Title: Simultaneous Contralateral Breast Reduction/ Mastopexy with Unilateral Breast Reconstruction Using Free Flaps

Article Type: Breast Surgery

Keywords: Unilateral breast reconstruction; contralateral balancing procedure; breast reduction; mastopexy; deep inferior epigastric perforator flap; superficial epigastric artery flap; transverse rectus abdominis myocutaneous flap.

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Manuscript Region of Origin: TAIWAN

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Manuscript Title: **Simultaneous Contralateral Breast Reduction/Mastopexy with Unilateral Breast Reconstruction Using Free Flaps**, including all accompanying digital supplementary content, if any (the "Work")

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We thank you for your time and look forward to your editorial decision regarding our manuscript.

Sincerely,

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Running head: Simultaneous contralateral breast reduction with free flaps
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Meetings at which the paper was presented:


• First Asian Symposium for Head and Neck Oncology, Taipei, Taiwan, September 18, 2009.

• 10th Congress of the International Confederation for Plastic Reconstructive Aesthetic Surgery, Tokyo, Japan, October 9, 2009.
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Conclusions: The simultaneous contralateral balancing reduction/mastopexy may achieve better symmetric and pleasing mounds in one-stage along with unilateral breast reconstruction using a free DIEP/SIEA or muscle-sparing TRAM flap with minimal complication.
INTRODUCTION

Refinements in breast cancer reconstruction have shifted patients’ expectations from surviving breast cancer treatment to achieving an aesthetically pleasing final outcome (1-4). Autologous tissue reconstruction has been recognized as the first option to achieve a desirable result if the donor adipose tissue is available (5-10). In particular, the deep inferior epigastric artery perforator (DIEP) or superficial inferior epigastric artery (SIEA) flap has recently emerged, in experienced hands, as the ideal free flap because of its minimal donor site morbidity and superior aesthetic satisfaction (7, 11-14). Successful breast reconstruction is judged not only by the creation of a natural appearing breast mound but also achieving maximum symmetry of both pleasing breasts. This often requires additional balancing procedures to the opposite breast in the form of augmentation, reduction or mastopexy (1-3, 15-16).

The ideal time to perform contralateral procedures remains debatable. Advocates of the simultaneous technique describe the advantages of using the revised contralateral breast as a ‘footprint’ for the reconstructed breast to achieve symmetry in one operative setting (1); decreased patient morbidity, reoperation time, and also cost-saving (15). Furthermore, surgery on the opposite breast offers an opportunity to obtain tissues for identifying occult carcinomas (17). In contrast, some authors may prefer to carry out a staged procedure; citing longer operating times, blood loss, difficulties in achieving long term symmetry, and distortion by adjuvant radiotherapy as potential disadvantages (1, 18-19).
There are still very few published series in the literature comparing the merits of simultaneous versus staged procedures, especially focusing on single, newer techniques, such as the DIEP or SIEA flap. We have previously published our results using endoscope-assisted simultaneous contralateral breast augmentation in patients undergoing unilateral breast reconstruction with the DIEP or SIEA flap (16), demonstrating a high patient satisfaction with long term aesthetically pleasing results and symmetry. These results have encouraged us to review our series on other simultaneous contralateral breast balancing procedures such as mastopexy or reduction mammoplasty that had been performed in patients who had undergone the DIEP, SIEA, or muscle-sparing TRAM flap for breast reconstruction. The objectives of this study were to investigate the outcome and patient’s satisfaction of simultaneous contralateral balancing mastopexy or reduction with unilateral breast reconstruction using free flaps.

**MATERIALS AND METHODS**

Between of March 2000 and September of 2009, 25 of 291 patients underwent unilateral breast reconstructions with a free DIEP, muscle-sparing TRAM, or SIEA flaps with contralateral breast reduction/mastopexy. 22 patients underwent the contralateral balancing procedures simultaneously while the other three patients received the procedures in a separate stage. The decision was based on the suitability of the confirmation of the unlikelihood of post-operative radiotherapy in immediate breast reconstruction, patients’ requests and surgeon’s experience.
The average age of 22 patients with simultaneous contralateral breast reduction/mastopexy was 45.4 ± 7.5 years (range 34 to 65). The mean body mass index (BMI) was 23.3 ± 4.4 (range 18-30). One case was in immediate reconstruction and the other 21 cases in delayed reconstructions. (Fig1-4) DIEP flap was in 19 cases, free muscle-sparing TRAM flap in 2 cases, and remain one case was a SIEA flap. The weight of breast tissue excised in immediate reconstruction, flap tissue used for reconstruction, and contralateral breast tissue removed were recorded and summarized in Table 1.

For further evaluation, the three patients receiving two-stage contralateral breast reduction/mastopexy (Group B) and another 265 patients without contralateral reduction/mastopexy (Group C) were used for comparisons. Complications including infection, partial flap loss, total flap failure and fat necrosis were compared.

