ORIGINAL ARTICLE

https://doi.org/10.1590/1806-9282.20210110

Aesthetic assessment of breast reconstruction in the eyes of plastic surgeons versus nonplastic physicians

Hianga Fayssa Fernandes Siqueira[1,2*], Jorge Teixeira[3], Reginaldo Lessa Filho[3], Erika de Abreu Costa Brito[1,3], Marcela Lima[1,3], Alex Rodrigues Moura[1,3], Tarcizo Figueiredo[3], Thiago Oliveira[3], Ana Alice Santana Vasconcelos[3], Carlos Anselmo Lima[1,3]

SUMMARY

OBJECTIVE: The aim of this study was to evaluate the perception of the aesthetic result of breast reconstruction surgery from the perspective of plastic surgeons compared with physicians who are not specialists in plastic surgery.

METHODS: Twenty patients who underwent breast reconstruction after mastectomy had their aesthetic results evaluated by 16 plastic surgeons and 16 nonplastic physicians, yielding a total of 620 ratings (320 ratings from plastic surgeons and 320 ratings from other specialists). For all analyses, the level of rejection adopted for the null hypothesis was 5% (p-value <0.05).

RESULTS: Significant differences were observed between the two groups. On average, medical professionals who specialized in plastic surgery always obtained higher scores than other physicians. However, no significant differences were found in the assessment of the aesthetic outcome of breast reconstruction according to the sex of the rating medical professional for any of the assessments considered in this study. A strong positive linear correlation between the time since training in the medical specialty of plastic surgery (r=0.750, p=0.001) and the mean aesthetic outcome score was observed in this study.

CONCLUSION: Plastic surgeons assessed the aesthetic results of breast reconstruction more positively than nonplastic physicians.

KEYWORDS: Breast neoplasms. Reconstructive surgical procedures. Mastectomy.

INTRODUCTION

The evaluation of aesthetic outcomes in the treatment of breast cancer is important because patient satisfaction and oncological outcomes are considered determinants of quality of life[1].

Several instruments are used to measure the aesthetic outcome of breast reconstruction from the medical point of view. The most frequently used subjective method is an assessment performed by one or more observers, typically through photographic records, using scales that compare the treated breast with the untreated breast[2].

Although many questionnaires are used to evaluate outcomes reported by the patients involved in studies on reconstructive and cosmetic breast surgery, only few have been subjected to any formal development or validation, with the exception of the Breast-Related Symptoms Questionnaire[3]. However, this questionnaire is intended only for patients and not for professionals involved in treatment.

Understanding the geometry of anthropometric proportions and its relationship with beauty and identifying the objections regarding the "ideal" aesthetic morphology are essential in defining the goals of breast surgery[4,5].

The assessment of aesthetic outcome in breast cancer surgery is especially relevant because patient satisfaction and oncological outcome are the predominant factors that determine the quality of life[6-8].

This study compared the results of the aesthetic assessment of breast reconstruction from the perspective of plastic surgeons (i.e., physicians who are directly involved in breast reconstruction) versus nonplastic physicians (i.e., physicians who have no experience in breast reconstruction) using an aesthetic assessment scale for healthcare professionals.

METHODS

Standardized photographs of the breast were obtained from a cross-sectional study of 20 patients who underwent reconstruction more than 1 year earlier. Inclusion criteria were as follows: patients with only breast reconstruction and without

[1]Health Sciences Graduate Program – Aracaju (SE), Brazil.
[2]Universidade Federal do Vale do São Francisco – Petrolina (PE), Brazil.
[3]Universidade Federal de Sergipe, Hospital Universitário/Empresa Brasileira de Serviços Hospitalares – Aracaju (SE), Brazil.
*Corresponding author: hfayssa@hotmail.com
Conflicts of interest: the authors declare there is no conflicts of interest. Funding: none.
Received on February 03, 2021. Accepted on March 04, 2021.

symmetrization, reconstructed patients with symmetrization but without nipple reconstruction, and patients who had already completed the three stages of reconstruction. The study protocol was approved by the Institutional Ethics Committee in Research, and informed consent was obtained.

