

Improving quality of breast conservative surgery for lower quadrants cancer in small and medium sized breasts: Crescent technique versus J mammoplasty.

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Short Report

Keywords: breast conservative surgery, lower quadrants, oncoplastic surgery, Crescent technique, J-mammoplasty technique, aesthetic outcome

Posted Date: January 15th, 2024

DOI: <https://doi.org/10.21203/rs.3.rs-3850290/v1>

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Additional Declarations: No competing interests reported.

Abstract

PURPOSE. For medium/small size breast, breast conserving surgery (BCS) is usually associated to poor cosmetic results. The objective of the study is to evaluate oncological safety and cosmetic results comparing the “Crescent” and the “J” mammoplasty technique and to develop an algorithm for the treatment of breast cancer located in LQ in medium/small breast.

METHODS. We retrospectively analysed all consecutive patients who underwent a “J” mammoplasty or a “Crescent” technique at our institution between 2016 and 2021. 58 patients were enrolled, the first group including 29 “Crescent” technique procedures and the second one including 29 patients who underwent the “J” mammoplasty technique. Oncological safety and surgical minor and major complications were evaluated. Aesthetic results were evaluated by two senior breast surgeons, independently, at least 6 months after radiotherapy (RT).

RESULTS. At follow-up of 36 months, no recurrences and no major complications were observed in both groups. Minor complications were observed in two (6.8%) “J” group cases and in six (20,6%) “Crescent” ones ($p < 0.05$). The 96.6 % of “Crescent” and the 73.5 % of “J” cases were judged excellent/good. One (3.4%) “Crescent” was judged fair versus six (20.6%) “J” mammoplasty. Two (6.9%) “J” cases were judged poor, requiring ipsilateral re-operation.

CONCLUSIONS. When a favourable ratio between tumor size and breast volume is present, BCS can be performed for tumors located in the LQ. Evaluating patients’ anthropometric characteristics, skin involvement and tumor features is the key to select the right technique and to obtain both great cosmetic result and low rate of complications.

INTRODUCTION

Breast conservative surgery (BCS) remains the gold standard in the management of early breast cancer (BC) [1]. Several randomized trials have confirmed that BCS followed by radiotherapy (RT) allows equivalent survival rates when compared to mastectomy [2–4] with good cosmetic results. Cancer in the lower pole of the breast represents a major challenge for the surgeon in achieving a good aesthetic outcome. In large/medium size ptotic breasts, tumors can be easily resected with large safety margins with an inverted T superior pedicle reduction mammoplasty avoiding important cosmetic defects. In case of medium/small size breasts BCS is usually associated to poor aesthetic results, which are often worsened by post-operative radiotherapy [5–9]. A correct previous planning is mandatory to prevent deformities in medium/small size breasts also when less than 30% of glandular tissue must be removed. The purposes of this paper are the evaluation of both safety and cosmetic results in “Crescent” and “J” mammoplasty techniques and the development of an algorithm for the treatment of breast cancer located in lower quadrant (LQ), lower inner quadrant (LIQ) and lower outer quadrant (LOQ) in medium/small size breasts. This research project was approved by our Institutional Review Board.

MATERIALS AND METHODS

Study cohort and data sources. All consecutive patients who underwent a traditional “J” mammoplasty or a “Crescent” technique at our Institution between July 2016 and December 2021 were analyzed for this retrospective study with a level IV of evidence. An informed consent was obtained from all women. Data were collected from computerized patient’s records.

The inclusion criteria for both techniques were:

- Patients with early breast cancer (T1) of LQ, LIQ and LOQ requiring a BCS. Feasibility for T2 breast cancer were evaluated individually in according to favourable tumor size/breast size ratio;
- Small (cup A/B) or medium (cup C) sized breast.

The exclusion criteria for both techniques were:

- multicentricity;
- unfavourable tumor size/breast size ratio.

The exclusion criteria for “Crescent” technique were:

- tumours located less than 0,5 cm from the skin;
- skin retraction;
- calcifications and multifocality.

