한국인 유방암 환자에서의 유방종양 성형술의 미용적 결과 및 만족도

하수민, 김태현, 이안복, 변경도, 한재웅, 안민성, 김광희, 배기범, 박하경, 신재호, 서상혁

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Cosmetic outcomes and patients' satisfaction of oncoplastic surgery in Korean patient with breast cancer

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Purpose: Oncoplastic surgery (OPS) has emerged as the latest ideal surgery in treatment of breast cancer. The purpose of this study is to evaluate the cosmetic outcome of volume displacement surgery and patients' satisfaction in Korean women with relatively small breast size.

Methods: This is a retrospective study of 173 patients who had volume displacement of OPS between January 2008 and December 2013. Cosmetic outcome was evaluated by patients' questionnaire and a doctor. The patients' satisfaction was assessed by a questionnaire divided into four categories; cosmetic satisfaction, satisfaction on operative method, femininity, and side effects. Relationship between removed specimen volume and patients' satisfaction was also analyzed.

Results: About 90% of patients answered above the fair in cosmetic items and operative methods, only less than 5% of all patients reported of severe complications such as cramps or limitations of exercise. The patients' cosmetic satisfaction score were significantly inversely related with removed specimen volume and doctor's cosmetic assessment was also accordance with this result ($P < 0.05$). Most patients preferred good contour over short scar regardless of age and marital status (good contour 54% vs. short scar 21%).

Conclusion: Volume displacement of OPS brings both the best possible cosmetic outcome and high patient satisfaction for Korean women with a small size of breast in breast cancer surgery. It is highly suggestive that Korean women considers good contour more than the size of scar; therefore, volume displacement of OPS is a recommendable means of breast cancer surgery for Korean women.

Keywords: Breast, Neoplasms, Cosmetics, Mammoplasty

INTRODUCTION

Breast conserving surgery (BCS) is the standard treatment of breast cancer. The proportion of BCS has gradually grown, now accounting

for up to 70% of all breast cancer surgery [1-4]. In comparison with mastectomy, BCS has the benefits of relatively satisfactory cosmetic outcome while showing no difference in the oncologic radicality [1,2]. However, sometimes BCS shows cosmetic limitation according to oncologic (tumor volume, multifocality) and anatomic (breast size, tumor-breast ratio, tumor location) characteristics [5]. Because of this limitation, oncoplastic surgery has emerged in the purpose of achieving oncologic safety whilst satisfying aesthetic outcomes [6-8]. The term oncoplastic surgery was first used by Audretsch [9] in 1998, meaning immediate defect-filling reconstruction to prevent deformity after BCS. Nowadays the term covers a broader aspect, which includes both immediate and delayed reconstruction not only in BCS but also in total mastectomy [10,11]. Breast onco-

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plastic surgery is divided into two large categories, which are volume displacement and volume replacement. The former is resection of cancer along with reshaping breast tissue; the latter is using autologous flap or prosthesis to reconstruct breast contour [12].

Breast oncoplastic surgery is an worldwide used method, and various surgical techniques are performed [13,14]. Korean women's average breast size is relatively small compared to that of western women, so the role of oncoplastic surgery could be more important. This study was performed to survey the satisfaction rates of breast cancer patients who underwent BCS with volume displacement oncoplastic surgery.

METHODS

Between January 2008 and December 2013, a total of 600 patients underwent oncoplastic surgery with breast cancer by one surgeon

at the Department of Surgery, Busan Paik Hospital. Among these patients, 173 patients who had agreed with this study were enrolled in this study and the patients who underwent reduction mammoplasty in large breast were excluded from this study.

Patients' satisfaction was surveyed with a questionnaire. In addition, cosmetic outcome was evaluated by a doctor. The doctor's judgement on aesthetic point of view was recorded by another doctor who did not participate in the surgery. In addition, the study looks into the patients' acceptability of long scars, which are possible results of oncoplastic surgery. This study was approved by the Institutional Review Board of Hospital (IRB approval number, 14-0127).