**Surgical Technique**

The DIEP, SIEA, or muscle-sparing TRAM flap was consistently selected by the senior author (M.-H. C.) because of the adequate donor fat tissue for achieving a superior cosmesis with minimal donor site morbidity. A contralateral breast procedure, mastopexy or reduction mammoplasty is considered if: (1) the patient is dissatisfied with her present contralateral breast profile with ptosis or hyperplasia, with or without functional symptoms and (2) the anticipated breast reconstruction using autologous tissue is unable to match the opposite breast regarding to the volume
and shape. A mastopexy procedure is discussed if the woman has significant ptosis, defined as Regnault grade II or III, or if there is significant loss of upper pole fullness.

Elevation of the Flap and Preparation of the Recipient Site

With the patient in the standing position, markings were made to establish the new infra-mammary fold and superior breast margin on reconstructed breast site and the new nipple position on the balancing breast site. The Asian woman usually has a sternum-to-nipple distance of between 19 to 21cm for a pleasing breast mound. A two-team approach was utilized. In delayed reconstruction, one team would start the flap dissection as usual while the other prepared the recipient site and finished the contralateral breast reduction/mastopexy. The DIEP or SIEA flap was raised using techniques described elsewhere (11-13). The internal mammary artery and vein were the preferred recipient vessels. A 1 cm in length of cartilage was preserved while dissecting the recipient vessels for secondary nipple reconstruction as previously described (20-21).

Contralateral Breast Procedures

On completion of recipient site preparation, the same team would then commence the contralateral breast reduction/ mastopexy using the central mound technique described by Hidalgo with inverted T scar or vertical scar for mastopexy. The mastopexy technique would depend on the severity of ptosis, ranging from a Benelli type nipple procedure for mild ptosis to vertical scar or inverted ‘T’ incisions for more severe ptosis. For reduction mammoplasty, the central mound technique with
inverted T scar was preferred as described by Hildago (22) as the preservation of second and third internal mammary perforators and 4th to 6th intercostal perforators for the nutrition of the nipple areolar complex and the upper chest wall skin flaps. The wound of mastopexy/reduction was held together by temporary staples, giving a room for any final alterations following flap inset if necessary.

**Microsurgical Anastomosis and Flap Inset**

There was usually very little time delay between the completion of the contralateral breast procedure and the raising of the flap. This smooth transition and well-timed sequence allowed the newly-shaped contralateral breast to then be used as a template for decision-making regarding the amount of transferred flap to be used during inset. Following division of the pedicle, the flap’s weight was measured and volume was determined by the water displacement technique (16). Any flap tissue that was discarded following the shaping and inset was also weighed to help the estimation of the amount of flap-used. The flap was then transferred and rotated 180 degrees and fixed temporarily to the chest wall, while both arterial and venous anastomoses were carried out. If there was any evidence of venous congestion, the SIEV may then be used in an additive or substutive anastomosis either to the internal mammary vein or deep inferior epigastric vein with end-to-end to the side branch or end-to-side fashion. After confirming adequate flap perfusion, the flap inset would be
guided by the contralateral breast to achieve most pleasing reconstructed and reduced breast mounds.

**Evaluation of Outcome**

The patient’s perception of the breast reconstruction was assessed using a modified questionnaire from Heden (23).

The questionnaire focused on the patient’s own perception of herself following breast reconstruction and looked at several areas including body image, relationship with partner and overall outlook on life with each category graded into 7 categories. The aesthetic results were also reviewed by 7 individual plastic surgeons using same photographs and a scoring system ranging from 1 to 4 (1= poor, 2= fair, 3= good, 4= excellent), based on assessment of various parameters including the overall breast shapes, position, volume of the reconstructed and reduced breasts and the symmetry between both breast mounds.

**Statistics**

To determine significant differences between the three groups, analysis was performed by using Fisher’s exact test, one-way ANOVA and Bonferroni post-hoc for evaluation. In all cases, differences were considered significant if the $P$ value is less than 0.05.

**RESULTS**

There were 22 simultaneous contralateral breast reduction/mastopexy with a mean reduced weight of 173.6 ± 101 gm. The mean operation time for both breast
reconstruction and contralateral breast procedure was 10 hours and 54.5 minutes (range: 8 hours and 36 minutes to 12 hours and 44 minutes). The mean hospital stay was 10.67 days (range: 7 to 43 days). All of the flaps survived. Two DIEP flaps developed venous congestion. One flap had a hematoma compressing the pedicle which was evacuated to relieve the congestion without further re-anastomosis. The flap subsequently sustained a partial flap necrosis of contralateral lateral zone (zone IV), which was debrided on day 10 without any more subsequent procedures to achieve symmetry. The other patient required two additional venous anastomoses to solve the venous congestion. On Day 2, the contralateral SIEV was anastomosed to the internal mammary vein (IMV) in end-to-end fashion with taking down of DIEV. When this failed to drain the congestion, the ipsilateral SIEV was then anastomosed in an end-to-side fashion to the contralateral SIEV to allow drainage into the IMV. Partial necrosis also occurred in the contralateral lateral zone (zone IV), which had to be debrided on day 7. To achieve symmetry of bilateral breasts, the contralateral breast, which had already been reduced by 235 grams, required additional liposuction in order to match the reconstructed breast.

