



# Oncoplastic Techniques in Treatment of Central Breast Tumors: Oncological, Aesthetic, and Patient Satisfaction Outcomes

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## Abstract

**Background:** The employment of oncoplastic techniques for the treatment of central breast cancer is becoming increasingly popular.

**Objectives:** Our study aimed to evaluate the oncological safety of oncoplastic techniques in central breast cancer patients, and to assess resulting breast aesthetics and patient satisfaction.

**Methods:** This descriptive study examined 68 patients with central breast cancer who were operated consecutively between March 2017 and March 2020. Demographic characteristics of the patients, biological characteristics of the tumor, surgical techniques and adjuvant treatments, postoperative complications, and follow-up (oncological, aesthetic, and satisfaction) results were evaluated.

**Results:** Sixty-eight patients were monitored for an average of 25 months post-operatively. Re-excision was required in 2 (2.9%) cases because of positive surgical margins. Local recurrence ensued in a total of 2 (2.9%) cases, and overall survival was 100%. During the postoperative follow-up period, an independent panel scored breast aesthetics at 76/100, while the patient satisfaction score was obtained at 7.5 on a 9-point Likert-type scale. Complications developed in 10 (14.7%) cases in our series.

**Conclusion:** According to our study findings, oncoplastic techniques can be considered safe in terms of oncological results for the surgical treatment of central breast cancer. This approach may provide high patient satisfaction.

**Keywords:** Central breast cancer, Nipple-areola complex, Oncoplastic surgery

## 1. Background

Breast-conserving surgery (BCS) is accepted as the gold standard surgical treatment for breast cancer. In recent years, oncoplastic breast surgery (OBS) has been developed as a modern approach that improves the scope of BCS (1). Studies have shown that compared to mastectomy, oncoplastic techniques could increase breast conservation rate while improving oncological outcomes (2, 3). About four decades ago, central breast cancers were considered to have a poor prognosis and were usually treated by mastectomy (4). Therefore, surgeons have always questioned whether using breast conservation methods to treat central breast cancers can be oncologically safe. In addition, this is an operation with high aesthetic stakes for the patients, as the nipple-areola complex (NAC) is the most important area for the breast and breast aesthetics. Nevertheless, recent large-scale series have discovered that central breast tumors have comparable oncological outcomes to cancers in other quadrants (5). Advances in diagnosis and treatment in recent years have led to longer survival rates in breast cancer patients, and for patients living longer with the results of their operation, breast aesthetics becomes increasingly important. By using oncoplastic techniques for central breast tumor surgery, the breast can be conserved with less deformity (6, 7). Huemer et al. reported that by using a variety of

oncoplastic techniques, satisfactory oncological results could be achieved in centrally located breast cancers (8). Therefore, although the evidence from such studies is not conclusive, the use of OBS techniques for centrally located breast cancer is becoming widespread today.

## 2. Objectives

This study focuses on the oncological safety of OBS in patients with central breast cancer. In addition, it aims to evaluate the quality of breast aesthetics achieved with oncoplastic techniques and to assess the satisfaction levels of the patients.

## 3. Methods

Local ethics committee approval was obtained by the Tepecik Research and Treatment Hospital, University of Health Sciences, Izmir, Turkey (2022/04-04). Our study consisted of a consecutive series of patients with central breast cancer who underwent surgery at the Izmir Tepecik Training and Research Hospital, University of Health Sciences, between March 2017 and March 2020. Informed consent was obtained from all patients for both the surgery and this study. Retrospective analysis of all patient data was processed through the hospital digital system (Probel Company). All surgical procedures were performed by an experienced

breast surgery team. We defined central breast tumors as tumors located < 2 cm from the areola. Demographic and oncological characteristics, surgical technique, adjuvant treatments, postoperative complications, and follow-up results were evaluated. Prior to surgery, patients were assessed by a multidisciplinary team, from both oncological and oncoplastic perspectives. Breast volume was measured using a Grossman-Roudner device (cm<sup>3</sup>), a method used in our clinic for several years. After completion of treatment, anamnesis, physical examination, and radiological follow-up were carried out. Oncological follow-up results of the patients were given as local-regional recurrence and overall survival. Pre- and postoperative adjuvant treatments were recorded. In addition, in December 2021, all patients were invited to the hospital to complete a Likert-type post-surgery satisfaction questionnaire (1-9 points) to assess their level of satisfaction with the results of their surgery. On the same day, two surgeons, who had not been involved in the surgery, carried out an aesthetic evaluation of the oncoplastic surgery. This was done using photographs of the patients taken from the front and at 45-degree angles to the left and right sides at the last follow-up visit. Any cases with multicentric cancers, inflammatory breast cancers, pregnant patients, or patients who were unavailable for oncological follow-up were excluded from the study. Patients were followed up with physical examinations, breast ultrasonography, and mammography every 6 months during the first 3 years, and subsequently with annual physical examinations and mammography.

