



# Evaluation of a Retroglandular Oncoplastic Technique as a Standard Level I Oncoplastic Breast-Conserving Surgery: A Retrospective Clinicopathologic Study of 102 Patients With Breast Cancer

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## Abstract

**This study presents a Level I oncoplastic breast-conserving surgery technique for performing tumorectomy by retroglandular exploration through a skin incision made in the inferior mammary fold. A retrospective study was performed involving patients with early stage breast cancer (n = 102). Retroglandular oncoplastic breast-conserving surgery is a novel, effective Level I oncoplastic technique for radical resection of breast tumors ≤ 3 cm in size.**

**Background:** This study presents a novel Level I oncoplastic breast-conserving surgery technique for performing tumorectomy by retroglandular exploration through a skin incision made in the inferior mammary fold. **Patients and Methods:** A retrospective single-center cohort study involving patients with early-stage breast cancer (n = 102) was performed. The patient characteristics were recorded, as well as the quality of life rated by BREAST-Q. Postoperative complications were assessed using the Clavien-Dindo classification system. Esthetic outcomes were evaluated with Breast Cancer Conservative Treatment-cosmetic results (BCCT.core) software and a 5-point Likert scale. **Results:** The median follow-up time was 11 months (range, 7-25 months). The median specimen weight and operative time were 49.8 g (range, 13.4-117.9 g) and 40 minutes (range, 20-80 minutes), respectively. The mean pathologic tumor size was 15 mm (SD, ±7). Owing to positive surgical margins, re-excisions and mastectomies were performed in 13.7% and 2.9% of patients, respectively. The overall complication rate was 24.5% (n = 25), with the most common being seroma formation (13.7%; n = 14). The median Likert scale score was 4.3 (range, 2.1-5), and the median overall esthetic outcome assessed by BCCT.core was 2.1 points (range, 1-4 points). In BREAST-Q domains, the median scores of the “adverse effects of radiation,” “physical well-being,” the “satisfaction with breasts,” and the “psychosocial well-being” were 27, 35, 90, and 93, respectively. **Conclusion:** Retroglandular oncoplastic breast-conserving surgery is a novel, effective Level I oncoplastic technique for radical resection of breast tumors ≤ 3 cm in size. Additional advantages include the preservation of natural breast shape, the safety of the technique, and the lack of a need for contralateral symmetrization.

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**Keywords:** Breast-conserving surgical technique, Level I oncoplasty, Modern breast surgery, Oncoplastic breast-conserving surgery, Retroglandular tumorectomy technique

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## Introduction

The first oncoplastic breast-conserving surgery (OBCS) techniques were described more than 2 decades ago. Since then, several OBCS techniques have been developed. Currently, there is little standardization of OBCS, and parallel different nomenclature exists. Weber et al proposed new nomenclature that distinguishes 4 categories by the key steps of the procedure: conventional tumorectomy, oncoplastic mastopexy, oncoplastic tumorectomy, and oncoplastic reduction mammoplasty.<sup>1</sup> Oncoplastic tumorectomy consists of either the displacement of tailored glandular and dermoglandular flaps as part of glandular reapproximation or volume replacement techniques. Glandular reapproximation is defined as epifascial and/or subcutaneous mobilization of the remaining breast tissue to bridge the cavity after tumorectomy.<sup>1</sup> Other OBCS techniques involve additional skin resection, nipple repositioning, or additional contralateral symmetrization.

In general, it can be stated that all OBCS techniques are performed from a frontal exploration of the dermoglandular breast tissue by making 1 or more skin incisions in the breast skin envelope.

The aim of the present study is to provide a detailed presentation of a novel Level I retroglandular oncoplastic tumorectomy technique that is performed by making a skin incision in the inferior mammary fold (IMF), combined with a retroglandular exploration that does not leave a scar on the breast skin envelope, preserving the full natural shape and appearance of the involved breast by glandular reapproximation.<sup>2</sup> A further aim of the present single-center, retrospective clinicopathologic analysis was to facilitate the acceptance of this novel retroglandular breast-conserving surgical technique as a standard Level I volume displacement OBCS by reporting its safety, reproducibility, and utility.

## Patients and Methods

A single-center, retrospective cohort study was performed between February 2016 and October 2017 based on a prospective database at the National Institute of Oncology in Budapest, Hungary. The study was approved by the institutional research ethics committee and involved 110 patients with stage 0 to II breast cancer.

All patients underwent retroglandular OBCS for solitary or multifocal cT0-2 unilateral tumors without contralateral symmetrization.

In retrospective processing, the exclusion criteria were as follows: patients with a history of breast-conserving surgery and/or radiation therapy, patients who had a completion mastectomy performed owing to the final histologic results, patients who were lost to follow-up, patients who declined to participate in the cosmetic

outcome measurements, and patients in whom genetic testing revealed a BRCA 1/2 mutation.

Re-excision owing to microscopically involved surgical margins was not an exclusion criterion. None of the patients with margin involvement received neoadjuvant systemic treatment.

