in its sociodemographic characteristics, consisting primarily of highly educated Caucasian women. The design may suffer from nonresponse bias; if the nonresponders had different satisfaction outcomes compared with those who responded, the magnitude of the survey results would be overestimated. Fortunately, our high response rate minimizes this bias, along with the similarity in the sociodemographics between the responders and nonresponders. Another variable that may affect satisfaction is the patient's quality of life, as this can also change over time. However, in a parallel study of this cohort, we did not find a significant difference in patient-reported quality of life by procedure type or by postreconstructive period.

Implications

Our results have important implications for the quality of reconstructive care delivered to the postmastectomy population. Breast reconstruction is a significant component of high-quality care in the breast cancer survivorship period. Sig-

nificant advances and changes have occurred in the area of breast reconstruction, such as perforator flaps, the return of silicone implants, and the combination of AlloDerm with expander/implants. Improving the quality of the reconstructive decision-making process not only will require longitudinal data on patient-reported outcomes across multiple sites but also should include these advances. These data could be incorporated into patient decision aids that will help set realistic expectations for long-term surgical outcomes. Most importantly, we must ensure that patients have access to their procedure of choice when clinically indicated. Although the Women's Health and Cancer Rights Act mandated insurance coverage of breast reconstruction,²² many believe that autogenous tissue procedures are poorly reimbursed compared with implant-based reconstructions, which may limit surgeons' willingness to provide these services. Patient-reported outcomes data such as ours will be instrumental when advocating for improved reimbursement for these procedures, particularly for autogenous tissue reconstruction. In addition, patient-reported outcomes data will be useful to develop appropriate decision-making tools for postmastectomy reconstruction, so that long-term satisfaction after reconstruction is optimized.

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REFERENCES

1. American Cancer Society. *Breast Cancer Facts and Figures 2005–2006*. Available at: <http://www.cancer.org/downloads/STT/CAFF2005BrFacs.pdf> Ed. Accessed May 17, 2007.
2. Nano MT, Gill PG, Kollias J, et al. Psychological impact and cosmetic outcome of surgical breast cancer strategies. *ANZ J Surg*. 2005;75:940–947.
3. Saulis AS, Mustoe TA, Fine NA. A retrospective analysis of patient satisfaction with immediate postmastectomy breast reconstruction: Comparison of three common procedures. *Plast Reconstr Surg*. 2007;119:1669–1676; discussion 1677–1678.
4. Mosahebi A, Ramakrishnan V, Gittos M, et al. Aesthetic outcome of different techniques of reconstruction following

- nipple-areola-preserving envelope mastectomy with immediate reconstruction. *Plast Reconstr Surg.* 2007;119:796–803.
5. Tykka E, Asko-Seljavaara S, Hietanen H. Patient satisfaction with delayed breast reconstruction: A prospective study. *Ann Plast Surg.* 2002;49:258–263.
 6. Tykka E, Asko-Seljavaara S, Hietanen H. Patients' satisfaction with breast reconstruction and reduction mammoplasty. *Scand J Plast Reconstr Surg Hand Surg.* 2001;35:399–405.
 7. Kovacs L, Papadopoulos NA, Ammar SA, et al. Clinical outcome and patients' satisfaction after simultaneous bilateral breast reconstruction with free transverse rectus abdominis muscle (TRAM) flap. *Ann Plast Surg.* 2004;53:199–204.
 8. Ramon Y, Ullmann Y, Moscona R, et al. Aesthetic results and patient satisfaction with immediate breast reconstruction using tissue expansion: A follow-up study. *Plast Reconstr Surg.* 1997;99:686–691.
 9. Simon AM, Bouwense CL, McMillan S, et al. Comparison of unipedicled and bipedicled TRAM flap breast reconstructions: Assessment of physical function and patient satisfaction. *Plast Reconstr Surg.* 2004;113:136–140.
 10. Moscona RA, Holander L, Or D, et al. Patient satisfaction and aesthetic results after pedicled transverse rectus abdominis muscle flap for breast reconstruction. *Ann Surg Oncol.* 2006;13:1739–1746.
 11. Lantz PM, Janz NK, Fagerlin A, et al. Satisfaction with surgery outcomes and the decision process in a population-based sample of women with breast cancer. *Health Serv Res.* 2005;40:745–767.
 12. Alderman AK, Wilkins EG, Lowery JC, et al. Determinants of patient satisfaction in postmastectomy breast reconstruction. *Plast Reconstr Surg.* 2000;106:769–776.
 13. Alderman AK, Kuhn LE, Lowery JC, et al. Does patient satisfaction with breast reconstruction change over time? Two-year results of the Michigan Breast Reconstruction Outcomes Study. *J Am Coll Surg.* 2007;204:7–12.
 14. Clough KB, O'Donoghue JM, Fitoussi AD, et al. Prospective evaluation of late cosmetic results following breast reconstruction: I. Implant reconstruction. *Plast Reconstr Surg.* 2001;107:1702–1709.
 15. Spear SL, Onyewu C. Staged breast reconstruction with saline-filled implants in the irradiated breast: Recent trends and therapeutic implications. *Plast Reconstr Surg.* 2000;105:930–942.
 16. Clough KB, O'Donoghue JM, Fitoussi AD, et al. Prospective evaluation of late cosmetic results following breast reconstruction: II. TRAM flap reconstruction. *Plast Reconstr Surg.* 2001;107:1710–1716.
 17. Dillman D. *Mail and Telephone Surveys: The Total Design Method.* New York: John Wiley and Sons, Inc.; 1978.
 18. 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 838–839.
 19. Cano S, Klassen A, Pusic A. The science of quality of life measurement: A primer for plastic surgeons. *Plast Reconstr Surg.* 2009;123:98e–106e.
 20. Pusic AL, Cano S, Klassen A, et al. *Measuring Quality of Life in Breast Surgery: Content Development of a New Modular System to Capture Patient-Reported Outcomes (the BREAST-Q).* Lisbon, Portugal, International Society of Quality of Life Research Meeting, October 2006.
 21. American Society of Plastic Surgeons. 2006 Reconstructive Surgery Procedures, 2006. Available at: http://www.plasticsurgery.org/Media/Statistics/2006_Statistics.html. Accessed August, 1, 2007.
 22. Department of Labor. Women's Health and Cancer Right's Act. Available at: <http://www.dol.gov/ebsa/publications/whcra.html>. Accessed May 17, 2007.

PRS Mission Statement

The goal of *Plastic and Reconstructive Surgery*[®] is to inform readers about significant developments in all areas related to reconstructive and cosmetic surgery. Significant papers on any aspect of plastic surgery—original clinical or laboratory research, operative procedures, comprehensive reviews, cosmetic surgery—as well as selected ideas and innovations, letters, case reports, and announcements of educational courses, meetings, and symposia are invited for publication.