



Therapeutic breast reduction—are doctors and patients satisfied?

Carolina Andresen¹  · Augusta Cardoso¹ · Cristina Cunha¹ · João Morais¹ · Gustavo Coelho¹ · Maria da Luz Barroso¹ · João Guimarães¹ · Horácio Costa¹

Received: 4 July 2018 / Accepted: 20 November 2018 / Published online: 2 January 2019
© Springer-Verlag GmbH Germany, part of Springer Nature 2019

Abstract

Background Therapeutic breast reduction (TBR) is an oncoplastic technique that applies breast reduction principles for oncologic purposes. Given that TBR indications have expanded, the purpose of this study is to ascertain the aesthetic outcome of this procedure, and determine how it may be influenced by different surgical techniques and postoperative radiotherapy.

Methods A non-randomized cohort study was performed, including breast cancer female patients who underwent breast conserving surgery with TBR. The primary outcome was the esthetic result of the reconstruction, evaluated by both plastic surgeons and patients, at least 12 months after surgery.

Results The aesthetic assessment was made in 42 patients. Overall, the clear majority of patients classified the outcome as good or perfect (95.2%), with less than 5% considering the outcome as mediocre. As for plastic surgeons, 83.3% were considered perfect/good outcomes, with 16.7% mediocre results. There were no poor results, neither for the patient nor the surgeon. There were no statistically significant associations between the esthetic result and tumor location nor its relation to the skin-resection pattern.

Conclusion Aesthetic outcomes with this technique are promising, even when there is the need for technical modifications and despite the need for adjuvant radiotherapy, making it valuable for tumors in all locations.

Level of Evidence: Level III, risk / prognostic study.

Keywords Breast · Therapeutic breast reduction · Oncoplastic surgery · Esthetic outcome

Introduction

Breast cancer is the most commonly diagnosed malignant tumor in women from developed countries [1–3] and carries important psychological and social distress. Nowadays, most women are expected to enjoy long-term survival [2, 4–6], and, besides disease control, the esthetic appearance of the reconstructed breast is considered critical [1, 2, 4, 6–10].

Breast-conserving procedures combined with radiotherapy (RT) were found to have recurrence rates comparable to those obtained with mastectomy [1, 2, 4, 5, 7, 11–14], while adding significant benefit to body image and patient satisfaction [1, 3, 5, 9, 12, 14, 15]. However, the use of RT in all patients seems to have significant implications in attaining long-term breast

symmetry that should be considered during the surgical procedure [2, 16].

Therapeutic breast reduction (TBR) is an oncoplastic technique that applies breast reduction principles for oncologic purposes [1, 2, 4, 6, 14, 17–19], whenever there is appropriate tumor-to-breast ratio [2, 4, 7, 15]. It allows for wider resection margins [2, 3, 5–7, 12, 17, 20] with greater oncologic safety [2, 4, 7, 12, 13] and, since it is a procedure with which most surgeons are familiarized, is associated with few complications [4, 12, 17]. Moreover, it permits contralateral breast symmetrization in the same surgery [15] and, by reducing breast volume, it theoretically diminishes the impact of RT in mammary tissue [2, 3, 5, 6, 13, 14]. Whenever tumors are located outside the standard skin-excision pattern, the regular technique may be subject of imaginative modifications, although worse aesthetic results have been described [2].

Given that TBR indications have expanded [1, 12, 18–20], the purpose of this study is to ascertain the aesthetic outcome of this procedure, and determine how it may be influenced by different surgical techniques and postoperative radiotherapy.

✉ Carolina Andresen
carolina_andresen@hotmail.com

¹ Plastic, Reconstructive and Craniomaxillofacial Microsurgery Unit, Centro Hospitalar Vila Nova de Gaia/Espinho, Rua Conceição Fernandes, s/n 4434-502 Vila Nova de Gaia, Portugal

Methods

A non-randomized retrospective cohort study was performed, including consecutive breast cancer female patients who underwent breast conserving surgery with TBR, between June 2011 and December 2016 in Vila Nova de Gaia Hospital Center (CHVNG), in Portugal. Patients with benign breast tumors were excluded. Demographic, procedural, and postoperative data were retrospectively collected from clinical records and patients' interview, using a standardized study pro-forma.

Preoperative assessment

All patients were preoperatively evaluated by a multidisciplinary team, including both plastic and breast surgeons.

Patients capable of sustaining adjuvant surgery, with medium- to large-sized breasts with or without ptosis, and tumor-to-breast ratio compatible with therapeutic breast reduction were offered conserving surgery with TBR and included in the study. Multifocal tumors—if located in a well-demarcated breast region—tumor size and tumor location were not considered to be absolute contraindications to this procedure.