The indications and contraindications for the retroglandular OBCS technique are summarized in Table 1.

The diagnosis of breast cancer, additional staging examinations, adjuvant treatments, and follow-up were performed according to an institutional protocol based on the European Society of Medical Oncology guidelines.<sup>3</sup>

Removal of nonpalpable tumors was performed with a radio-guided occult lesion localization technique supplemented by intraoperative specimen mammography and/or ultrasound examinations. For sentinel lymph node biopsy (SLNB), intraoperative imprint cytology was used only if the number of sentinel lymph nodes was 3 or more.

All of the analyzed patients underwent whole-breast radiation therapy with an overall dose of 50 Gy and additional tumor bed boost (16 Gy) irradiation (n = 45; 44.11%) and/or regional axillary and supraclavicular irradiation if indicated.

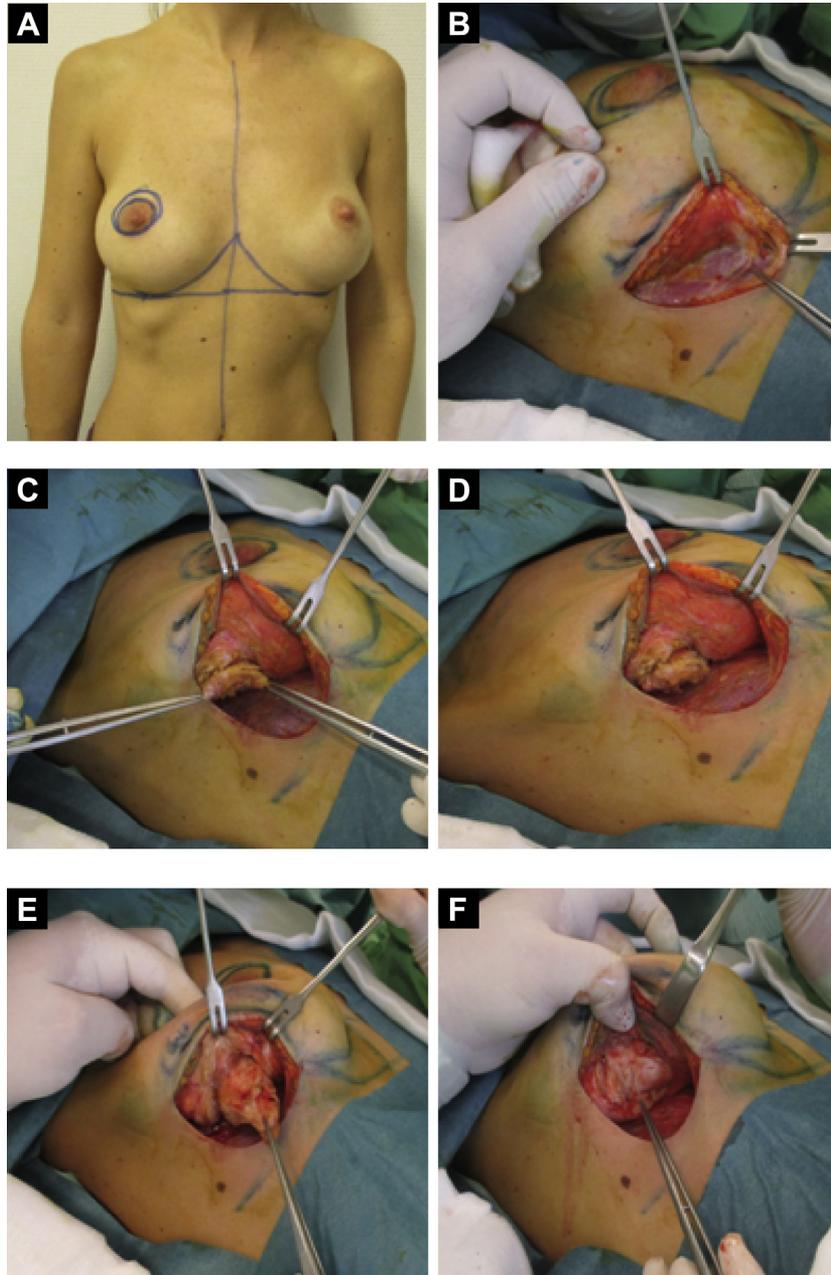
Level I to III axillary lymph node dissection was omitted in patients with limited axillary metastases (1 or 2 involved sentinel lymph nodes), according to the criteria of the American College of Surgeons Oncology Group (ACOSOG) Z0011 and the Optimal Treatment Of the Axilla—Surgery Or Radiotherapy (OTOASOR) trials.<sup>4-6</sup> The database included the most important clinicopathologic parameters, the initiation time of the adjuvant treatments, follow-up time, and oncologic status of the patients.<sup>3</sup> Postoperative complications were assessed according to the Clavien-Dindo classification system.<sup>7,8</sup> Grade I included minor, asymptomatic complications that did not require medical therapy or surgical intervention (eg, infections, hematomas, or suffusions, seromas, partial skin/nipple-areola complex [NAC] necrosis, limited fat necrosis, wound dehiscence, and lymphedema [redness of the skin]). Grade II included the same complications as grade I but requiring pharmacologic therapy or any minor intervention (eg, suture of wound dehiscence, chronic seroma puncture). Grade III complications were treated by invasive surgical procedures (eg, hematoma evacuation, chronic infections, extensive fat necrosis, full thickness skin/NAC necrosis, and wound dehiscence). Grade IV complications included permanent loss of function of an organ, whereas grade V complications resulted in the death of the patient.