The photographs were taken by a single researcher at a standardized distance and patient position. A digital camera with a resolution of 12 MP was used. All surgeries were performed by the same multidisciplinary team consisting of a breast surgeon and a plastic surgeon. Breast reconstruction procedures included techniques using autologous flaps and breast prostheses. The photographs were evaluated according to the criteria presented in the modified scale by Garbay et al.[9] (volume of breast, shape of breast, placement of breast, inframammary fold, and breast scars). Then, the findings were classified from 0 to 10, where 0 was the worst and 10 was the best result.

All raters were physicians: 16 plastic surgeons and 16 nonplastic physicians. All ratings of plastic surgeons were certified by the Brazilian Society of Plastic Surgery. None of the raters participated in the patient treatment. Each rater performed, by themselves or by other raters, the assessments independently without accessing the previous assessments.

The demographic and professional variables of the study participants were descriptively analyzed according to sex, age group, medical specialty, and length of time in medical specialty practice. Qualitative variables were described as absolute and relative frequencies, while the quantitative variable related to length of time in practice was described as the mean and 95% confidence interval (95%CI), in addition to minimum and maximum values.

To make comparisons between physicians who specialize in plastic surgery and those who do not, as well as between the professionals according to sex, a test was conducted to detect differences in mean scores corresponding to the final breast aesthetic outcome, which ranged from 0 to 10. These comparisons were performed for each evaluated patient (n=20) and in relation to the mean of all patients. Either Student's t-test (parametric test suitable for normal distribution) or the Mann-Whitney U test (counterpart test for nonparametric distribution) was used, depending on the nature of the variable. The Shapiro-Wilk normality test was used for decision-making. In addition to the values presented in tables, these differences are also presented in boxplots.

Due to the evidence of significant differences in the assessment of physicians according to specialty, the absolute and relative frequencies of the variables, such as breast volume, shape, position, sulcus, and scar, were compared. For these variables, Kendall's W concordance coefficient was estimated to assess interobserver agreement.

The Pearson correlation coefficient (r) and its respective p-value were also estimated to assess the association between length of time in their professional practice (considered the time since the completion of medical specialty training) and the final aesthetic outcome score of breast reconstruction surgery, according to medical specialty. For all analyses, the level of rejection adopted for the null hypothesis was 5% ($p<0.05$).

RESULTS

A total of 32 physicians evaluated the aesthetic outcome of 20 patients undergoing breast reconstruction surgery after mastectomy due to breast cancer, resulting in a total of 620 assessments (320 assessments by plastic surgeons and 320 assessments by nonplastic physicians).

Notably, 53.1% of the raters were women, 59.4% aged between 30 and 40 years of age, and 59.4% had practiced their medical specialty for less than 10 years, with a mean of 9.9 years (95%CI 6.2–13.7).

Considering all the raters, when observing the aesthetic outcome of the breast reconstruction, a score of 0–10 was assigned. On average, the scores ranged from 3.1 to 9.1, but patients were given a score of 5.9 (95%CI 5.3–6.5).

On average, the medical professionals who specialized in plastic surgery always obtained higher scores than other physicians; this difference was significant at 95%CI (Table 1).

On average, plastic surgeons gave a score of 7.0 (95%CI 6.5–7.6, ranging from 5.5 to 9.1), while nonplastic physicians gave a score of 4.8 (95%CI 4.0–5.6, ranging from 3.1 to 8.5), which represents a mean difference of 2.3 (95%CI 1.3–3.2).

A high positive linear correlation was also observed between the time since training in the medical specialty of plastic surgery ($r=0.750$, $p=0.001$) and the mean aesthetic outcome score. In contrast, the same result was not observed for physicians from other specialties ($r=0.061$, $p=0.0822$).