Patients with significant chest-wall or skin involvement, extensive and disseminated malignant microcalcifications, and inflammatory carcinoma were excluded.

Written informed consent was obtained for all patients.

Surgical methods

All surgeries were conducted by senior breast and plastic surgeons. Preoperatively, plastic surgeons marked the breast reduction skin-resection pattern on the patient. The skin incision outline was selected according to breast ptosis and the pedicle was chosen regarding tumor location. Tumor-to-skin distance inferior to 1 cm defined the necessity of en bloc skin excision with the tumor. When there was the need for concomitant skin resection that would distort or alter nipple-areolar complex (NAC) shape or position under direct closure, and the lesion was outside the mammoplasty pattern, modifications to the classical breast reduction design were ensued.

During surgery, all rules for hygienic surgery were followed meticulously to decrease the risk of infection. Senior breast surgeons were responsible for sentinel lymph node biopsy, after dual-agent lymphatic mapping, and tumor resection. All tumor specimens were sent to extemporaneous examination by an experienced pathologist. When peripheral tumor margins were positive for breast cancer on histological examination, surgical margins were widened. The tumor bed was then marked with surgical clips.

Afterward, TBR was ensued by plastic surgeons. Contralateral breast reduction was generally made with similar skin-resection pattern and pedicle. Excised breast tissue was sent to anatomopathological analysis. One closed-suction drain was placed on each breast.

Antibiotic prophylaxis was made in all patients for the first 24 h, commencing 30 min before surgery, according to hospital protocol. Suction drains were removed if drainage was equal or less than 30 ml in 24 h. All patients underwent thromboembolism prophylaxis with subcutaneous enoxaparin 40 mg, each day, starting the first dose 12 h before surgery.

After hospital discharge, every patient had oncologic, plastic, and general surgery follow-up. A multidisciplinary group decided which adjuvant therapy was required to complement surgery.

Outcomes

The primary outcome was the aesthetic result of the reconstruction. All patients were summoned to an outpatient consult, at least 12 months after surgery, in the presence of two senior plastic surgeons.

The aesthetic result was objectively evaluated by means of a questionnaire, based on the one published by Strasser et al. [21]. This grading system lays on the premise that perfection is the lack of imperfection, and it is easier to define what makes the result less than perfect, rather than defining what a perfect result is. Five categories of imperfections were assessed—malposition, distortion, asymmetry, contour deformity, and scar. Malposition refers to NAC placement in the breast mound; distortion relates with the shape of the NAC; asymmetry includes any difference in size or shape between both breasts; contour deformity includes any interruption of the smooth continuous curve of the breast mound; and scar refers to its quality, positioning, and length. These flaws were graded according to their severity: if only noticeable, they were assigned 1 point under each of the five categories; obviously, noticeable flaws were assigned 5 points; and obvious and deforming flaws were given 15 points under each heading. These points were then added to give a final score of perfect, good, mediocre, or poor. A perfect result was one with no noticeable flaws under any of these five headings, when the final score was 0. Total scores of 1 to 4 were considered good, 5 to 14 were mediocre, and 15 or higher were poor (Fig. 1). It took only one obvious and deforming flaw to deem a result as poor.

Both the patient and the physicians independently evaluated the final outcome. The scores were recorded. Standardized photographs were taken to document the results.

Secondary outcomes included early complications, defined by the occurrence of any adverse effect within