The final subjective and objective esthetic outcomes were assessed during the sixth postoperative month following therapeutic OBCS. To assess the esthetic results, a 5-point Likert scale (1: strongly

**Table 1** Indications and Contraindications for the Retroglandular Oncoplastic Breast-conserving Surgery Technique

Indications	Contraindications
<ul style="list-style-type: none"> <li>- Solitary or multicentric tumors (optimally not close to the periphery)</li> <li>- Level I oncoplastic tumorectomy</li> <li>- Tumor size ≤ 20-30 mm</li> <li>- Any breast size, but ideally ≥ a B-cup size</li> <li>- Any breast ptosis, ranging from a normal breast to Regnault classification type I-III ptosis, pseudoptosis, or parenchymal maldistribution</li> <li>- Previously augmented breasts (submuscular or subglandular) with silicone implants</li> </ul>	<p>Relative contraindications:</p> <ul style="list-style-type: none"> <li>- Involution of fatty degenerated breast parenchyma</li> <li>- Unfavorable tumor-to-breast volume ratio</li> <li>- Previous mastopexy</li> </ul>

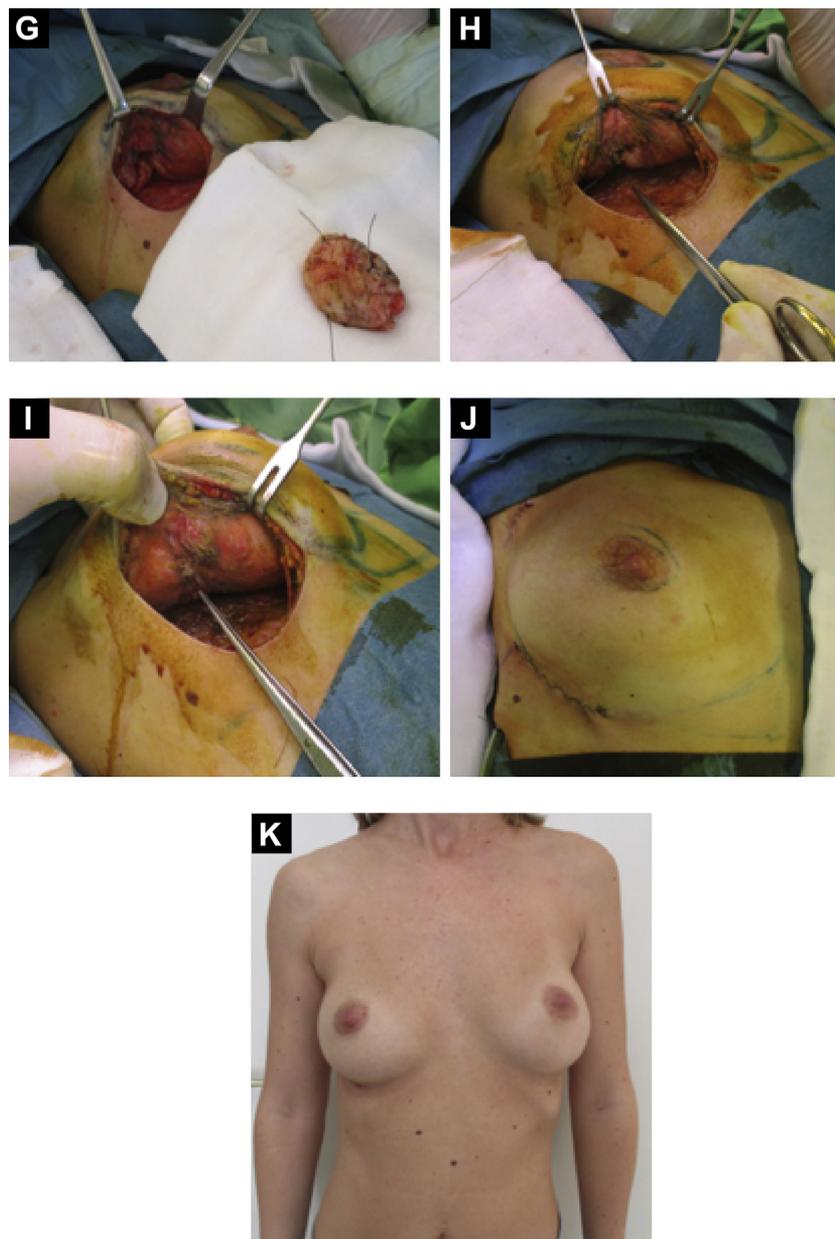
**Figure 1** A) A Palpable cT2 Invasive Ductal Carcinoma Was Confirmed in the Lower-outer Quadrant of the Right Breast in a Young Female Patient. The Footprint and the Incision in the Inferior Mammary Fold Were Marked in Standing Position During Preoperative Planning. The Periareolar Marking Served as an Alternative Plan. (B) The Incision Is Made Slightly Lateral in the Inferior Mammary Fold. The Parenchyma and the Deep Fascia Is Dissected From the Major Pectoral Muscle as Needed With Electrocautery. (C) The Resection Margin Is Marked With Electrocautery Around the Tumor by Incising the Deep Fascial Layer Around the Tumor. (D) The Dissection Is Performed Circularly Towards the Anterior Lamina of the Superficial Fascia. (E and F) The Tumor Is Dissected to the Level of the Subcutaneous Tissue. (G) Orientation of the Specimen According to Its in Vivo Position. (H) Placing the Adaptive Sutures Using Absorbable Yarn Into the Edges of the Mobilized Parenchymal Pillars. (I) Complete Parenchymal Reapproximation. (J) The Postoperative Result With a Vacuum and Suction System in Place. (K), Postoperative Status, 4 Weeks After Surgery