Volume displacement oncoplastic surgery

Oncoplastic surgery was named as three different groups depending on the amount of excised tissue, skin excision and the range of displacement of breast parenchymal tissue. Simple glandular ad-

Fig. 1. The postoperative picture of 55-year-old woman who underwent simple glandular advancement for left breast cancer. (A, B) Postoperative breast shows good shape and short scar. This patient answered as fair in question for her undressed appearance and doctor scored as excellent for her cosmetic result.

Fig. 2. The picture of 47-year-old woman who underwent dermo-glandular advancement (DGA) for right breast cancer. (A) Diamond shape skin incision line was designed for DGA. (B) Postoperative breast shows good contour and symmetry. (C) Right breast shows a relative long postoperative scar.

vancement (SGA) indicates surgical technique that does not require further skin excision, which is performed only in small size mass with small defects. The defect is filled with minimal breast parenchymal displacement (Fig. 1). Dermo-glandular advancement (DGA) is performed when defect is relatively big; a further skin excision is made, followed by excision of breast mass and parenchyme and then displacement of skin and breast parenchyme to fill in the defect (Fig. 2). Dermo-glandular rotation (DGR) is a surgical technique that requires a long skin incision with wide excision of breast parenchyme and skin, thereby resulting in a relatively large defect; this is replaced by the rotation of another quadrant of breast parenchyme and skin (Fig. 3). Surgical method was selected according to tumor and breast size (excision volume) and tumor location, which was judged subjectively by an operator.

Questionnaire on patients' satisfaction

The questionnaire on patients' satisfaction was carried out at the follow-up visit at least one year after surgery. The questionnaire was adapted from Pusic's BREAST-Q [15], which was revised and adjusted to fit this study. The questionnaire was divided into five categories; cosmetic satisfaction, satisfaction on operative method, femininity, postoperative side effects, and preference of operative method. Last category was added to investigate the patients' acceptability of long surgical scar has the benefits of maintaining breast contour, but leaves a relatively long scar. Patients answered questions of the five-point scale (Table 1).

Doctor's cosmetic assessment

Cosmetic outcome was evaluated by a doctor who did not participate in the surgery. He inspected the operation site in the point of breast shape and symmetry, dimpling, nipple deviation, deformity, scar contracture either at the clinic during the patient following or via photographs without knowledge of questionnaire results.

The result was classified according to specific criteria using four-

point Likert scale [16] and scored as follows: (1) excellent (implies absolutely satisfactory outcomes)=4; treated breast was nearly identical to untreated breast, (2) good (implies satisfactory outcomes)=3; treated breast was slightly different to untreated breast, (3) fair (implies somewhat satisfactory outcomes)=2; treated breast was clearly different to untreated breast, (4) poor (implies needing corrections)=1; treated breast was seriously distorted.

Table 1. Questionnaire items for patients' satisfaction

Category	Questions
Cosmetic satisfaction	<ol style="list-style-type: none"> 1. How do you feel when you look yourself undressed on in the mirror? 2. How do you feel when you look yourself dressed in the mirror? 3. How does your breast look with a brassiere? 4. How comfortable are you with a brassiere? 5. Do you feel natural with breast?
Satisfaction of operative method	<ol style="list-style-type: none"> 1. Are you satisfied with the result of the surgery? 2. Does the result coincide with the expectation before surgery? 3. If you were to have a surgery again, would you take the same procedure?
Femininity	<ol style="list-style-type: none"> 1. I am attractive. 2. I am emotionally stable. 3. I am generally confident. 4. I feel feminine after dressed. 5. I can accept the changes of the body after the surgery.
Side effects	<ol style="list-style-type: none"> 1. Do you have pain on your operated breast? 2. Do you have cramps around the breasts? 3. Are there any limitations on moving your arm? 4. Are there any pains on the shoulder or arm?
Preference of operative method: contour vs. scar length	<ol style="list-style-type: none"> 1. Is it acceptable that scar is obvious when the breast shape is satisfactory? 2. Is it acceptable that breast shape is unsatisfactory when the scar is barely visible?