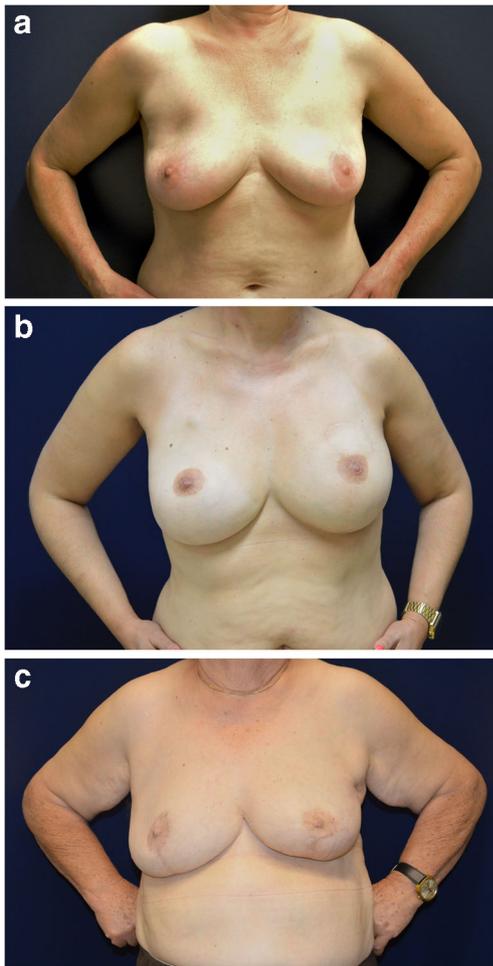


Fig. 1 Plastic surgery aesthetic scores. **a** Perfect score (0 point). There are no flaws concerning NAC position and shape; breast mound contour is smooth and harmonious; good breast symmetry; scars are inconspicuous, with no dog ears. **b** Good score (1 point). No flaws concerning NAC position and shape, breast contour or scars; there is, however, a noticeable breast asymmetry (1 point). **c**. *mediocre* score (7 points). There is an obvious breast asymmetry (5 points), and noticeable right NAC shape deformity (1 point). There is, as well, a noticeable alteration of breast contour in the lower quadrant transition (1 point). NAC nipple-areolar complex

30 days of surgery as a direct result of the procedure, such as hematoma, infection, seroma, and delayed wound healing.

Statistical analysis

Continuous variables were expressed as median (range) and categorical variables as percentages and frequencies. Statistical analysis was performed using IBM SPSS v24.0 (SPSS Inc., Chicago, IL). Chi-squared test was used for categorical variables, and median test was used to compare medians between groups. *P* values of less than 0.05 were considered statistically significant.

Results

There were 47 patients who underwent TBR between June 2009 and December 2014 (Table 1). Patients were all female, with a median age of 62 years old (range 44–77 years old) and a median body mass index (BMI) before surgery of 28.5 (range 21–38). Most patients were overweight or obese. Subjectively, some women mentioned weight variation during adjuvant therapy, although it was already regularized by the time of the interview. Arterial hypertension was present in approximately one third of patients. Only a small minority of patients were diabetic or active smokers. Median follow-up was 42 months (range 12–71 months).

Tumor characteristics

Median tumor size was 12 mm, but tumors up to 40 mm were addressed with this technique (range 5–40 mm). As for tumor location, 40.4% ($n = 19$) were located in the right breast and 59.6% ($n = 28$) in the left. There were no bilateral cancers. Tumor location was defined according to Fig. 2.

Surgery

All patients were submitted to conserving surgery with either lumpectomy or quadrantectomy. Specimen median weight was 108.5 g (range 43.0–420.0 g). Tumor and additional breast's weight together was a median of 126.0 g, but there were patients in which there was up to 960.0 g of excised breast tissue. Contralateral breast reduction or mastopexy was ensued, with excision of a similar amount of breast tissue (median 156.0 g, range 33.6–1040 g).

Therapeutic mammoplasty

The skin-resection outline consisted of Wise pattern in most patients.

For clinical and surgical purposes, the authors consider that, more important than tumor location alone, is its relation to the skin-resection pattern and the need for concomitant skin excision.

- a) Tumor inside regular skin-resection pattern (27.6%, $n = 13$)

When the tumor was located inside the regular skin excision outline ($n = 13$), there was no concern about concomitant skin excision and the main decision resided in pedicle choice: for tumors in the upper quadrant transition ($n = 4$), the inferior pedicle was chosen; for tumors in outer and inner quadrant transitions ($n = 2$), the preferred pedicle was the inferior-medio-lateral, while for tumors in the lower quadrants ($n = 6$), the NAC pedicle was mostly based superiorly.

Table 1 Study population detailed data. Normal weight: BMI < 25, overweight: BMI ≥ 25 and < 30, obese: BMI ≥ 30; BMI body mass index

Patient demographics		
Age (years) (median, range)	62 (44–77)	
BMI	Preoperative	At interview
Normal weight	24.0% (<i>n</i> = 11)	19.5% (<i>n</i> = 8)
Overweight	42.0% (<i>n</i> = 20)	48.8% (<i>n</i> = 20)
Obese	34.0% (<i>n</i> = 16)	31.7% (<i>n</i> = 13)
Comorbidities		
HT	36.0% (<i>n</i> = 17)	
DM	14.0% (<i>n</i> = 6)	
Active smokers	4.0% (<i>n</i> = 2)	
Tumor characteristics		
Size (mm) (median, range)	12.0 (5.0–40.0)	
Weight (g) (median, range)	108.5 (43.0–420.0)	
Location		
Inside regular skin-resection pattern	27.6% (<i>n</i> = 13)	
Outside skin-resection pattern without associated skin excision	53.2% (<i>n</i> = 25)	
Outside skin-resection pattern with associated skin excision	19.2% (<i>n</i> = 9)	
Therapeutic mammoplasty		
Skin-resection outline		
Wise	72.3% (<i>n</i> = 34)	
Vertical scar	8.5% (<i>n</i> = 4)	
Periareolar	17.0% (<i>n</i> = 8)	
Others	2.2% (<i>n</i> = 1)	
Pedicle		
Inferiorly based	55.3% (<i>n</i> = 26)	
Superiorly based	27.7% (<i>n</i> = 13)	
Central	12.8% (<i>n</i> = 6)	
Missing	4.2% (<i>n</i> = 2)	
Adjuvant treatment		
Radiotherapy	91.5% (<i>n</i> = 43)	
Chemotherapy	51.1% (<i>n</i> = 24)	
Hormonal therapy	78.7% (<i>n</i> = 37)	
None	8.5% (<i>n</i> = 4)	