disagree, 2: disagree, 3: undecided, 4: agree, and 5: strongly agree) was used to evaluate the following statement: “This patient had an excellent esthetic outcome.”<sup>9</sup> The evaluation was performed by a

committee of 3 breast surgeons (Z.M., D.P., and P.K., who were not involved in the surgical procedure) by reviewing the whole series of photo documentation and individually scoring each patient. The

Figure 1 Continued



overall esthetic outcomes were classified objectively based on photo documentation using Breast Cancer Conservative Treatment-cosmetic results (BCCT.core) software (version 20)<sup>10</sup> on a 4-point classification scale (1: excellent, 2: good, 3: fair, 4: poor).<sup>10</sup>

For the study, selected modules, including the satisfaction with the breast, satisfaction with the outcome, and the psychosocial, sexual, and physical well-being modules, of the BREAST-Q validated patient-reported outcome measure postoperative questionnaire were used.<sup>11</sup>

The BREAST-Q questionnaire was administered to the patients at the sixth month following surgery.<sup>11</sup> The patients' responses to

each item on the scale were transformed using a scoring conversation table. The results ranged from 0 to 100, with higher scores reflecting higher satisfaction or better quality of life.

The collected data were analyzed using Statistica 12.0 software. To determine the mean and median values of the recorded factors, a descriptive statistical analysis and the Wilcoxon signed-rank test were used. Data with a non-normal distribution were analyzed with the Mann-Whitney *U* test. Survival intervals were analyzed using the Kaplan-Meier method and log-rank statistics. The correlations between active smoking, diabetic comorbidity, body mass index, and the occurrence of complications were statistically analyzed using

**Figure 2** A) Schematic Cross-sectional View of a Breast Containing a Tumor. (B) Status After Open Cavity Tumor Resection According to the Tumor Bed. (C) Direct Tension-free Glandular Pillar Approximation. (D) Absorbable Sutures Are Placed Approximately 10 to 12 mm From the Parenchymal Pillars, Not at the Edge, So the Surgeon Is Able to Invert a Significant Amount of Parenchymal Tissue Inside out to Fill the Tumor Bed. (E) A Dual-plane Parenchyma Mobilization. The Parenchyma Is Not Only Mobilized From the Major Pectoral Muscle but Also Over the Anterior Lamina of the Superficial Pectoral Fascia Directly Deep to the Subcutaneous Tissue