Fig. 3. The picture of 53-year-old woman who underwent dermo-glandular rotation. (A) Preoperative skin incision design was done for lower outer tumor. (B) Postoperative frontal view shows asymmetry of both breast. (C) Lateral view shows a relative good breast contour.

Percentage of removed breast volume

We evaluated the patients' cosmetic satisfaction according to percentage of removed breast volume. Removed breast volume was estimated by dividing the pathologic specimen weight by the calculated preoperative breast volume. The cone breast volume was estimated with using formula $V = 1/3\pi r^2 h$. The breast height and radius was measured in preoperative mediolateral oblique mammogram by two independent observers. This method was adapted from previous study [17].

Statistical analysis

The survey on patients' satisfaction and doctor's assessment were technically analyzed on each question. Analysis of variance test was used for the comparison of mean score. All statistical tests were performed by PASW ver. 18 (SPSS Inc., Chicago, IL, USA) and P-value < 0.05 was considered as statistically significant in all results.

RESULTS

Patients' characteristics

A total of 173 females were enrolled in this study and their mean age of the patients was 53.9 ± 9.0 years. The mean tumor size was 2.3 ± 1.4 cm. In terms of tumor location, 107 tumors (61.8%) locat-

Table 2. Patients' characteristics

Characteristic	Value
No. of patients	173
Mean patients' age (yr)	53.9 ± 9.0
Brassiere cup size	
Large	33 (19)
Medium	80 (47)
Small	60 (34)
Mean tumor size (cm)	2.3 ± 1.4
Tumor location	
Upper outer	107 (61.8)
Lower outer	25 (14.5)
Upper inner	31 (17.9)
Lower inner	10 (5.8)
Operative methods	
SGA	56 (32.4)
DGA	102 (60.0)
DGR	15 (7.6)
Mean specimen weight (g)	74.0 ± 67.2
Mean breast volume (mL)	497.5 ± 247.6
Mean resection volume ratio (%)	15.4 ± 9.3

Values are presented as mean $\pm$ standard deviation or number (%).

Large, equal to or more than C cup; Medium, B cup; Small, A cup of brassiere; SGA, simple glandular advancement; DGA, dermo-glandular advancement; DGR, dermo-glandular rotation.

Table 3. Patients' satisfaction results

Question	Score = 5 (very satisfied)	Score = 4 (satisfied)	Score = 3 (fair)	Score = 2 (dissatisfied)	Score = 1 (very dissatisfied)
Cosmetic satisfaction (n = 173)					
Q 1	25 (14.5)	52 (30.1)	65 (37.6)	25 (14.5)	6 (3.5)
Q 2	37 (21.4)	70 (40.5)	54 (31.2)	9 (5.2)	3 (1.7)
Q 3	27 (15.6)	77 (44.5)	57 (32.9)	9 (5.2)	3 (1.7)
Q 4	25 (14.5)	76 (43.9)	57 (32.9)	12 (6.9)	3 (1.7)
Q 5	27 (15.6)	73 (42.2)	53 (30.6)	17 (9.8)	3 (1.7)
Satisfaction to operative method (n = 173)					
Q 1	46 (26.6)	79 (45.7)	33 (19.1)	14 (8.1)	1 (0.6)
Q 2	43 (24.9)	67 (38.7)	47 (27.2)	12 (6.9)	4 (2.3)
Q 3	48 (27.7)	55 (31.8)	50 (28.9)	13 (7.5)	7 (4.0)
Femininity (n = 173) ^{a)}					
Q 1	9 (5.2)	22 (12.7)	91 (52.6)	15 (8.7)	36 (20.8)
Q 2	21 (12.1)	59 (34.1)	60 (34.7)	20 (11.6)	13 (7.5)
Q 3	19 (11.0)	40 (23.1)	76 (43.9)	15 (8.7)	23 (13.3)
Q 4	20 (11.6)	41 (23.7)	77 (44.5)	20 (11.6)	15 (8.7)
Q 5	27 (15.6)	56 (32.4)	70 (40.5)	18 (10.4)	2 (1.2)
Side effect (n = 173) ^{b)}					
Q 1	69 (39.9)	57 (32.9)	24 (13.9)	15 (8.7)	8 (4.6)
Q 2	90 (52.0)	46 (26.6)	26 (15.0)	8 (4.6)	3 (1.7)
Q 3	90 (52.0)	45 (26.0)	21 (12.1)	11 (6.4)	6 (3.5)
Q 4	80 (46.2)	59 (34.1)	11 (6.4)	16 (9.2)	7 (4.0)