Regarding breast volume of the 320 assessments performed by plastic surgeons (16 physicians and 20 patients), 43.8% evaluated volume with a marked discrepancy compared with the contralateral side. For nonplastic physicians, 57.8% of the assessments were also scored similar to that above. Regarding shape, 29.7% of plastic surgeons determined that the breast had a natural or symmetrical contour compared with only 11.6% of nonplastic physicians. The assessments of the position, sulcus, and scar of the breast reconstruction were also discrepant, as plastic surgeons obtained higher scores (Table 2).

Regarding the assessment of the aesthetic outcome of breast reconstruction according to the sex of the medical professional,

Table 1. Results of the final aesthetic assessment of patients according to the medical specialty of the physicians who evaluated them.

Patients	Plastic surgeon				Differences*	95%CI or z (p-value)	
	Yes		No				
	Median (SD)		Median (SD)			Superior	Inferior
Patient 1	5.9	(1.5)	2.9	(1.9)	3.0	1.7	4.3
Patient 2**	8.7	(1.1)	6.9	(1.4)	1.8	z=-3.1	(0.001)
Patient 3	6.5	(2.0)	3.6	(1.9)	2.9	1.4	4.4
Patient 4	6.6	(1.7)	3.5	(2.6)	3.2	1.5	4.8
Patient 5**	8.1	(0.8)	6.6	(1.8)	1.5	z=-2.8	(0.006)
Patient 6	7.0	(1.4)	3.9	(2.3)	3.1	1.7	4.5
Patient 7	5.9	(1.3)	3.1	(2.3)	2.9	1.5	4.2
Patient 8	7.3	(1.3)	4.1	(2.2)	3.2	1.8	4.5
Patient 9	6.4	(1.6)	4.3	(2.5)	2.1	0.6	3.6
Patient 10	7.7	(1.5)	6.1	(1.4)	1.6	0.5	2.6
Patient 11**	4.9	(1.7)	2.0	(1.6)	2.9	z=-3.7	(0.001)
Patient 12**	5.9	(1.8)	4.3	(1.6)	1.7	z=-2.6	(0.008)
Patient 13**	6.6	(1.9)	3.9	(1.7)	2.6	z=-3.4	(0.001)
Patient 14	6.8	(1.7)	4.9	(2.2)	1.9	0.4	3.3
Patient 15**	9.4	(0.6)	7.8	(1.3)	1.6	z=-3.4	(0.001)
Patient 16**	8.9	(0.9)	6.6	(1.7)	2.3	z=-3.7	(0.001)
Patient 17	6.3	(2.0)	3.9	(2.2)	2.3	0.8	3.8
Patient 18	6.1	(1.5)	4.8	(2.0)	1.3	0.0	2.5
Patient 19**	8.3	(1.1)	6.3	(1.8)	2.0	z=-3.1	(0.002)
Patient 20	7.2	(1.4)	5.5	(1.8)	1.7	0.5	2.8
Median	7.0	(1.0)	4.8	(1.5)	2.3	1.3	3.2

*All differences were significant. **Significant Shapiro–Wilk normality test (p-value <0.05); thus, the Mann–Whitney U test for comparison of means was adopted.

no significant differences were found for any of the assessments in this study. The mean score given by female doctors was 6.0 (95%CI 5.1–7.0), while the mean score given by male doctors was 5.7 (95%CI 4.9–6.5) (Table 3).

It was observed that plastic surgeons had higher levels of agreement in three of the five variables analyzed, namely, breast volume, shape, position, sulcus, and scar. Nonplastic surgeons had higher levels of agreement regarding position (W=0.43) and sulcus (W=0.39). The levels of agreement between the specialties were greater than that between sex regarding breast volume and shape.

Among the female doctors, the levels of agreement were higher for the position (W=0.42) and sulcus (W=0.37) variables. This same result was identified for male doctors, but the levels of agreement were higher (W=0.49 and W=0.48, respectively) when compared with the female doctors.

Regardless of sex or medical specialty, the levels of agreement in relation to the position and sulcus are distinct compared with other variables.