b) Tumor outside skin-resection pattern without associated skin excision (53.2%, *n* = 25)

Most tumors were located outside the skin resection pattern (*n* = 35), but when tumor-to-skin distance was superior to 1 cm, there was no need for skin excision to attain safe margins (*n* = 25). The pedicle was selected according to tumor location. For upper outer quadrant lesions (*n* = 15), the most used technique was the inferior pedicle, either classical (*n* = 4) or with medial and lateral extensions (*n* = 4). However, the superior (*n* = 1) and superior-medial pedicle (*n* = 1) were used as well. Upper inner quadrant tumors (*n* = 4) were managed with inferior and superior-lateral pedicles. For upper quadrant transition (*n* = 3), the inferior or inferior-medial-lateral pedicles were preferred.

c) Tumor outside skin-resection pattern with associated skin excision (19.2%, *n* = 9)

The biggest challenge posed when tumors were located outside the skin resection pattern but needed concomitant skin excision that would distort or alter NAC shape or position under direct closure, to obtain oncologic margins (*n* = 9). In superior quadrant transition (*n* = 3), a superior extension of the inferior pedicle with a cutaneous island and upper displacement of the key hole were made in two patients. In outer quadrant transition (*n* = 1), a skin-trade modification of the Wise pattern was used (Fig. 3). For a tumor in inner quadrant transition, a clockwise 90° rotation of the vertical scar was used. Retroareolar tumors (*n* = 3) were present in three patients, and in all of them, the inferior pedicle was used and there was immediate nipple

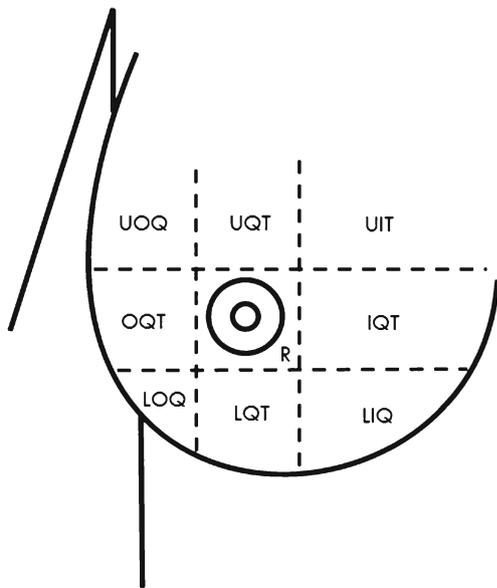


Fig. 2 Tumor location. UOQ upper outer quadrant, UQT upper quadrant transition, UIQ upper inner quadrant, OQT outer quadrant transition, R retroareolar, IQT inner quadrant transition, LOQ lower outer quadrant, LQT lower quadrant transition, LIQ lower inner quadrant

reconstruction with local flaps and areolar reconstruction with full-thickness skin grafting.

Adjuvant treatment

All but four patients received adjuvant radiotherapy, either alone ($n = 2$) or combined with chemotherapy ($n = 4$),

hormonal therapy ($n = 15$), or both ($n = 22$). Two patients needed subsequent mastectomy due to the presence of multifocal tumors with positive specimen margins on definitive pathological exam. Those patients were excluded from esthetic outcome assessment.