Values are presented as number (%).

^{a)}Score = 5, definitely agree; score = 4, agree; score = 3, fair; score = 2, disagree; score = 1, definitely disagree. ^{b)}Score 5, excellent; score 4, good; score 3, fair; score 2, poor; score 1 very poor.

ed in upper outer quadrant, 25 tumors (14.5%) in lower outer quadrant, 31 tumors (17.9%) in upper inner quadrant, and 10 tumors (5.8%) in lower inner quadrant. In operative methods, 56 patients (32.4%) underwent SGA, 102 patients (60.0%) underwent DGA and the rest 15 patients (7.6%) underwent DGR. The average weight of removed specimens was 74.0 ± 67.2 g and the average breast volume was 497.5 ± 247.6 mL. The mean specimen weight to breast volume ratio was $15.4\% \pm 9.3\%$. Table 2 presents the clinico-pathologic characteristics of all patients.

Survey on patients' satisfaction and doctor's cosmetic assessment

Table 3 showed the patients' satisfaction on cosmetic appearance, operative method, femininity, and side effect. For the cosmetic appearance, over the 50.0% of the patients were above satisfied in all questions except for the undressed appearance (44.6%). However, 82.2% of patients answered above the fair in their undressed ap-

pearance. In respect to operative method, 72.3% of all patients were above satisfied in their operative results and about 60.0% of the patients showed their satisfaction on the results coincide with expectation before surgery and surgery procedure. Regarding to the femininity criteria, patients showed relatively low confidence compared to other criteria. Especially, only 17.9% of patients agreed that they were attractive. In the case of side effect, less than 5% of all patients experienced very poor side effect in all items.

Doctor's cosmetic perception on volume displacement breast oncoplastic surgery showed relatively good results. Among the 173 cases, 43 (24.9%) cases, and 81 (46.8%) cases were scored as excellent and good, respectively. Only, seven cases (4.0%) were scored as poor (Table 4).

Cosmetic assessment according to removed specimen volume

The patients' satisfaction and doctor's assessment score were analyzed according to removed specimen volume. In respective to patients' satisfaction, when the removed volume was less than 10%, patients' cosmetic satisfaction score was the highest and score dropped significantly as removed specimen volume increased ($P < 0.05$). However, no significant differences were observed in the other question items according to removed volume. Regarding to doctor's cosmetic assessment, the score also decreased significantly

Table 4. Doctor's cosmetic assessment result

Score	Excellent 4	Good 3	Fair 2	Poor 1
No. of patients (%)	43 (24.9)	81 (46.8)	42 (24.3)	7 (4.0)

Values are presented as number (%).