DISCUSSION

In this study, we compared assessments by plastic surgeons and nonplastic physicians in the cosmetic outcome of breast reconstruction to observe the differences between the evaluations of plastic surgery specialists and nonspecialists. Since the modified Garbay scale[9] with technical terms aimed at health professionals, nonspecialist physicians would be able to interpret it and, at the same time, would have a "lay" view regarding the results of the reconstruction. The researchers, who were not specialists in plastic surgery, could have an expectation close to that of

Table 2. Results according to variables related to breast volume, shape, position, sulcus, and scar.

Variables	Plastic surgeon			
	Yes		No	%
	n	%	n	
Volume				
Marked discrepancy relative to contralateral side	140	43.8	185	57.8
Mild discrepancy relative to contralateral side	107	33.4	90	28.1
Symmetrical volume	73	22.8	45	14.1
Shape				
Marked contour deformity or shape asymmetry	105	32.8	168	52.5
Mild contour deformity or shape asymmetry	120	37.5	115	35.9
Natural or symmetrical contour	95	29.7	37	11.6
Placement of breast				
Marked displacement	46	14.4	133	41.6
Mild displacement	139	43.4	116	36.3
Symmetrical and aesthetic placement	135	42.2	71	22.2
Inframammary fold*				
Poorly defined/not identified	39	12.2	148	46.5
Defined but with asymmetry	141	44.1	109	34.3
Defined and symmetrical	140	43.8	61	19.2
Breast scars				
Poor (hypertrophy and contracture)	29	9.1	94	29.4
Fair (wide scars and poor color match, but without hypertrophy and contracture)	110	34.4	116	36.3
Good (thin scars and good color match)	181	56.6	110	34.4

*Loss of two data points related to the assessment by non-plastic physicians (n=318).

patients, since they are not acquainted with the results of breast reconstruction.

Significant differences were observed between the two groups. On average, medical professionals who specialized in plastic surgery always obtained higher scores compared with physicians from other specialties.

This is in contrast to the study by Veiga et al.[1], which compared the assessments of two plastic surgeons versus two breast surgeons and found that breast surgeons scored the aesthetic outcome higher than the plastic surgeons.

In the study by Kuroda et al., the aesthetic outcomes of 98 patients who underwent breast reconstruction were evaluated by three different methods: patient self-report, BCCT.core software (Breast Cancer Conservation Treatment. cosmetic results), and assessment of four independent specialists (two breast surgeons and two plastic surgeons) from different institutions. They concluded that the assessments by plastic surgeons and breast surgeons were not in agreement[10].

Wachter et al. compared the assessment of aesthetic outcomes after immediate and late breast reconstruction with implants between 47 patients and 18 professionals (medical students, doctors, and seniors) and observed that the assessments did not differ significantly among the professionals. However, the assessments made by patients were better, whereas the assessments made by the medical professionals were more critical[11].

Patients are typically less critical of the aesthetic outcome than medical professionals, which suggests that patients consider other factors when evaluating the aesthetic outcome[10,12,13].

The assessment of photographic records by one or more specialists is frequently used to evaluate the cosmetic outcome of breast reconstructions, but since aesthetic outcome is a subjective measure, it is difficult to measure the results of breast reconstruction procedures.

Table 3. Results of the final aesthetic assessment, according to the sex of the rating medical professional.