Fifty-eight patients were enrolled in the study and divided into two groups: twenty-nine patients underwent the “Crescent” technique and twenty-nine underwent the “J” mammoplasty technique. The study focused on oncological safety and surgical complications, which were divided into minor and major complications. Minor complications included: wound infection which only required antibiotic therapy, marginal skin necrosis/partial Nipple Areola Complex (NAC) necrosis managed without further surgery, fat necrosis, ecchymosis and seromas. Major complications involved: complete and partial NAC necrosis which required surgery, wound dehiscence and haematoma. Furthermore, aesthetic results were evaluated at least six months after radiotherapy (RT). Cosmetic outcomes were assessed by two senior breast surgeons, independently, evaluating the following criteria: volume symmetry, breast shape, nipple-areola complex symmetry, scars and overall appearance of the breast and NAC (excellent, good, fair, poor, bad) as described by Clough et al [10]. In conclusion, we developed an algorithm to allow an effective pre-operative surgical strategy for the treatment of lower breast cancer in medium/small size breasts.

SURGICAL TECHNIQUE: The Crescent technique described by Nos et al. [11] is characterized by a fasciocutaneous flap taken from the fatty area below the inframammary fold. The “Crescent” flap is designed by drawing the following two lines: the first one is situated 0.5 cm above the inframammary fold and the second one 1 cm below it, corresponding to the width of the flap. The skin and the subcutaneous tissue are incised along the upper line with electrocautery up to the pectoralis major

muscle. Breast parenchyma is raised from the muscle following the pectoralis fascia to allow a wide resection of the tumor. Subsequently de-epithelialization of the skin area situated between the incision and the inferior line below the inframammary fold is performed. In order to realize the “Crescent” fasciocutaneous flap, the inferior line is incised laterally and medially to a central zone which is left attached to the thoracic wall. No preset flap thickness was used. After checking the flap volume and its perfusion, the two edges of the “Crescent” flap are stitched together and pulled up to fill the breast defect. In case of lateral or medial defect a hemiflap can be easily raised through the incision of the inferior line only in the lateral or medial part of the attached area realizing the so called “Emicrescent” technique.

The lower quadrants J mammoplasty technique is performed to resect tumors situated into inferior quadrants, with a predilection for those located in the LOQ. It allows the excision of a larger portion of breast parenchyma when compared to both “Crescent” and “Emicrescent” techniques. The tumor, the overlying skin and the adjacent glandular tissue are removed thanks to a wide incision shaped like a “J” starting from the NAC and descending down to the inframammary fold inward or outward depending on the tumor location. The NAC is subsequently recentralized through the de-epithelialization of an upper outer/inner periareolar skin crescent directly opposite from the initial tumor position. This technique leaves a “J” scar formed by the radial, inframammary and periareolar incisions.

STATISTICAL ANALYSIS: Quantitative variables were analyzed using the Student’s T test to detect differences between the two groups. Categorical variables were analyzed using the Chi square test and the Fisher’s exact test. A p value of 0.05 or less was considered statistically significant. All the analyses were performed using SPSS 22 software package (SPSS, Inc., Chicago, IL).

RESULTS

Median age was 52 years (range, 31–75 years) in the “Crescent” group and 58 years (range, 40–87 years) in the “J” mammoplasty group. A higher number of overweight patients were found in the “J” group than in the “Crescent” one (26.5% vs 25.2%), without a significant statistical difference. No differences were found between the two groups also regarding age, tobacco and common comorbidities as hypertension and diabetes. Crescent technique was used for 13 lesions located in the LQ, 8 located in the LOQ and 8 in the LIQ. Moreover, in the “Crescent” group BCS was required for radial scar in 1 case, for infiltrative ductal carcinoma in 25 cases and for infiltrative lobular carcinoma in 3 cases; in situ ductal carcinoma was found associated to infiltrative carcinoma in 17 cases. The “J” mammoplasty group consisted of 29 patients, who underwent 29 BCS for 9 lesions located in the LQ, 15 in the LOQ and 5 in the LIQ. 6 in situ ductal carcinoma, 18 infiltrative ductal carcinoma, 3 infiltrative lobular carcinoma and 2 atypical ductal hyperplasia underwent “J” BCS technique. No significant statistical differences ($P > 0.05$) in terms of histological and biological features were observed between the two groups, as summarized in Table 1. Despite a larger surgical specimen in the “J” technique group (17.1 ± 10.7 mm) compared to the “Crescent” one (13.5 ± 8.3 mm), no statistically meaningful differences were detected between the two groups ($p = 0.141$). A statistical significant difference was found in the histological size of the lesions ($p = 0.003$), which was higher in the “J” group (15 ± 10.1 mm) compared to “Crescent” one (13 ± 5.1 mm)