Table 5. Patient's satisfaction score according to removed specimen volume

Questions	Vol < 10% (n = 56)	10% ≤ Vol < 20% (n = 82)	20% ≤ Vol < 30% (n = 19)	30% ≤ Vol < 40% (n = 16)	P-value
Cosmetic satisfaction (n = 173)					
Q 1	3.8 ± 0.8	3.3 ± 1.0	2.8 ± 1.1	2.9 ± 1.0	< 0.001
Q 2	4.0 ± 0.8	3.7 ± 1.0	3.4 ± 1.0	3.6 ± 0.7	0.035
Q 3	3.9 ± 0.8	3.7 ± 0.9	3.4 ± 1.0	3.2 ± 0.8	0.006
Q 4	3.9 ± 0.8	3.6 ± 0.8	3.3 ± 1.2	3.2 ± 0.8	0.008
Q 5	3.8 ± 0.8	3.6 ± 0.9	3.2 ± 1.0	3.4 ± 0.9	0.033
Satisfaction to operative method (n = 173)					
Q 1	4.0 ± 1.0	3.8 ± 0.9	4.1 ± 0.7	3.6 ± 1.1	0.243
Q 2	3.8 ± 1.0	3.8 ± 0.9	3.9 ± 0.8	3.4 ± 1.3	0.359
Q 3	3.8 ± 1.1	3.7 ± 1.1	3.7 ± 1.1	3.3 ± 1.1	0.423
Femininity (n = 173)					
Q 1	3.0 ± 1.0	2.7 ± 1.0	2.7 ± 1.1	2.3 ± 1.3	0.089
Q 2	3.5 ± 1.0	3.2 ± 1.1	3.2 ± 1.3	3.4 ± 1.0	0.513
Q 3	3.3 ± 1.1	3.0 ± 1.1	3.1 ± 1.3	3.0 ± 1.3	0.686
Q 4	3.5 ± 1.0	3.0 ± 1.0	3.1 ± 1.2	2.9 ± 1.4	0.020
Q 5	3.6 ± 0.9	3.4 ± 0.9	3.6 ± 1.0	3.6 ± 0.8	0.737
Side effect (n = 173)					
Q 1	4.0 ± 1.0	3.9 ± 1.2	3.7 ± 1.5	4.3 ± 0.9	0.448
Q 2	4.2 ± 1.1	4.2 ± 1.0	4.4 ± 0.9	4.4 ± 0.7	0.809
Q 3	4.2 ± 1.2	4.2 ± 1.0	4.3 ± 0.9	3.8 ± 1.3	0.429
Q 4	4.0 ± 1.3	4.1 ± 1.1	4.2 ± 1.0	4.0 ± 0.8	0.916

Table 6. Doctor's cosmetic assessment score according to removed specimen volume

	Vol < 10 (n = 56)	10 ≤ Vol < 20 (n = 82)	20 ≤ Vol < 30 (n = 19)	30 ≤ Vol < 40 (n = 16)	P-value
Mean score	3.4 ± 0.6	2.8 ± 0.7	2.5 ± 0.8	2.4 ± 1.3	< 0.001

when the removed volume became larger ($P < 0.001$) (Tables 5, 6).

Acceptance of long scar (preference of good contour vs. minimal scar)

We evaluated the patients' preference of good breast contour vs. minimal scar after surgery. Of the patients, 94 (54.3%) of them preferred good contour over long scar regardless of age and marital status. Only, 37 (21.4%) patients preferred short scar despite bad contour (Table 7).

DISCUSSION

Oncoplastic surgery is divided into two large categories, which are volume displacement and volume replacement surgery [12]. Among these, volume displacement oncoplastic surgery is resection of cancer along with reshaping breast tissue and this usually needs large breast volume [17]. Considering this, application of displacement of oncoplastic surgery to small to medium breast like in Korean women could be limited. Moreover, the acceptability of long scar for fine breast contour did not have been evaluated for Korean women who received oncoplastic surgery.