Outcomes

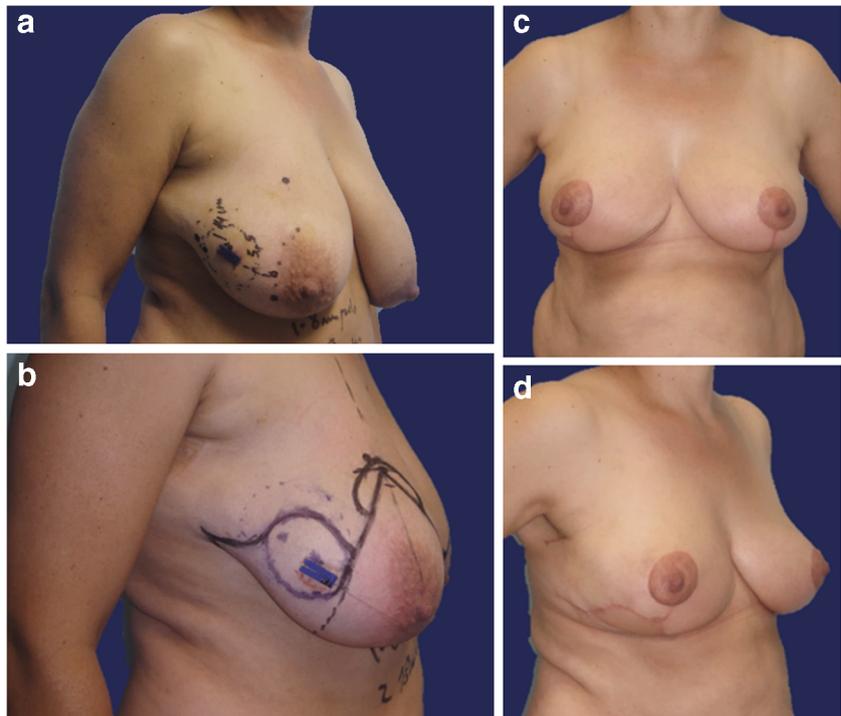
The questionnaire for aesthetic assessment was applied to 42 patients. Two patients had undergone mastectomy and three patients were unavailable for the outpatient consult.

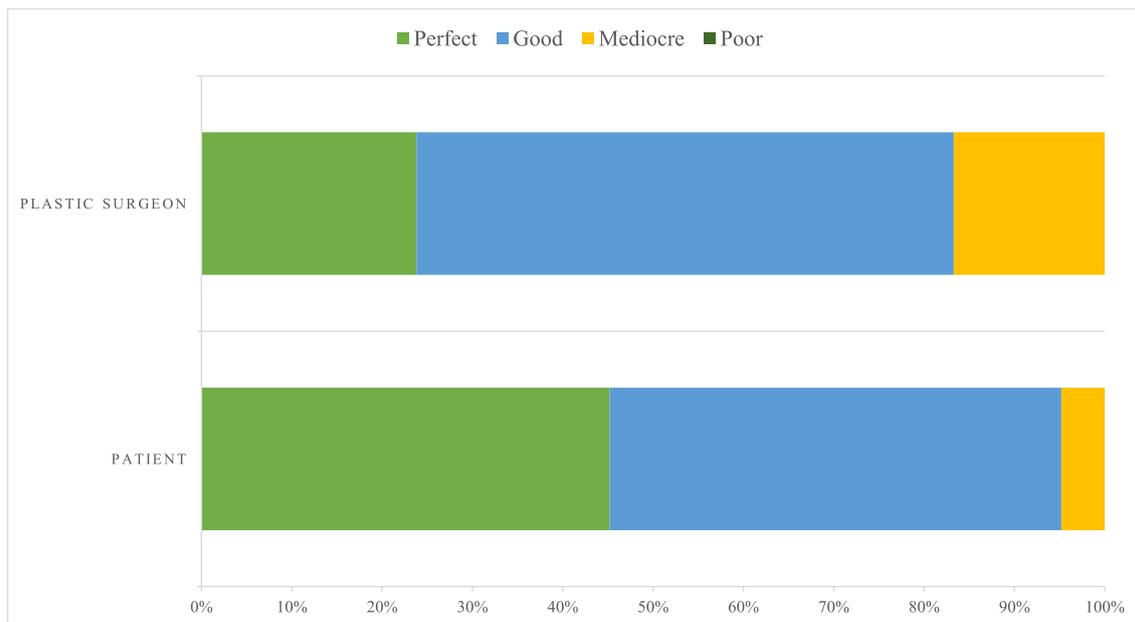
Overall, the clear majority of patients classified the outcome as good or perfect, with only two patients considering the outcome as mediocre. As for plastic surgeons, over 80% were considered perfect/good outcomes, with 16.7% mediocre results. There were no poor results, neither for the patient nor the surgeon (Graphic 1 and Table 2). There was a 52.4% ($n = 22$) concordance between patient and physician. When the score was discordant, patient score was better in 85% ($n = 17$) of cases. This is understandable since, subjectively, there was a clear perception of patients’ psychological and ergonomic improvement, besides the aesthetic compensation.