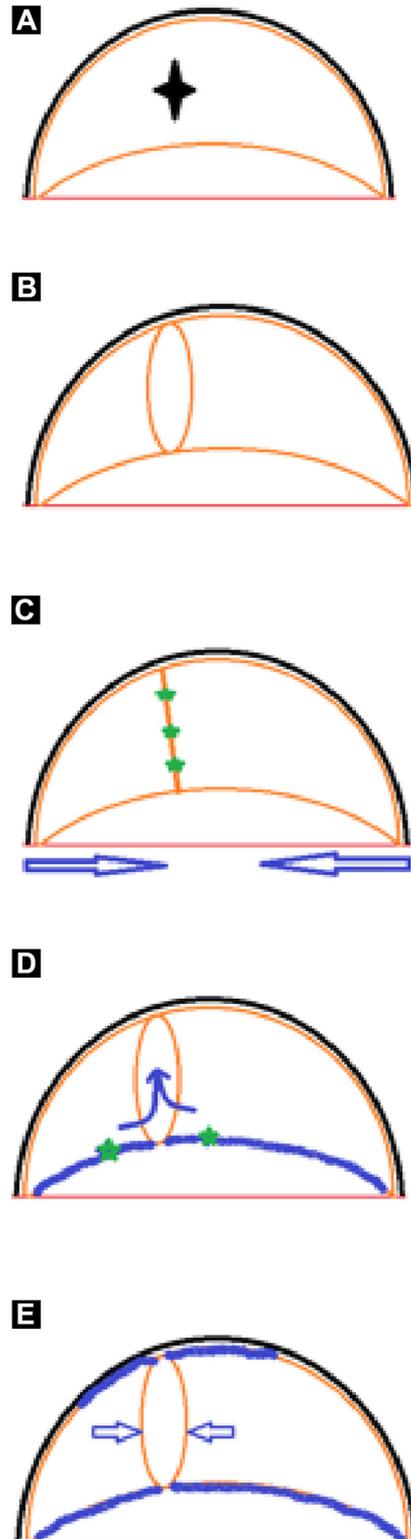


Table 2 Patient and Tumor Characteristics	
Characteristic	N (%)
No. patients	102
Median age (range), y	55 (31-80)
Mean height (±SD), cm	167 ± 6
Mean weight (±SD), kg	74 ± 17
Mean body mass index (±SD)	26.5 ± 6.2
Laterality	
Left	43 (42.2)
Right	59 (57.8)
Axillary	
Sentinel lymph node biopsy	89 (87.25)
Axillary lymph node dissection	13 (12.75)
Mean clinical tumor diameter (±SD), mm	17 ± 13
Cup size	
A	14 (13.7)
B	17 (16.7)
C	30 (29.4)
D	30 (29.4)
E	11 (10.8)
Location of the tumor	
Upper-outer	44 (43.1)
Inner-lower	12 (11.8)
Lower-outer	20 (19.6)
Inner-upper	9 (8.8)
Central	17 (16.7)
cT	
0	3 (2.9)
1s	5 (4.9)
1a	5 (4.9)
1b	33 (32.4)
1c	35 (34.3)
2	21 (20.6)
cN	
0	95 (93.1)
1	7 (6.9)
M	
0	100 (100)
Median operative duration (min-max), min	40 (20-80)
Mean volume of the specimen (±SD), cm <sup>3</sup>	61.3 ± 57.8
Median weight of the excised specimens (min-max), g	49.8 (13.4-117.9)
Mean pathologic diameter of invasive tumors (±SD), mm	13 ± 8
Mean pathologic diameter of DCIS (±SD), mm	4 ± 6
Mean pathologic diameter of invasive tumors + DCIS (±SD), mm	15 ± 7
pT	
0	6 (5.9)
1s	5 (4.9)
1a	11 (10.8)
1b	24 (23.5)
1c	45 (44.1)
2	13 (12.8)

Table 2 Continued	
Characteristic	N (%)
pN	
0	74 (72.5)
1a	27 (26.5)
2a	1 (1)
Histologic type	
DCIS	3 (2.9)
Invasive ductal carcinoma	69 (67.7)
Invasive lobular carcinoma	24 (23.5)
Other	6 (5.9)
DCIS component	
No	48 (47.1)
Yes	54 (52.9)
Grade	
1	22 (21.5)
2	57 (55.9)
3	21 (20.6)
DCIS grade	
1	8 (7.8)
2	28 (27.5)
3	18 (17.6)
No DCIS	48 (47.1)
Estrogen receptor	89 (87.3)
Progesterone receptor	81 (79.4)
Median Ki-67 index (min-max)	10 (1-80)
HER-2	
Negative	83 (84.4)
Positive	16 (15.6)
Molecular subtype	
Luminal A	66 (64.7)
Luminal B	13 (12.7)
HER-2	16 (15.7)
Triple negative	7 (6.9)
Adjuvant chemotherapy	30 (31.4)
Adjuvant endocrine therapy	
No	13 (12.7)
Yes	89 (87.3)
Median follow-up (min-max), mos	11 (7-25)

Abbreviations: DCIS = ductal carcinoma in situ; HER2 = human epidermal growth factor receptor 2.

the Pearson  $\chi^2$  test or Fisher exact test. Statistical significance was determined when *P* values were < .05.

### Surgical Technique for Retroglanular OBCS

A single dose of an antibiotic (cefazolin or ciprofloxacin) was administered 30 to 60 minutes before surgery.

The footprint and the surgical incision are drawn onto the breast lateral to the IMF with the patient in standing position (Figure 1A). After aseptic preparation and draping, the subdermal plexus along the incision line is infiltrated with a 0.5% solution of epinephrine and lidocaine, and a 7- to 9-cm long incision is made. The

**Table 3** Results of the Preoperative and Postoperative BCCT.core and Postoperative BREAST-Q Measurements

Measurement	N (%)
BCCT.core (preoperative)	
Excellent	85 (83.3)
Good	15 (14.7)
Fair	2 (2)
Poor	0 (0)
BCCT.core (postoperative)	
Excellent	69 (67.6)
Good	26 (25.5)
Fair	7 (6.9)
Poor	0 (0)
Median BREAST-Q postop 1 (min-max) <sup>a</sup>	90 (59-100)
Median BREAST-Q postop 2 (min-max) <sup>b</sup>	27 (21-45)
Median BREAST-Q postop 3 (min-max) <sup>c</sup>	93 (48-100)
Median BREAST-Q postop 4 (min-max) <sup>d</sup>	35 (23-49)
Median BREAST-Q postop 5 (min-max) <sup>e</sup>	64 (44-78)

Abbreviation: BCCT.core = Breast Cancer Conservative Treatment-cosmetic results.