Patients	Plastic surgeon				Differences*	95%CI or z (p-value)	
	Female		Male				
	Median (SD)		Median (SD)			Inferior	Superior
Patient 1	4.3	(2.2)	4.5	(2.5)	-0.2	-1.9	1.5
Patient 2**	8.1	(1.7)	7.6	(1.3)	0.5	z=-1.0	(0.338)
Patient 3	5.8	(2.6)	4.4	(2.1)	1.4	-0.4	3.1
Patient 4	5.4	(3.1)	4.7	(2.3)	0.7	-1.3	2.7
Patient 5**	7.6	(1.2)	7.1	(1.9)	0.4	z=-0.4	(0.711)
Patient 6	5.3	(2.6)	5.8	(2.3)	-0.6	-2.4	1.3
Patient 7	4.6	(2.7)	4.5	(2.0)	0.0	-1.7	1.8
Patient 8	5.9	(2.8)	5.5	(2.0)	0.5	-1.3	2.3
Patient 9	5.3	(2.8)	5.5	(1.8)	-0.2	-2.0	1.5
Patient 10	6.9	(1.7)	6.9	(1.6)	0.1	-1.1	1.3
Patient 11**	3.6	(2.5)	3.3	(1.9)	0.3	z=-0.3	(0.766)
Patient 12**	5.6	(2.0)	4.5	(1.6)	1.1	z=-1.5	(0.132)
Patient 13**	5.4	(2.4)	5.1	(2.1)	0.3	z=-0.4	(0.682)
Patient 14	6.4	(2.4)	5.2	(1.8)	1.2	-0.4	2.7
Patient 15**	8.6	(1.2)	8.6	(1.5)	0.0	z=-0.3	(0.794)
Patient 16**	7.6	(2.0)	7.9	(1.6)	-0.2	z=-0.3	(0.794)
Patient 17	5.6	(2.6)	4.5	(2.0)	1.2	-0.5	2.9
Patient 18	5.9	(1.9)	4.9	(1.7)	0.9	-0.3	2.2
Patient 19**	7.1	(1.9)	7.5	(1.7)	-0.4	z=-0.6	(0.576)
Patient 20	6.1	(2.2)	6.6	(1.2)	-0.5	-1.8	0.8
Median	6.0	(1.9)	5.7	(1.4)	0.3	-0.9	1.6

*None of the differences were significant. **Significant Shapiro–Wilk normality test (p<0.05); thus, the Mann–Whitney U test for comparison of means was adopted.

In our study, we observed that the agreement among physicians who specialized in plastic surgery was always higher than among physicians who do not specialized in plastic surgery. This finding suggests that although examination of photographs is a subjective method, when photographic records are assessed by experienced observers, this can become a valid method. However, this type of assessment hinders conclusions when photographs are evaluated by nonspecialists.

In the study by Dikmans et al., in addition to the patients, five plastic surgeons and three mammography nurses evaluated breast reconstruction through photographs. They concluded that the agreement among experienced plastic surgeons was higher than among mammography nurses[13].

Regarding the assessment of the aesthetic outcome of breast reconstruction according to the sex of the rating medical professional, no significant differences were found for any of the assessments considered in this study. These results are in agreement with those of Wachter et al.[11]. However, Veiga et al.[1] observed that female specialists obtained higher scores.

A strong correlation between the time since training in the medical specialty of plastic surgery and the mean aesthetic outcome score may indicate that the experience of plastic surgeons decreases their expectation regarding the outcome, perhaps because they are more accustomed to observe complications and have a more realistic view of the outcome that can be expected after a reconstruction. However, the same result was not observed for physicians from other specialties. Many factors may influence the assessment of aesthetic outcomes, such as age, high body mass index, smoking, tumor size and location, breast size, and adjuvant treatment applied[10,14]. Therefore, the differences between the assessments of the professionals may

be the result of their trained outlook regarding these variables, which can cause limitations in the aesthetic outcome.

CONCLUSION

Plastic surgeons assessed the aesthetics results of breast reconstruction more positively than nonplastic physicians, and the time of experience of plastic surgeons could decrease their expectation regarding the outcome.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the ethical committees of the Federal University of Sergipe and was conducted in accordance with the Declaration of Helsinki. All study participants provided informed written consent as set forth in CNS Resolution No. 466/12 and CAAE: 92210218.2.0000.5546.

ACKNOWLEDGMENTS

The authors wish to thank all study participants.

AUTHORS' CONTRIBUTIONS

HFFS, CAL: Writing – original draft, Writing – review & editing, Methodology, Formal Analysis, Supervision. **HFFS:** Conceptualization, Project administration, Resources. **HFFS, JLT, RLF, ÉACB, ML, ARM, TCFJ, TO, AASV, CAL:** Data curation, Investigation.