Breast symmetry was the most affected outcome, out of the five categories assessed by the questionnaire. According to surgeons’ evaluation, 57.1% ($n = 24$) of patients presented breast asymmetry. In two thirds (66.7%, $n = 16$) of those cases, the breast which had the tumor was smaller.

There was no statistically significant relation between esthetic result and location of the tumor nor its relation to the

Fig. 3 Outer quadrant transition tumor of the right breast, with the need for en bloc skin excision. A skin-trade modification of the Wise pattern was made. **a, b** Preoperative skin markings. **c, d** Three-month postoperative result





Graphic 1 Overall esthetic outcome for both plastic surgeons and patients

skin-resection pattern. Similarly, there were no statistically significant associations between tumor size, skin-incision pattern, age, patient's weight, comorbidities, or time elapsed

Table 2 Aesthetic outcome in therapeutic breast reduction

Esthetic outcome	Patient	Plastic surgeon
Overall ($n = 42$)		
Perfect	45.2% ($n = 19$)	23.8% ($n = 10$)
Good	50% ($n = 21$)	59.5% ($n = 25$)
Mediocre	4.8% ($n = 2$)	16.7% ($n = 7$)
Poor	–	–
Tumor inside regular skin-resection pattern ($n = 12$)		
Perfect	50% ($n = 6$)	25% ($n = 3$)
Good	33.3% ($n = 4$)	50% ($n = 6$)
Mediocre	16.7% ($n = 2$)	25% ($n = 3$)
Poor	–	–
Tumor outside skin-resection pattern without associated skin excision ($n = 23$)		
Perfect	39.1% ($n = 9$)	21.7% ($n = 5$)
Good	60.9% ($n = 14$)	65.2% ($n = 15$)
Mediocre	–	13.1% ($n = 3$)
Poor	–	–
Tumor outside skin-resection pattern with associated skin excision ($n = 7$)		
Perfect	57.1% ($n = 4$)	28.6% ($n = 2$)
Good	42.9% ($n = 3$)	57.1% ($n = 4$)
Mediocre	–	14.3% ($n = 1$)
Poor	–	–

since the last RT session and the aesthetic outcome ($p > 0.05$ for all variables; chi-squared test).

Early complications were registered in 14.9% ($n = 7$) patients, six hematomas and one seroma. There were no records of infection or wound-healing problems. Three hematomas needed surgical drainage while the remaining complications were treated conservatively. None of these problems delayed the beginning of selected adjuvant therapy. However, the presence of early postoperative complications was found to be associated to a mediocre aesthetic result ($p = 0.023$; chi-squared test).

Discussion

TBR is an oncoplastic technique that applies breast reduction principles for oncologic purposes [1, 2, 4, 12, 17], whenever there is appropriate tumor-to-breast ratio [2, 4]. There are, although, several concerns about the effect of postoperative complications, technique modifications, and adjuvant RT on the esthetic outcome [2, 13]. Radiotherapy's acute and chronic implications are well described [16] and, thus, may alter the esthetic outcome of breast reconstruction and even convert an initial good result into an average one [1].

This cohort shows that the esthetic outcome of TBR is rather favorable. Overall, in the patients' perspective, the outcome was perfect/good in 95.2%, comparing to 83.3%, according to plastic surgeons, with no poor results. It is understandable that patients' perception is better than the surgeons'. Besides the esthetic compensation, there is psychological and ergonomic improvement [2, 6, 7, 12, 15, 22]. Just like any

other woman who undergoes a regular breast reduction, most these women stop complaining about upper body pain, inability to exercise, difficulty in finding adequate clothing, or shoulder grooving from bra straps [3, 7, 14, 15, 17].

Some of these patients, however, may be subjected to modifications to the regular breast reduction technique, dictated by tumor location and/or the need to excise skin en bloc with the tumor. When the tumor is located inside the regular skin excision outline, there is no need for concern about concomitant skin excision. The main decision resides in pedicle choice, with or without extension, which is made according to tumor location, as it has already been extensively described in the literature [2, 4, 9].

Regarding tumors outside the regular skin pattern without the need for skin resection, once again the choice of technique lays on the pedicle, but there is the additional concern to fill the defect caused by tumorectomy, to create a harmonious and undeformed breast mound [4, 22]. Maintaining the medial and lateral wedges that are usually discarded in a breast reduction, together with the regular inferior pedicle, creates an inferior-medial-lateral pedicle. This allows filling tumorectomy defects in the upper inner and outer quadrants, as well as inner and outer quadrant transition, attaining favorable aesthetic results [2].