<sup>a</sup>BREAST-Q postop 1: Satisfaction with breasts (With your breasts in mind, in the past week, how satisfied have you been?).

<sup>b</sup>BREAST-Q postop 2: Adverse effects of radiation (With your radiated breast(s) in mind, in the past week, how much have you been bothered by symptoms?).

<sup>c</sup>BREAST-Q postop 3: Psychosocial well-being (With your breasts in mind, in the past week, how often have you felt confident?).

<sup>d</sup>BREAST-Q postop 4: Physical well-being: chest (In the past week, how often have you experienced pain, tightness, etc.?).

<sup>e</sup>BREAST-Q postop 5: Sexual well-being (Thinking of your sexuality, since your lumpectomy surgery, how often do you generally feel sexual?).

retroglandular approach requires an “inverted” perspective of the operating surgeon.

The dermoglandular flap forming the upper wound edge is elevated with hooks held by the assistant, and the parenchyma is dissected (along with the deep pectoral fascia) from the major pectoral muscle with electrocautery. The dissection should be extended as far beyond the location of the tumor as possible but should reach at least to the mammillary line. The dissection from the major pectoral muscle can extend to the complete footprint (Figure 1B). The vasculature of the parenchyma is supplied by the superficial plexus arteries running in the subcutaneous layer and medial/lateral lamellae towards the nipple from the periphery, which is supplied by perforator that vessels originate parasternally and cranial to the second intercostal space, just below the IMF and just outside the lateral mammary fold. These perforator vessels should be accurately preserved when the parenchyma is dissected from the major pectoral muscle.

If the surgeon is right-handed, the mobilized parenchyma of the breast along with the intact, complete covering skin is gently but firmly grasped and everted with the surgeon’s left hand. This can be facilitated by wearing textile gloves on the left hand, which helps to prevent slipping of the everted dermoglandular flap. After localizing the tumor by palpation (or with radio-guided occult lesion localization), a 10-mm large macroscopic safety margin is marked. The margin is circularly incised along the continuous shining surface of the pectoral fascia with electrocautery (Figure 1C).

The specimen is dissected from the surrounding parenchyma by sectioning deeper and deeper with electrocautery (Figure 1D-F). The specimen is grasped with an atraumatic forceps to avoid disturbing the assessment of the gross macroscopic margins. The power of the electrocautery should be decreased as the subcutaneous fat layer is reached. If necessary, even this layer can be resected by grasping the dermis to have a free anterior margin. By holding the breast with the left hand and turning the parenchyma inside out, the surgeon is able to feel even narrow distances from the preparation by palpating the subcutis with the middle finger of the left hand. After the anterior lamina of the superficial pectoral fascia is transected, the glandular tissue can usually be easily bluntly dissected from the subcutaneous tissue with the tip of the electrocautery device (Figure 1D-F). It is important to avoid thermal or mechanic injury of the skin, even if obtaining a sufficient anterior margin requires extending the dissection to the subcutaneous tissue or the dermis. Because the surgeon is working with an inverted perspective, the anterior margin needs to be clarified according to the in vivo orientation of the specimen. In this way, ex vivo everted transposition of the specimen can be avoided (Figure 1G). After removing the specimen, SLNB can usually be safely performed with the same skin and retroareolar exposure. In patients with central or retromamillary tumors, tumorectomy must be performed as detailed above through the subareolar step. If indicated, at that point, the tumor is resected en bloc with the central ductal branch and the nipple by making an additional perimamillary skin incision on the front surface.

If the resection is adequate, it is followed by reconstruction of the remaining breast parenchyma. For this, if tension-free closure of the tumor bed is indicated, the parenchymal pillars must be further mobilized both in the plane between the glandular tissue and the pectoral muscle, and if necessary, in the plane between the anterior lamina and the subcutaneous tissue. This is so-called dual-plane dissection. The assistant gently pulls on the wall of the wound cavity with hooks, while the everted glandular tissue is held in the left hand of the operating surgeon, so he can palpate the distance to the skin. The edge of the subcutaneous tissue is visible above the superficial pectoral fascia lamina anterior in cases of clean dissection. The dissection of the superficial plane only needs to be continued until the glandular pillars can be closed without tension or skin retraction.

After clip marking of the tumor bed, there are 3 different surgical options for direct tumor bed closure using glandular reapproximation. The first option is direct apposition of the parenchyma pillars with absorbable interrupted sutures (Figure 1H-I). The second option is filling of the tumor bed with the inverted posterior edges of the glandular pillars with absorbable sutures, placing each suture into the posterior parenchymal surface and approximately 10 to 12 mm beyond the wound edges, rather than in direct contact with them. Therefore, these sutures turn the parenchymal edges into the volume defect of the tumor bed to fill it (Figure 2A-D). The third option for closing the postresectional cavity is dual-plane parenchymal mobilization along the subcutaneous and epimuscular planes for adequate glandular reapproximation (Figure 2E). Of course, this option requires the most complex surgical glandular mobilization, with a higher risk of causing tissue trauma or ischemia, which can result in fat necrosis or infection.