REFERENCES

1. Veiga DF, Veiga-Filho J, Ribeiro LM, Archangelo-Junior I, Mendes DA, Andrade VO, et al. Evaluations of aesthetic outcomes of oncoplastic surgery by surgeons of different gender and specialty: a prospective controlled study. Breast. 2011;20(5):407-12. https://doi.org/10.1016/j.breast.2011.04.001
2. Santos G, Urban C, Edelweiss MI, Kuroda F, Capp E. Avaliação dos resultados estéticos e de qualidade de vida após tratamento cirúrgico do câncer de mama. Rev Bras Mastologia. 2013;23(3):60-8.
3. Pusic AL, Chen CM, Cano S, Klassen A, McCarthy C, Collins ED, 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(4):823-37. https://doi.org/10.1097/01.prs.0000278162.82906.81
4. Mallucci P, Branford OA. Concepts in aesthetic breast dimensions: analysis of the ideal breast. J Plast Reconstr Aesthet Surg. 2012;65(1):8-16. https://doi.org/10.1016/j.bjps.2011.08.006
5. Fantozzi F. Applications of anthropometry in torsoplastic surgery. Eur J Plast Surg. 2013;36(8):519-26. https://doi.org/10.1007/s00238-013-0854-z
6. Asgeirsson KS, Rasheed T, McCulley SJ, Macmillan RD. Oncological and cosmetic outcomes of oncoplastic breast conserving surgery. Eur J Surg Oncol. 2005;31(8):817-23. https://doi.org/10.1016/j.ejso.2005.05.010
7. Dian D, Schwenn K, Mylonas I, Janni W, Friese K, Jaenicke F. Quality of life among breast cancer patients undergoing autologous breast reconstruction versus breast conserving therapy. J Cancer Res Clin Oncol. 2007;133(4):247-52. https://doi.org/10.1007/s00432-006-0163-z
8. Fitzal F, Krois W, Trischler H, Wutzel L, Riedl O, Kühbelböck U, et al. The use of a breast symmetry index for objective evaluation of breast cosmesis. Breast. 2007;16(4):429-35. https://doi.org/10.1016/j.breast.2007.01.013
9. Garbay JR, Rietjens M, Petit JY. Esthetic results of breast reconstruction after amputation for cancer. 323 cases. J Gynecol Obstet Biol Reprod (Paris). 1992;21(4):405-12. PMID: 1624727
10. Kuroda F, Urban C, Zucca-Matthes G, De Oliveira VM, Arana GH, Iera M, et al. Evaluation of aesthetic and quality-of-life results after immediate breast reconstruction with definitive form-stable anatomical implants. Plast Reconstr Surg. 2016;137(2):278e-86e. https://doi.org/10.1097/01.prs.0000475746.17968.f4
11. Wachter T, Edlinger M, Foerg C, Djedovic G, Mayerl C, Kinzl J, et al. Differences between patients and medical professionals in the evaluation of aesthetic outcome following breast reconstruction with implants. J Plast Reconstr Aesthet Surg. 2014;67(8):1111-7. https://doi.org/10.1016/j.bjps.2014.04.004
12. Beesley H, Ullmer H, Holcombe C, Salmon P. How patients evaluate breast reconstruction after mastectomy, and why their evaluation often differs from that of their clinicians. J Plast Reconstr Aesthet Surg. 2012;65(8):1064-71. https://doi.org/10.1016/j.bjps.2012.03.005
13. Dikmans REG, Nene LEH, Bouman MB, De Vet HCW, Mureau MAM, Buncamper ME, et al. The aesthetic items scale: a tool for the evaluation of aesthetic outcome after breast reconstruction. Plast Reconstr Surg Glob Open. 2017;5(3):e1254. https://doi.org/10.1097/GOX.0000000000001254
14. Kim MK, Kim T, Moon HG, Jin US, Kim K, Kim J, et al. Effect of cosmetic outcome on quality of life after breast cancer surgery. Eur J Surg Oncol. 2015;41(3):426-32. https://doi.org/10.1016/j.ejso.2014.12.002