#### Surgical procedure

When a centrally located tumor is detected, the standard procedure is pathological diagnosis and evaluation with preoperative Tru-cut biopsy, radiological examination using ultrasound examination, mammography, and magnetic resonance imaging. Additionally, if deemed necessary for staging purposes, positron emission tomography is also employed. After these procedures, each case is reviewed by the multidisciplinary Tumor Board members who recommend a treatment plan. The

intended procedures and potential outcomes are shared with the patient. A clip is then placed to mark the breast tumor in any patients who are due to receive neoadjuvant chemotherapy. Oncoplastic planning and drawings are prepared by the patient's surgical team. During surgery, once the specimen has been removed, the tumor site is marked with metal clips. The weight of the excised specimen is recorded in grams. Intraoperative frozen section for surgical clear margins is performed in all patients using guiding sutures to orient the specimen. For cases with microcalcification, intraoperative specimen radiographs are taken. If these procedures identify cancer at the surgical margins, intraoperative re-excision from the suspected area is made.

#### Statistical analysis

Data analysis was performed using the IBM Statistical Package for Social Science (SPSS) statistics version 22.0 software (IBM Corp, Armonk, NY, USA). Data are presented as mean  $\pm$  standard deviation or median (interquartile ranges) for quantitative variables and count (percentages) for qualitative variables.

## 4. Results

During the study period, 79 patients underwent conservative surgery for central breast cancer. Two of these patients did not attend the postoperative follow-up sessions, and in nine cases, BCS was the preferred surgical method; therefore, the study comprised a total of 68 (68/79: 86,1%) patients who underwent OBS. The demographics of these patients and the biological characteristics of their tumors are presented in Table 1. The patients were staged according to the TNM-2021 classification. Axillary intervention was unknown for a total of 16 (23.5 %) patients: 4 (5.9%) with malignant phyllodes tumor, 8 (11.8%) with ductal carcinoma in situ, and 4 (5.9%) due to Paget's disease. When axillary dissection was required, it was performed at levels 1 and 2. Radioisotope and blue dye were used in 18 (47.4%) cases, and blue dye alone was used in 20 (52.6%) cases for axilla sentinel lymph node biopsy.

**Table 1.** Patient demographics and tumor biological characteristics.

	n (%)	Mean $\pm$ SD	Min-Max
<b>Demographics</b>			
Patients	68 (100%)		
Age (years)		49.4 $\pm$ 9.5	29-74
Premenopausal patients	31 (45.6%)		
Postmenopausal patients	37 (54.4%)		
<b>Histological types</b>			
Invasive ductal cancer	49 (72.0%)		
Invasive lobular cancer	3 (4.4%)		
Ductal carcinoma in situ	8 (11.8%)		
Malignant phyllodes tumor	4 (5.9%)		
Paget's Disease	4 (5.9%)		
<b>Molecular subtypes</b>			
Luminal A	23 (33.8%)		
Luminal B	18 (26.5%)		
HER-2 positive	11 (16.2%)		
Triple negative	7 (10.3%)		
Unknown	9 (13.2%)		

**Table 1 Continue**

TNM Stage	
0	12 (17.6%)
I A	6 (8.8%)
I B	9 (13.2%)
II A	11 (16.1%)
II B	12 (17.6%)
III A	11 (16.1%)
III B	3 (4.4%)

Neoadjuvant chemotherapy was administered in the form of adriamycin, cyclophosphamide, and paclitaxel, with an additional 4 cycles of Herceptin for HER2-positive patients. Adriamycin, cyclophosphamide, and paclitaxel were administered as adjuvant chemotherapy, and at least 8 courses of Herceptin were administered to eligible patients. For adjuvant hormone therapy, tamoxifen (20 mg/day) was used in 32 (75%) cases and aromatase inhibitor in 16 (25%) cases. Postoperative radiotherapy was administered at a dose of 25x2 Gy with a booster dose of 5x2 Gy.