# Clinicopathologic Study of a Retroglandular Oncoplastic Technique in 102 Breast Cancer Patients

A suction drain should be placed in the space above the pectoral muscle. The wound is closed in multiple layers (Figure 1J).

## Results

Eight patients were excluded owing to undergoing completion mastectomy (3 patients), loss to follow-up (3 patients), and refusal to have control photos taken for BCCT.core (2 patients). As a result, a total of 102 patients were enrolled and underwent retroglandular OBCS. The median follow-up time was 11 months (range, 7-25 months). Fifteen (14.7%) patients were active smokers, and 7 (6.8%) had diabetes as a comorbidity. The patient and tumor characteristics are listed in Table 2.

The median microscopically free surgical margin was 3 mm (range, 0.1-20.5 mm) for invasive tumors and 2 mm (range, 1-11 mm) for ductal carcinoma in situ. Owing to positive or close surgical margins, 14 (13.7%) re-excisions and 3 (2.9%) mastectomies were performed, resulting in 17 (16.6%) reoperations. Statistical analysis showed a significant correlation between the clinical ( $P = .043$ ) and pathologic size (invasive + in situ) of the tumor ( $P = .0249$ ) and the operative time.

## Complications and Timing of Initiation of Adjuvant Therapy

In total, 25 (24.5%) complications were recorded. In all the patients with complications, seroma formation was observed after the suction drain was removed. In 14 (13.7%) patients, seroma formation required only 1 additional puncture, whereas in 11 (10.8%) patients, chronic seroma formation required multiple punctures. There were 3 (2.9%) patients with limited fat necrosis and 2 (1.9%) patients with partial skin redness and fever (both had chronic seroma formation) that resolved with antibiotic and anti-inflammatory treatment. Overall, 18.5% of patients had grade I and II morbidity, and 5.9% of patients had grade III morbidity requiring surgical invasive intervention, owing to hematoma in 4 (3.9%) patients and chronic infection in 2 (2.0%) patients. None of the complications were classified as grade IV or V.

The median time until the initiation of adjuvant treatment was 4.8 weeks (range, 4-10 weeks). During the follow-up period, all the enrolled patients were alive, and no patients experienced locoregional or distant recurrence.

## Esthetic Outcomes and Quality of Life

The majority of breast surgeons agreed with the statement that "This patient had an excellent esthetic outcome," with a mean score of 4.3 (range, 2.1-5) Evaluating the objective outcomes with BCCT.core, the median value of the overall esthetic outcome was 2.1 (range, 1-4) (Table 3). A correlation analysis showed that surgery performed using the retroglandular OBCS technique did not significantly influence the BCCT.core objective esthetic results.

The results of the corresponding BREAST-Q domains are presented in Table 3. The median "adverse effects of radiation" and "physical well-being" scores were considerably reduced compared with the "satisfaction with breasts" and "psychosocial well-being" scores (27 and 35 vs. 90 and 93). The lowest mean scores were observed for "adverse effects of radiation." A tendency towards increased scores for "satisfaction with breasts" was observed to be associated with increased scores for "psychosocial well-being."

Using the correlational analysis between the objective esthetic results based on the BCCT.core software and the BREAST-Q patient-reported outcome measures, there were significant correlations between psychosocial well-being ( $P < .000001$ ), physical well-being: chest ( $P = .005$ ), and a BCCT.core category of excellent/good or fair. The median scores of the BREAST-Q domain regarding the "satisfaction with breast" and "psychosocial well-being" were very high (90, 93); however, the median scores of the "adverse effects of radiation" and "physical well-being" were quite low (27, 35). The latter low scores could be explained by the relatively short period of time (6 months) from the adjuvant whole-breast radiation therapy when the questionnaires were rated by the patients. At that time, the adverse effects of the radiation therapy could still be significant. This may be a limitation of the current study.

## Discussion

Unlike other OBCS techniques that have been reported so far, there are 2 revolutionary concepts of this novel oncoplastic technique.

The first is that the incision is not made on the breast skin envelope but is instead hidden in the IMF. This incision is generally performed in nipple-sparing mastectomy procedures, and usually heals with a barely visible scar. In other traditional Level I oncoplastic glandular reapproximation techniques, for example, Benelli or round block OBCS techniques, the periareolar scar is easily visible, and often heals with a disturbing hypertrophic or broad atrophic scar, sometimes requiring contralateral symmetrization.<sup>12</sup>

The other significant change compared with all the traditional OBCS techniques is that the tumor resection is performed from the posterior surface of the parenchyma and not from the anterior surface.