and in the volume of tissue removed ($p = 0.04$) which was higher in the “J” group (132 ± 97 cc) compared to the “Crescent” one (63 ± 57 cc). No recurrences were observed during a mean follow-up of 36 months. Complications: One patient who underwent BCS with the “J” technique (3.4%) developed a marginal skin necrosis, which did not require surgery. No skin necrosis was observed in the “Crescent” technique group. Six lumpectomies (20.6%) in the “Crescent” technique group and only one (3.4%) in the “J” mammoplasty one developed seroma, showing the only complication-related significant statistical difference ($p < 0.05$) between the two groups. Cosmetic outcomes: Cosmetic outcomes were evaluated six months after adjuvant radiotherapy, independently by two senior plastic surgeons. Criteria for optimal cosmesis as described by Clough et al (10) included, for both groups: breast form, Nipple Areola Complex (NAC) position, Action required as showed in Table 2. All breasts were available for evaluation. 96.6% of the “Crescent” technique cases and the 73.5% of the “J” mammoplasty one were judged excellent/good. Interestingly, only 1 (3.4%) “Crescent” techniques was judged fair due to a minimal retraction of inframammary fold not requiring contralateral symmetrisation; whereas 6 (20.6%) of the patients who underwent “J” mammoplasty technique were judged fair due to volume asymmetry and deviation of NAC requiring an ideal ipsilateral re-operation mainly with lipofilling. 2 (6.9%) “J” techniques cases were judged poor in the overall appearance of the breast because of NAC deformation and deviation requiring ipsilateral re-operation.

DISCUSSION

Patients with favourable ratio between tumor size and breast volume undergo breast conservative surgery. The choice of the technique depends exclusively on the breast surgeon experience as if no guidelines have been developed to optimize oncological and cosmetic results. In women with large and/or ptotic breast an inverted T reduction mammoplasty allows both good aesthetic result and oncological safety and represents the best possible choice. In our series we evaluated 58 consecutive patients who underwent a “Crescent” or a “J” technique for tumors located in lower quadrants in small/medium breasts. No differences in oncological safety were found, indeed, no recurrences were identified in both groups at a mean follow-up of 36 months. Whereas, we observed a statistical significant difference in volume of breast tissue removed and histological size of the lesions which were both higher in the “J” techniques compared with the “Crescent” one. Despite the higher volume of breast tissue excised with the “J” mammoplasty, an increased complication rate have been found for the “Crescent” technique mainly due to seroma formation following fat necrosis. These results are slightly higher than those showed by Aljarra et al. [12] (6/54; 11% versus 6/28; 21.4%), probably related to the ultrasound examination to which all our patients were subjected and not only those clinically evaluable. Aesthetic results, in particular concerning the “Crescent” technique, are better compared with those observed in literature by Aljarra (96.6% of the procedures were judged excellent/good versus 74%). We believe that our results depend on different factors. First of all, an accurate selection of the patients is mandatory to obtain excellent results. We also consider antibiotic therapy a crucial factor to avoid infection that can cause breast deformity. Moreover, placing the patient in a sitting position at the end of the surgical procedure can strongly improve the aesthetic final result, as it shows defects not detectable

with the patients lying down, allowing an easy repair of the defect by modifying the way in which the fasciocutaneous flap is stitched in the cavity.