One patient, who underwent oncoplastic breast reduction, required postoperative re-excision for microcalcification and tumor at the surgical margins. The final pathological examination of this patient revealed clean surgical margins. Information about operative procedures, neoadjuvant and adjuvant

treatments, and our follow-ups based on oncological results are provided in Table 2. One of the two patients with local recurrence was diagnosed in the 13th month of follow-up. In this case, a mastectomy was performed, with a later breast reconstruction at the patient's request. The second case of recurrence was in a patient who underwent oncoplastic reduction at the age of 74. In this case, the tumor was found at the 42nd month of follow-up, and a lumpectomy was performed with the patient's informed consent. Complications in our study, shown in Table 3, developed in a total of 10 (14.7 %) cases. One patient (1.5%) developed a hematoma, which was treated in the operating room within the first 24 hours. Other conditions were considered minor complications and recovered within the first 3 weeks with careful management. There was no delay in adjuvant treatments in any of our cases.

**Table 2.** Operative procedures, neoadjuvant and adjuvant treatments, and oncological and follow-up results

	n (%)	Mean±SD	Min-Max
<b>Oncoplastic procedures</b>	68		
Oncoplastic breast reduction ± nipple reconstruction	26 (38.2%)		
Grisotti flap ± nipple reconstruction	10 (14.7%)		
Benelli mastopexy	9 (13.2%)		
Purse-string suture ± nipple reconstruction + tattoo	7 (10.4%)		
Inferior mammoplasty ± nipple reconstruction	6 (8.9%)		
Inverted T ± nipple reconstruction	5 (7.4%)		
Latissimus dorsi flap ± nipple reconstruction	5 (7.4%)		
<b>Axillary approach</b>	54		
Sentinel lymph node biopsy	38 (70.4%)		
Axillary dissection	16 (29.6%)		
<b>Lymph node status</b>	68		
Negative	30 (44.1%)		
Positive	22 (32.4%)		
Unknown	16 (23.5%)		
<b>Neoadjuvant and adjuvant treatments</b>	64		
Neoadjuvant chemotherapy	20 (31.3%)		
Adjuvant chemotherapy	47 (73.4%)		
Adjuvant hormone therapy	48 (75%)		
Postoperative radiotherapy	64 (100%)		
<b>Follow-up and oncological results</b>	68		
Follow-up (months)		25.1±6.9	(18-56)
Breast volume (cm <sup>3</sup> )		850	(470-1650)
Specimen weight (g)		356	(70-750)
Re-excision	2 (2.9%)		
Local recurrence	2 (2.9%)		
Overall survival	68 (100%)		
Patient satisfaction (1-9 points)		7.5±1.01	(5-9)
Aesthetic evaluation (10-100 points)		76	(40-100)

**Table 3.** Postoperative complications (n=10)

	n (%)
<b>Oncoplastic complications</b>	
Seroma	3 (4.4%)
Ecchymosis, bleeding	1 (1.5%)
Hematoma	1 (1.5%)
Partial wound dehiscence	3 (4.4%)
Partial areola necrosis	1 (1.5%)
Infection	1 (1.5%)

## Discussion

The results of our study showed that oncoplastic techniques can be applied in centrally located breast cancer without any oncological problems. Breasts are aesthetic organs that define and complete a woman. In the past, some oncological reservations have been reported regarding the application of BCS in centrally located cancers (9). However, in recent studies involving large numbers of cases, these problems have not been observed. One study reported that centrally located tumors did not differ from tumors in other quadrants of the breast in terms of local recurrence and overall survival rates (5). Breast cancer was thought to be strongly associated with the nipple, and therefore, oncological risks for local recurrence were identified. In important studies such as NSABP B06, centrally located breast cancers were specifically excluded. However, oncoplastic techniques have been reported to be as safe as BCS in the latest studies (6, 7). In our study, local recurrence during the follow-up period was found to be 2.9%. In addition, the overall survival rate of our patients was 100%. In the final pathological examination, which is another oncological outcome, a tumor at the surgical margins was detected in only one case. Another benefit of oncoplastic techniques is that they allow surgeons to conduct extensive surgery without anxiety. All these results show that oncoplastic techniques can be employed safely in central breast cancers from an oncological point of view.

The adoption of oncoplastic techniques in central breast cancers can also prevent the kind of breast deformities often caused by surgical procedures. It is crucial to avoid deformities in any surgical procedure of the breasts, which are aesthetic external organs. Late complications of BCS have been reported to cause dents in the breast, asymmetry, areola deficiencies, and/or areola deformities (6). In addition to these problems, total removal of the NAC may be required oncologically due to cancer involvement of the areola. In such cases, mastectomy and immediate reconstruction may be needed. Complications of mastectomy and reconstruction, as well as the workload involved, are well documented; additional radiotherapy is a further complication. The use of oncoplastic techniques in breast cancer surgery, developed over recent decades, offers the broadest solutions to these problems (6, 10). In our study, mastectomy was deemed necessary in one case and late reconstruction was performed. While occasionally NAC may be lost during oncological resection, in this case, a new NAC was created and the formation of significant deformities in the breasts was prevented. The main concept behind oncoplastic surgery is to avoid breast deformities as well as to conserve the breast with oncological safety. This goal was achieved in our study.