This study has surveyed the satisfaction of patients with breast cancer who underwent volume displacement oncoplastic surgery after BCS. Cosmetic outcome was considered satisfactory over 50% of all patients in all questions but for the undressed appearance (44.6%); however, if "fair" is included, 82.2% of patients answered above the fair in their undressed appearance and the rate peaks up to around 90% in the other cosmetic satisfaction items. In complication items, only less than 5% of all patients reported of severe complications such as cramps or limitations of exercise.

Chan et al. [17] studied the cosmetic outcome according to percentage of volume after oncoplastic BCS in Asian women, who have relatively small breast. They also performed oncoplastic surgery applying displacement surgery and reported very high satisfaction rate for cosmetic appearance; over the 90% of the patients were very satisfied or satisfied in their postoperative appearance. In the other previous meta-analysis study which compared patients' cosmetic satisfaction on those who had oncoplastic BCS with those who only had BCS, the satisfaction rate of oncoplastic BCS group was reported as 89.5% while that of BCS only group was 83.0%

Table 7. Preference of operative method: contour vs. length

Characteristic	Good contour	Short scar	Both
Age (yr)			
Age < 50	29 (47.5)	14 (23.0)	18 (29.5)
50 ≤ Age < 60	35 (55.6)	16 (25.4)	12 (19.0)
Age ≥ 60	30 (61.2)	7 (14.3)	12 (24.5)
Marital status			
Married	88 (54.3)	35 (21.6)	39 (24.1)
Unmarried	6 (54.5)	2 (18.2)	3 (27.35)
Total	94 (54.3)	37 (21.4)	42 (24.3)

Values are presented as mean ± standard deviation or number (%).

[18]. These results are relatively high satisfaction results compared to ours, and we think that this might be attributed to mean removed specimen weight to breast volume ratio. Actually, in Chan's study, their median percentage of volume excision was smaller compared to ours (7.4% vs. 12.8%) and the meta-analysis study also discussed patients with larger breasts were most satisfied for their cosmetic results [17,18]. Although this study did not compare satisfaction between oncoplastic surgery and BCS, the cosmetic satisfaction rated up to about 90% (including fair) with postoperative severe complications being less than 5%, suggesting that oncoplastic surgery is a good surgical technique.

We evaluated patients' satisfaction depending on specimen volume. According to the previous study, oncoplastic surgery enables to resect up to 50% of the breast [19] and our maximum percentage of removed volume specimen was around 40%. In this result, patients' cosmetic satisfaction score were significantly inversely related with removed specimen volume and doctor's cosmetic assessment was also accordance with this result ($P < 0.05$). On the basis of this result, we could recognize the pattern of satisfaction score change according to specimen volume. In the case of cosmetic score, mean cosmetic satisfaction score dropped until removed volume reached 30% and score was plateau when the removed volume was over 30% in both patient's and doctor's results. In the patients' satisfaction operative method, mean score was similar until removed volume became 30%, but the score dropped dramatically when the removed volume was over 30%. The previous study on volume displacement oncoplastic surgery showed patients' satisfaction score was almost similar until removed volume was around 20% and after that satisfaction score dropped dramatically [17]. Considering these results, we suggest carefully that marginal value of percentage of volume excision for better cosmetic result could be between 20% and 30% in volume displacement oncoplastic surgery and volume replacement oncoplastic surgery might be necessary when the excised volume is more than 40% of the breast. However, we think that more studies will be needed to clarify this

suggestion.

This study has evaluated the acceptability of long scar for fine breast contour. Generally speaking, good breast contour was preferred over short scar (54.5% vs. 21.4%), regardless of age and marital status. Interestingly, the preference for good contour increased as patients get older. This shows that Korean women put importance on general appearance with their clothing on and older women less concerns on scar compared to young women.