CONCLUSIONS

We offer conservative surgery in all patients affected by breast cancer located in the lower inner quadrants (LIQ), lower quadrants (LO) and lower outer quadrants (LOQ) when a favourable ratio between tumor size and breast volume are present. We suggest to assess patients' anthropometric characteristics (breast volume, cup A,B,C), tumor location (LOQ, LQ, LIQ), skin involvement and tumor features (calcifications/mass, in situ/invasive, lobular/ductal) as showed in Figure. 1 when choosing the most suitable surgical technique. Large and ptotic breast (Cup D) can be easily treated with an inverted T reduction mammoplasty regardless of tumor features and skin involvement. Small (Cup A), medium size (Cup B,C), without ptosis or with moderate ptosis must be served by crescent or J techniques.

Declarations

Author Contribution

Study conception and design: Giuseppe Falco; data collection: Saverio Coiro, Evelina Begnini, Monica Foroni, Eugenio Cenini; analysis and interpretation of results: Giuseppe Falco, Simone Mele, Guglielmo Ferrari, Fabio Castagnetti; draft manuscript preparation: Giulia Borgonovo, Ljuba Morando. All authors reviewed the results and approved the final version of the manuscript.

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

The authors have no relevant financial or non-financial interests to disclose.

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Tables

TABLE 1: Patient and tumor features.

	J - TECHNIQUE	CRESCENT TECHNIQUE	P VALUE	TOTAL
Age	62,7	57,4	0,24	31-87 (60)
BMI	26,5	25,2	0,43	17,2-45 (25,9)
Hypertension	13 (54,2%)	12 (45,8%)	0,59	24 (41,4%)
Smoke	7 (58,8%)	5 (41,7%)	0,51	12 (20,7%)
Diabetes	1 (33,3%)	2 (66,6%)	0,55	3 (5,2%)
Neo-adjuvant chemotherapy	1 (50%)	1 (50%)	1,00	2 (3,4%)
Tumor hystology			0,169	
<i>IDC</i>	8(44,4%)	10(55,6%)		18(31%)
<i>IDC+DCIS</i>	10(41,7%)	14(58,3%)		24(41,4%)
<i>DCIS</i>	6(100%)	0(0%)		6(10,3%)
<i>ILC+LCIS</i>	3(50%)	3(50%)		6(10,3%)
<i>Other</i>	0(0%)	1(100%)		1(1,7%)
<i>ADH</i>	2(100%)	0(0%)		2(3,4)
<i>RS</i>	0(0%)	1(100%)		1(1,7%)
Tumor location			0,053	
<i>LQ</i>	9(40,9%)	13(59,1%)		22(37,9%)
<i>LIQ</i>	5(38,5%)	8(61,5%)		13(22,4%)
<i>LOQ</i>	15(65,2%)	8(34,8%)		23(39,7%)
Type				
<i>Luminal-A</i>	14(50%)	14(50%)		28(48,3%)
<i>Luminal-B</i>	3(37,5%)	5(62,5%)		8(13,8%)
<i>Luminal-B, HER2+</i>	2(22,2%)	7(77,8%)		9(15,5%)
<i>HER2+</i>	1(100%)	0(0%)		1(1,7%)
<i>Triple negative</i>	1(33,3%)	2(66,7%)		3(5,2%)
Radiological size	17,10	13,48	0,141	3-50(15,29)
Hystological size	15,52	13,00	0,003	4-50(14,26%)
Specimen volume	132,04	63,86	0,036	15-504(97,9)

Table 2. Five-point scale used to rate cosmetic outcome.

Scores	Overall aesthetic results	Breast forms	NAC positions	Action required
5	Excellent	No detectable asymmetry	Perfect position	No further action
4	Good	Perfect breast form with minimal asymmetry	Good position	No further action
3	Fair	Minimal retraction in the operated quadrant/asymmetry of volume	Minimal deviation of NAC toward the operated quadrant	ASCT type 1 requiring contralateral symmetrization
2	Poor	Deformation of operated breast	Deviation of NAC	ASCT type 2 requiring ipsilateral reoperation
1	Bad	Major deformation of operated breast	Distortion of NAC	ASCT type 3 mastectomy