In our study, the results demonstrated how the

adoption of oncoplastic techniques could produce positive breast aesthetics. Breasts are strategic organs in the life of any woman. It is the nipple and its appearance that gives the breast its identity. Many methods for evaluating breast aesthetics take into account various factors, including the symmetry of the breast, the condition of the nipple, any visible scars, and the general condition of the breast (6, 11). Shechter et al., in a recent study, have reported that the use of oncoplastic techniques in patients with centrally located cancer is relatively better in terms of aesthetic results than BCS (12). In our study, satisfactory results were obtained in the breast aesthetics evaluation performed by an independent panel. Oncoplastic techniques bolster aesthetic results in central cancer patients. We took into account that the reconstruction of the areola and nipple is beneficial in helping patients perceive their breasts as complete, particularly following areola excision. Our procedures were widely accepted by the patients, and they were satisfied with the results. Because of the increased awareness of breast cancer, widespread screening, and adjuvant treatments, today a long life is possible for women with breast cancer, and this increases the importance placed on their quality of life. In addition to conserving the breasts, providing aesthetics with oncoplastic techniques increases the satisfaction of the patients (13). Losken et al. in their extensive meta-analysis, reported that the employment of OBS techniques led to greater patient satisfaction than BCS. In a study comparing OBS and BCS in central breast tumors, the measurement of postoperative completeness of patients with BREAST-Q was found to be 75.18 in OBS compared to only 39.64 in BCS. In the same study, the rates for psychosocial well-being were reported as 76.09 in OBS and 43.18 in BCS (12). High satisfaction rates have generally been reported in patients with breast cancer who have undergone oncoplastic breast reduction (14).

In our study, we found patients' satisfaction with their oncoplastic procedures, even in the medium term, to be high, with a rate of 7.5. This high patient satisfaction rate was maintained over the long term. In our series, we found that the aesthetic conserving of the breast and nipple led to a strong feeling of satisfaction in our patients.

In this study, complication rates stemming from the use of oncoplastic techniques in central cancers were found to be acceptable. Every surgical procedure has a certain complication rate. Lumpectomy and oncoplastic techniques in OBS with central breast cancer require more breast surgeries than BCS. The inevitable consequence includes a slight increase in the complication rate. However, there are studies demonstrating that OBS complications do not increase the oncological risk for the patient (15). One study reported the complication rate of OBS in patients with locally advanced breast

cancer as within acceptable limits (16). Another study reported that oncoplastic techniques were used with low complication rates in central breast cancers (12). In our study, the complication rate was 16.7%, and most incidences were minor complications. There were no complication-related delays in adjuvant treatment in our series.

This study had some limitations, including the limited number of cases in our series. Moreover, descriptive statistics were used in the analysis of our patient series, and subgroup analyses were not performed.

## 6. Conclusion

In conclusion, complication rates are acceptable when the breast is treated with oncoplastic techniques, which are relatively more challenging in terms of surgery. Oncoplastic techniques can be safely applied in the surgical treatment of central breast cancers with satisfactory oncological results. The adoption of these techniques prevents deformity in the central part of the breast, which is the most difficult area to manage. These procedures bring about acceptable aesthetic evaluation and high patient satisfaction. Well-designed multicenter studies are needed for stronger recommendations.

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## Footnotes

**Conflicts of Interest:** None.

**Author Contribution:** Both authors contributed to the conception and design of the study, analysis and interpretation of data, collection and assembly of data, and drafting of the article. They both gave final approval for submission of the article.