Volume displacement breast oncoplastic surgery ensures both the best possible cosmetic outcome of breast cancer resection and high patient satisfaction for Korean women with small sized breasts. For this reason, it is a recommendable surgical technique. Korean women tend to consider general contour of breast more than the size of scar in terms of cosmetic satisfaction.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER, et al. Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. *N Engl J Med* 2002; 347:1233-41.
2. Veronesi U, Cascinelli N, Mariani L, Greco M, Saccozzi R, Luini A, et al. Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. *N Engl J Med* 2002;347:1227-32.
3. Garcia-Etienne CA, Tomatis M, Heil J, Friedrichs K, Kreienberg R, Denk A, et al. Mastectomy trends for early-stage breast cancer: a report from the EUSOMA multi-institutional European database. *Eur J Cancer* 2012;48:1947-56.
4. Truin W, Roumen RM, Siesling S, van der Heiden-van der Loo M, Duijm LE, Tjan-Heijnen VC, et al. Patients with invasive lobular breast cancer are less likely to undergo breast-conserving surgery: a population based study in the Netherlands. *Ann Surg Oncol* 2015; 22:1471-8.
5. Clough KB, Benyahi D, Nos C, Charles C, Sarfati I. Oncoplastic surgery: pushing the limits of breast-conserving surgery. *Breast J* 2015;21:140-6.
6. Asgeirsson KS, Rasheed T, McCulley SJ, Macmillan RD. Oncological and cosmetic outcomes of oncoplastic breast conserving surgery. *Eur J Surg Oncol* 2005;31:817-23.
7. Quinn McGlothlin TD. Breast surgery as a specialized practice. *Am J Surg* 2005;190:264-8.
8. Bredart A, Petit JY. Partial mastectomy: a balance between oncology and aesthetics? *Lancet Oncol* 2005;6:130.
9. Audretsch W. Reconstruction of the partial mastectomy defect: classification and method. In: Spear SL, editor. *Surgery of the breast: principles and art*. Philadelphia: Lippincott-Raven; 1998. p.155-96.
10. Rutgers EJ. Guidelines to assure quality in breast cancer surgery. *Eur J Surg Oncol* 2005;31:568-76.
11. Baildam AD. Oncoplastic surgery of the breast. *Br J Surg* 2002;89: 532-3.
12. Yang JD, Bae SG, Chung HY, Cho BC, Park HY, Jung JH. The usefulness of oncoplastic volume displacement techniques in the superiorly located breast cancers for Korean patients with small to moderate-sized breasts. *Ann Plast Surg* 2011;67:474-80.
13. Churgin S, Isakov R, Yetman R. Reconstruction options following breast conservation therapy. *Cleve Clin J Med* 2008;75 Suppl 1: S24-9.
14. Sanuki J, Fukuma E, Wadamori K, Higa K, Sakamoto N, Tsunoda Y. Volume replacement with polyglycolic acid mesh for correcting breast deformity after endoscopic conservative surgery. *Clin Breast Cancer* 2005;6:175.
15. Pusic AL, Klassen AF, Scott AM, Klok JA, Cordeiro PG, Cano SJ. Development of a new patient-reported outcome measure for breast surgery: the BREAST-Q. *Plast Reconstr Surg* 2009;124:345-53.
16. Haloua MH, Krekel NM, Jacobs GJ, Zonderhuis B, Bouman MB, Buncamper ME, et al. Cosmetic outcome assessment following breast-conserving therapy: a comparison between BCCT.core Software and Panel Evaluation. *Int J Breast Cancer* 2014;2014:716860.
17. Chan SW, Cheung PS, Lam SH. Cosmetic outcome and percentage of breast volume excision in oncoplastic breast conserving surgery. *World J Surg* 2010;34:1447-52.
18. Losken A, Dugal CS, Styblo TM, Carlson GW. A meta-analysis comparing breast conservation therapy alone to the oncoplastic technique. *Ann Plast Surg* 2014;72:145-9.
19. Clough KB, Kaufman GJ, Nos C, Buccimazza I, Sarfati IM. Improving breast cancer surgery: a classification and quadrant per quadrant atlas for oncoplastic surgery. *Ann Surg Oncol* 2010;17:1375-91.