The biggest challenge poses, however, when tumors are located outside the skin resection pattern but need concomitant skin excision that would distort or alter NAC shape or position under direct closure, to obtain oncologic margins. Several technical modifications are presented in the literature. According to the authors' experience, superior extension of the inferior pedicle with a cutaneous island and upper displacement of the key hole attains good aesthetic results for tumor in upper quadrant transition, attaining a good-to-perfect score in all three cases in this cohort, both for patients and surgeons.

For outer and inner quadrant transition the best option seems to be skin-trade modifications to the regular Wise pattern (Fig. 3). Clock or counterclockwise rotations of skin incision patterns, either Wise type or vertical, especially close to 90°, place transverse scars in areas where scar retraction will obviously alter breast mound shape and natural outline, especially after RT, as was observed in one case in this cohort. Therefore, in the authors' opinion they should be avoided and, when possible, replaced by other technical modifications.

Retroareolar tumors also pose a challenge and were long considered a relative contraindication for breast-conserving surgery [2, 16]. However, immediate nipple reconstruction may take place with good or perfect esthetic results [9, 16], as shown in this study. Despite NAC excision, a breast pedicle is created, leaving a skin circle which will be placed on the desired NAC position. This skin will then provide local flaps for nipple reconstruction, allowing for total breast reconstruction in one surgery. Despite technical modifications, there were good/perfect results in most patients (Table 2).

One major concern about breast-conserving surgery rests on the need for adjuvant RT in all patients. This seems to have significant implications in attaining long-term breast symmetry that should be considered during the surgical procedure. RT is known to cause long-term fibrosis and atrophy with subsequent shrinkage of the remaining breast tissue, leading to breast asymmetry [4, 16, 22]. Some authors advocate that, during surgery, the breast with the tumor should be left 10% larger than the contralateral one [4, 6, 22], considering the subsequent RT effects. Indeed, in this study, breast symmetry was the most affected outcome, out of the five categories assessed by the questionnaire, existing in more than half the patients. In most cases, the breast which had the tumor was smaller. Subjective analysis, however, can deliberate that in most cases this asymmetry was only noticeable, but not obvious nor deforming. One can, thus, assume that the RT effects must be taken into consideration, but should not preclude the use of TBR.

There was an expected correlation between the presence of postoperative complications and a worse esthetic outcome. However, considering that TBR is a procedure with which most surgeons are familiarized, it is associated with a low early complication rate [4, 12, 17], with many of them being addressed by conservative treatment, and none of them delaying further adjuvant treatment [9, 20, 22].

Nevertheless, this study presents several limitations, being a single-center retrospective non-randomized cohort with a small sample size.

Conclusions

Therapeutic breast reduction is an oncoplastic technique that applies breast reduction principles for oncologic purposes, depending much more on tumor-to-breast ratio than on tumor size. Its widening use in clinical practice has allowed for the expansion of breast-conserving surgery indications, while adding significant improvement in body image and patient self-esteem. Aesthetic results with this technique are promising, even when there is the need for technical modifications and despite the need for adjuvant RT, making it valuable for tumors in all locations. Although different tumor characteristics may compel the need for pedicle or skin incision modifications, neither skin-pattern incision nor pedicle choice significantly influence the final esthetic result. The implications of radiotherapy must be accounted for during surgery but should not preclude the use of this technique.

Compliance with ethical standards

Funding The authors have no financial interest to declare in relation to the content of this article. No funding was received for this article.

Conflict of interest Carolina Andresen, Augusta Cardoso, Cristina Cunha, João Morais, Gustavo Coelho, Maria da Luz Barroso, João Guimarães, and Horácio Costa declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained for all patients who were questioned and photographed in the outpatient consult. For the remaining patients, for this type of study formal consent is not required.