NAC nipple-areolar complex, ASCT aesthetic sequelae of conservative treatment, types 1-3¹⁰

Figures

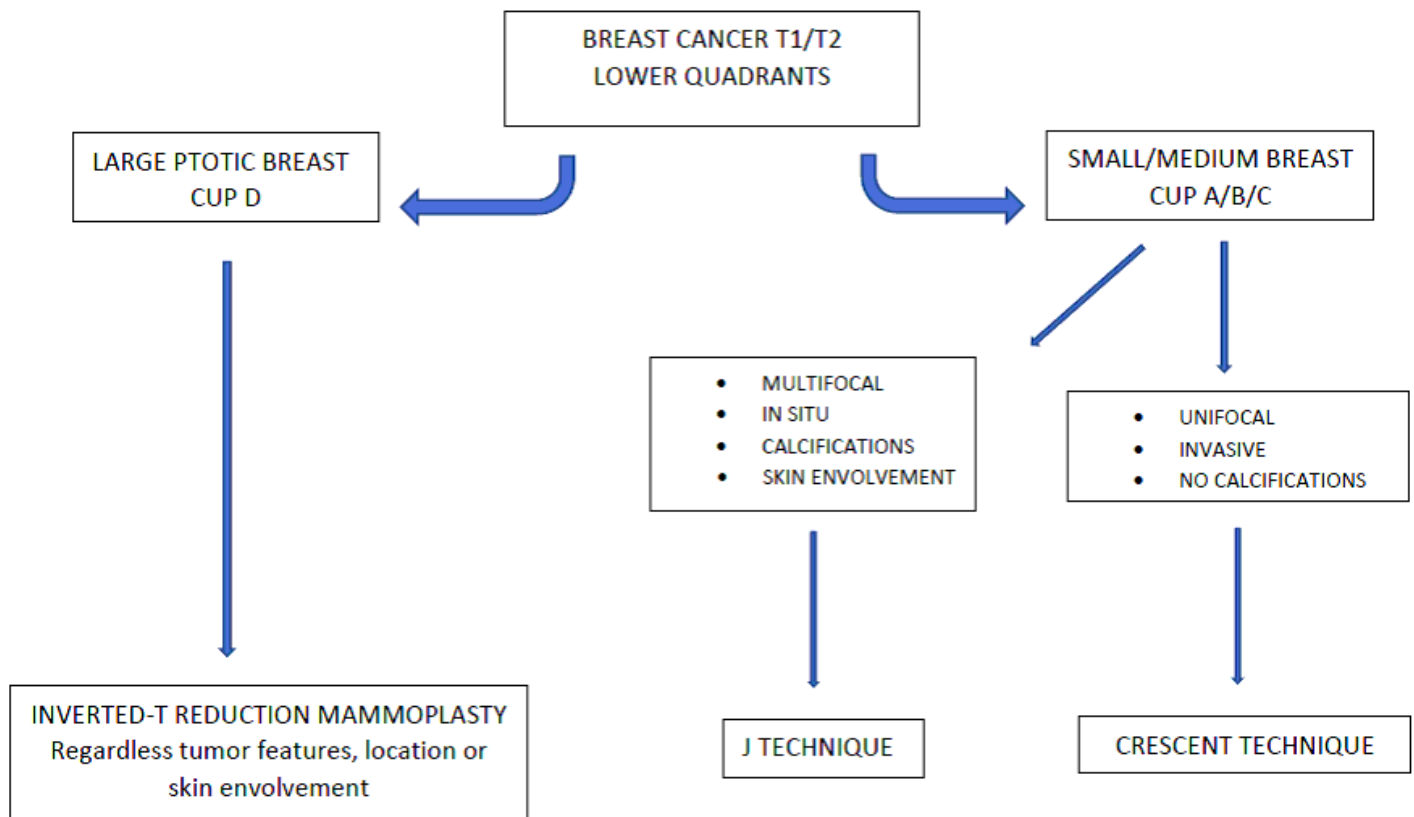


Figure 1

Simplified algorithm for decision making in lower quadrant conservative surgery.