Interestingly, in the case of nonpalpable tumors, even small tumors can be palpated from the posterior surface of the parenchyma. This observation does not facilitate the omission of special tumor localization techniques but does facilitate successful radical tumor resection.

The results of our study revealed an acceptable rate of fat necrosis of 2.9%. According to our results, wide parenchymal mobilization from the pectoral muscle was associated with the only significant drawback of retroglandular OBCS, namely, seroma formation (13.7%). In a systemic review of oncoplastic reduction mammoplasty published by Piper et al of 1324 oncoplastic cases, the overall rate of significant complications was higher (13.2% vs. 5.9%), with only a 0.6% rate of seroma formation.<sup>13</sup>

According to the prospective study by Bramhall et al that involved 57 patients with breast cancer treated with central round block repair of large breast resection defects, the reported rate of early postoperative complications was 21% (12 patients), which is comparable to the complication rate of 24.5% in our study.<sup>12</sup>

The median specimen resection weight in this recent study was reported to be 50 g (range, 25-361 g), which was also comparable to that in our study (49.8 g). Interestingly, the median tumor size was larger in this study than in our study (25 mm vs. 15 mm).<sup>12</sup> Comparing the rate of involved surgical margins between the 2 studies, in the round block study, the rate of incomplete margins was higher (21% vs. 16.6%), the re-excision rate was lower (8.7% vs. 13.7%), and the completion mastectomy rate was higher (12.3% vs. 2.9%) than in our retroglandular OBCS study.<sup>12</sup> The difference

between the rates of completion mastectomies highlights that retroglanular OBCS and round block OBCS are Level I oncoplastic surgical techniques, and if extended tumor resections are indicated, Level 2 OBCS techniques or mastectomy can be performed as salvage methods.

One of the major differences between round block OBCS performed from a frontal approach using skin incision made in the breast skin envelope and retroglanular OBCS is that in cases in which completion mastectomy is indicated, nipple-sparing mastectomy may be easily and safely performed because of the lack of previous skin incisions made in the breast skin envelope; however, after a previous periareolar incision, only skin-sparing mastectomy can be safely performed to prevent necrosis of the circumareolar-incised NAC.

Another advantage of the retroglanular OBCS technique is that the lateral skin incision made in the IMF allows appropriate SLNB, whereas in round block OBCS, in most patients, an additional incision in the axillary area is necessary.

At the median follow-up time of 5 years (range, 1.9-8.4 years) reported by Bramhall et al, the oncologic results revealed 2/57 local recurrences and 5/57 distant metastases.<sup>12</sup> Kronowitz et al reported a 5% local recurrence rate after a mean follow-up of 36 months using therapeutic mastoplastic techniques, whereas a slightly lower rate (2%) was reported by Losken et al after a mean follow-up of 40 months using the classic, dermal pedicle therapeutic mastoplastic techniques.<sup>14,15</sup> In the present study, the mean follow-up time was only 11 months, and no local or distant tumor recurrence was noted; however, because of this limitation of the study, no conclusions can be drawn from an oncologic point of view. Further follow-up is needed.

According to the esthetic outcomes of the round block OBCS study in which glandular reapproximation was performed by frontal exploration, 34% of the patients had no measurable asymmetry, and 89% had a nipple position within 2 cm of the original height. Only 2 patients requested symmetrizing surgery. According to the results of the 5-point Likert scale (4.3) and the BCCT.core points (2.1), the majority of the observer surgeons agreed with the statement that “This patient had an excellent or good esthetic outcome”; thus, retroglanular OBCS was able to fully preserve the initial natural appearance and shape of the breast while accomplishing radical tumor resection.

## Conclusion

A retroglanular OBCS technique is a novel concept and is an effective, safe Level I oncoplastic technique for radical resection of breast tumors that are  $\leq 3$  cm in size and are located in the central part of any quadrant of the breast in an area of minimal fatty degenerated breast parenchyma. The surgical technique leaves no scar on the breast skin envelope, maintaining the natural appearance and shape of the breast, avoiding the need for contralateral symmetrization. However, the risk of seroma formation is increased. To evaluate the oncologic safety of retroglanular OBCS, longer follow-up is needed.

## Clinical Practice Points

- In general, it can be stated that all OBCS techniques are performed from a frontal exploration of the dermoglandular breast tissue by making 1 or more skin incisions in the breast skin envelope.

- The presented Level I retroglanular tumorectomy technique that is performed by making a skin incision in the inferior mammary fold combined with a retroglanular exploration that does not leave a scar on the breast skin envelope, preserving the full natural shape and appearance of the involved breast by glandular reapproximation.
- A retroglanular OBCS technique is a novel concept and is an effective, safe Level I oncoplastic technique for radical resection of breast tumors that are  $\leq 3$  cm in size and are located in the central part of any quadrant of the breast in an area of minimal fatty degenerated breast parenchyma. The surgical technique leaves no scar on the breast skin envelope, maintaining the natural appearance and shape of the breast and avoiding the need for contralateral symmetrization, which are an important factors in the clinical practice.

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## Disclosure

The authors have stated that they have no conflicts of interest.

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