References

- Hillberg NS, Meesters-Caberg MAJ, Beugels J, Winkens B, Vissers YLJ, van Mulken TJM (2018) Delay of adjuvant radiotherapy due to postoperative complications after oncoplastic breast conserving surgery. *Breast* 39:110–116
- Bertozzi N, Pesce M, Santi PL, Raposio E (2017) Oncoplastic breast surgery: comprehensive review. *Eur Rev Med Pharmacol Sci* 21(11):2572–2585
- Barnea Y, Inbal A, Barsuk D, Menes T, Zaretski A, Leshem D, Weiss J, Schneebaum S, Gur E (2014) Oncoplastic reduction using the vertical scar superior-medial pedicle pattern technique for immediate partial breast reconstruction. *Can J Surg* 57(4):E134–E140
- Thiessen FEF, Tjalma WAA, Tondu T (2018) Breast reconstruction after breast conservation therapy for breast cancer. *Eur J Obstet Gynecol Reprod Biol* 230:233–238
- van Paridon MW, Kamali P, Paul MA, Wu W, Ibrahim AMS, Kansal KJ, Houlihan MJ, Morris DJ, Lee BT, Lin SJ, Sharma R (2017) Oncoplastic breast surgery: achieving oncological and aesthetic outcomes. *J Surg Oncol* 116(2):195–202
- Emiroglu M, Karaali C, Salimoglu S, Sert I, Aydın C (2016) Oncoplastic reduction mammoplasty for breast cancer in women with macromastia: long term aesthetic, functional and satisfaction outcomes. *Contemp Oncol (Pozn)* 20(3):256–260
- Shin ES, Kim HI, Song SY, Lew DH, Lee DW (2018) Selection of oncoplastic surgical technique in Asian breast cancer patients. *Arch Plast Surg* 45(1):37–44
- Weber WP, Soysal SD, el-Tamer M, Sacchini V, Knauer M, Tausch C, Hauser N, Güntherth A, Harder Y, Kappos EA, Schwab F, Fitzal F, Dubsy P, Bjelic-Radisic V, Reitsamer R, Koller R, Heil J, Hahn M, Blohmer JU, Hoffmann J, Solbach C, Heitmann C, Gerber B, Haug M, Kurzeder C (2017) First international consensus conference on standardization of oncoplastic breast conserving surgery. *Breast Cancer Res Treat* 165(1):139–149
- Weber WP, Soysal SD, Fulco I, Barandun M, Babst D, Kalbermatten D, Schaefer DJ, Oertli D, Kappos EA, Haug M (2017) Standardization of oncoplastic breast conserving surgery. *Eur J Surg Oncol* 43(7):1236–1243
- Shekhawat L, Busheri L, Dixit S, Patel C, Dhar U, Koppiker C (2015) Patient-reported outcomes following breast reconstruction surgery and therapeutic mammoplasty: prospective evaluation 1 year post-surgery with BREAST-Q questionnaire. *Indian J Surg Oncol* 6(4):356–362
- Rodriguez GJZ et al (2018) Oncoplastic surgery for the conservative treatment of breast cancer in Peru's National Cancer Institute. *Ecancermedicalscience* 12:815
- Crown A, Handy N, Rocha FG, Grumley JW (2018) Oncoplastic reduction mammoplasty, an effective and safe method of breast conservation. *Am J Surg* 215(5):910–915
- Acea-Nebri B, Cerejio-Garea C, García-Novoa A, Varela-Lamas C, Builes-Ramírez S, Bouzón-Alejandro A, Mosquera-Oses J (2017) The role of oncoplastic breast reduction in the conservative management of breast cancer: complications, survival, and quality of life. *J Surg Oncol* 115(6):679–686
- Di Micco R et al (2017) Standard wide local excision or bilateral reduction mammoplasty in large-breasted women with small tumours: surgical and patient-reported outcomes. *Eur J Surg Oncol* 43(4):636–641
- Hiller A et al (2018) Oncoplastic reduction pattern technique following removal of Giant Fibroadenoma. *Eplasty* 18:e4
- Buller M et al (2017) Immediate breast reconstruction of a nipple areolar lumpectomy defect with the L-flap skin paddle breast reduction design and contralateral reduction mammoplasty symmetry procedure: optimizing the Oncoplastic surgery multispecialty approach. *Eplasty* 17:e14
- Imahiyerobo TA, Pharmed LA, Swistel AJ, Talmor M (2015) A comparative retrospective analysis of complications after Oncoplastic breast reduction and breast reduction for benign Macromastia: are these procedures equally safe? *Ann Plast Surg* 75(4):370–375
- Challoner T, Skillman J, Wallis K, Vourvachis M, Whisker L, Hardwicke J (2017) Oncoplastic techniques: attitudes and changing practice amongst breast and plastic surgeons in Great Britain. *Breast* 34:58–64
- Piper ML, Esserman LJ, Sbitany H, Peled AW (2016) Outcomes following Oncoplastic reduction mammoplasty: a systematic review. *Ann Plast Surg* 76(Suppl 3):S222–S226
- Ettinger RE et al (2016) Bilateral reduction Mammoplasty as an Oncoplastic technique for the Management of Early-Stage Breast Cancer in women with Macromastia. *Eplasty* 16:e5
- Strasser EJ (1999) An objective grading system for the evaluation of cosmetic surgical results. *Plast Reconstr Surg* 104(7):2282–2285
- Losken A et al (2017) Oncoplastic Breast Reduction Technique and Outcomes: An Evolution over 20 Years. *Plast Reconstr Surg* 139(4):824e–833e