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## References

1. Kaufman CS. Increasing role of oncoplastic surgery for breast cancer. *Curr Oncol Rep.* 2019 ;**21**(12):111. doi :10.1007/s11912-019-0860-9. [PubMed: 31838584].
2. Losken A, Dugal CS, Styblo TM, Carlson GW. A meta-analysis comparing breast conservation therapy alone to the oncoplastic technique. *Ann Plast Surg.* 2014 ;**72**(2):145-9. doi:10.1097/sap.0b013e3182605598. [PubMed: 23503430].
3. De La Cruz L, Blankenship SA, Chatterjee A, Geha R, Nocera N, Czerniecki BJ, et al. Outcomes after oncoplastic breast-conserving surgery in breast cancer patients: a systematic literature review. *Ann Surg Oncol.* 2016;**23**(10):3247-58. doi: 10.1245/s10434-016-5313-1. [PubMed: 27357177].
4. Haffty BG, Wilson LD, Smith R, Fischer D, Beinfeld M, Ward B, et al. Subareolar breast cancer: long-term results with conservative surgery and radiation therapy. *Int J Radiat Oncol Biol Phys.* 1995;**33**(1):53-7. doi:10.1016/0360-3016(95)00165-U. [PubMed: 7642431].
5. Shen YF, Huang J, Zhou WB, Li JH, Xiao Z, Huang AJ, et al. Breast-conserving in centrally located breast cancer patients confirmed safe by SEER based study. *Gland Surg.* 2022;**11**(1):226-35. doi: 10.21037/ggs-21-914. [PubMed: 35242684].
6. McCulley SJ, Durani P, Macmillan RD. Therapeutic mammoplasty for centrally located breast tumors. *Plast Reconstr Surg.* 2006;**117**(2):366-73. doi: 10.1097/01.prs.0000200874.31320.c2. [PubMed: 16462314].
7. Johnson M, Cook L, Rapisarda FI, Betal D, Bonomi R. Oncoplastic breast surgery technique for retroareolar breast cancer: a technical modification of the Grisotti flap in patients with short nipple to inferior mammary crease distance. *J Surg Case Rep.* 2020; **2020**(9): 285. doi: 10.1093/jscr/rjaa285. [PubMed: 32934787].
8. Huemer GM, Schrenk P, Moser F, Wagner E, Wayand W. Oncoplastic techniques allow breast-conserving treatment in centrally located breast cancers. *Plast Reconstr Surg.* 2007;**120**(2):390-8. doi: 10.1097/01.prs.0000267328.09246.02. [PubMed: 17632339].
9. Fisher ER, Gregorio RM, Fisher B, Redmond C, Vellios F, Sommers SC. The pathology of invasive breast cancer. A syllabus derived from findings of the National Surgical Adjuvant Breast Project (protocol no. 4). *Cancer.* 1975;**36**(1):1-85. doi: 10.1002/1097-0142(197507)36:1%3C1::aid-cnrc2820360102%3E3.0.co;2-4. [PubMed: 173455].
10. Park HC, Kim HY, Kim MC, Lee JW, Chung HY, Cho BC, et al. Partial breast reconstruction using various oncoplastic techniques for centrally located breast cancer. *Arch Plast Surg.* 2014;**41**(5):520-8. doi: 10.5999/aps.2014.41.5.520. [PubMed: 25276644].
11. Cardoso MJ, Cardoso JS, Vrieling C, Macmillan D, Rainsbury D, Heil J, et al. Recommendations for the aesthetic evaluation of breast cancer conservative treatment. *Breast Cancer Res Treat.* 2012;**135**(3):629-37. doi: 10.1007/s10549-012-1978-8. [PubMed: 22307267].
12. Shechter S, Friedman O, Inbal A, Arad E, Menes T, Barsuk D, et al. Oncoplastic partial breast reconstruction improves patient satisfaction and aesthetic outcome for central breast tumours. *ANZ J Surg.* 2019;**89**(5):536-40. doi: 10.1111/ans.15078. [PubMed: 30895710].
13. Adimulam G, Challa VR, Dhar A, Chumber S, Seenu V, Srivastava A. Assessment of cosmetic outcome of oncoplastic breast conservation surgery in women with early breast cancer: a prospective cohort study. *Indian J Cancer.* 2014;**51**(1):58-62. doi: 10.4103/0019-509x.134629. [PubMed: 24947098].
14. Emiroglu M, Salimoglu S, Karaali C, Sert I, Gungor O, Sert F, et al. Oncoplastic reduction mammoplasty for breast cancer in women with macromastia: Oncological long-term outcomes. *Asian J Surg.* 2017;**40**(1):41-7. doi: 10.1016/j.asjsur.2015.07.007. [PubMed: 26358362].
15. Gulcelik MA, Dogan L, Camlibel M, Karaman N, Kuru B, Alagol H, et al. Early complications of a reduction mammoplasty technique in the treatment of macromastia with or without breast cancer. *Clin Breast Cancer.* 2011;**11**(6):395-9. doi: 10.1016/j.clbc.2011.08.001. [PubMed: 21993009].
16. Emiroglu M, Sert I, Karaali C, Aksoy SO, Ugurlu L, Aydin C. The effectiveness of simultaneous oncoplastic breast surgery in patients with locally advanced breast cancer. *Breast Cancer.* 2016;**23**(3):463-70. doi: 10.1007/s12282-015-0585-z. [PubMed: 25585655].