The average size of flap used was 568 ± 128.6 gram. This was slightly higher than the flap used in the control group (486 ± 158 gram), which reduction mammaplasty was not preformed, although there was no statistical significance between the two groups. ($P=0.03$)
None of reduced breast tissue revealed breast cancer in pathology. There were no complications resulting from the reduction mammoplasty / mastopexy procedures regarding to chest wall skin necrosis, nipple areolar partial loss, hematoma, and fat necrosis. The mean weight of tissue removed for breast reduction was 173.6 ± 101 gm (range 85 to 355 gm) reflecting the relative smaller breast sizes of women in Asian population in contrast to western women with hyperplasia breasts. At a mean follow-up of 28.4 months, (range 1 to 72 months), two of the DIEP flap patients required additional revisions of the reconstructed breasts due to fat necrosis. None of them required additional procedures on the contralateral breasts during the follow up period.

Table 2 lists the complications encountered in the three groups of patients regarding to infection, partial or total flap loss and subsequent fat necrosis. There was no statistical difference between the simultaneous, two-stage contralateral reduction and control groups regarding to overall complication rates.

**Evaluation of Ultimate Cosmesis**

There were 132 patients available for the evaluation of ultimate cosmesis with the complete pre-operative and post-operative pictures, including 16 patients in group A, two patients in group B and 114 patients in group C. The overall score of medial fullness, breast shapes, and bilateral symmetry in one-stage balancing procedure group evaluated by 7 plastic surgeons presented higher than in the two-stage and
control groups. However, there was no statistical difference between three groups. (P = 0.66; 0.62; 0.23; respectively.) (Table 3)

Patient’s satisfaction

16 of 22 patients had completed the survey of the quality of life post unilateral breast reconstruction with simultaneous contralateral balancing procedures. (Table 4). Overall, 7 of the 16 patients (43.8 %) graded the breast reconstruction using free tissue transfer from abdomen with simultaneous balancing procedure as very advantageous and the remaining 9 of the 16 patients (56.2 %) graded the procedure as advantageous. (Table 4)

DISCUSSION

Advances in breast cancer treatment over the past 50 years have allowed earlier detection, accurate staging, and potentially curative treatment with overall improved survival rates (15, 24). More recently, reports about the safety of sentinel node biopsy, skin sparing mastectomy and immediate breast reconstruction has allowed further refinements in breast reconstruction techniques (25-27). The definition of a satisfactory outcome is now not only survival through total eradication of the tumor or draining lymphatic basins but also a symmetrical, aesthetically pleasing reconstruction with minimal complications, low cost and reduced requirement of second operation.
Although the ability to obtain good, consistent results is sometimes possible with a unilateral DIEP or SIEA reconstruction, contralateral procedures are often necessary to achieve the bilateral symmetric and pleasing breast mounds. With recent advances, many women may see the time of mastectomy and reconstruction as an opportunity to explore an overall change to their breast profiles, prompting discussion for contralateral procedures such as reduction mammoplasty, mastopexy and breast augmentation.

Simultaneous breast augmentation is the most commonly performed contralateral procedure for Asian women who are typically slim with smaller body habitus (16). In a smaller group of patients, however, reduction mammoplasty or mastopexy is indicated. Occult carcinoma could also be incidentally identified (as high as 4.6 %) by sending the contralateral breast tissue for histology (17).

Although contralateral procedures are common, there remain very few published articles on this topic, especially concerning simultaneous procedures. This may reflect the ongoing debate about the ideal time to perform a symmetric procedure. Stevenson and Goldstein were probably the first to compare staged and simultaneous procedures using the pedicled TRAM for breast reconstruction (1). They reported a satisfactory success rate based on the collective subjective analysis by patients and physicians and the absence of secondary revisions. Losken and colleagues presented a large series of 1394 patients from the Emory institute who underwent contralateral breast procedures, but they did not compare the
differentiation between simultaneous and staged procedures (3). Giacalone et al reported their experience with 683 patients in achieving breast symmetry using autologous and non-autologous reconstruction but no mention was made of the timing of contralateral procedures (2). More recently, Hakyal and Guay reported a single-stage breast cancer reconstruction (SSBCR) technique using autologous tissue reconstruction with a revision rate of 11.3% for secondary procedures (15). 75.2% of their patients had free autologous tissue transfer although it is not mentioned what proportion constitutes either the TRAM, muscle-sparing TRAM or DIEP flaps.

The DIEP or SIEA flaps present unique challenges for the breast surgeons. Extra time is often needed in the dissection and harvest of the flap to pursue the intramuscular course of the perforators. Such additional challenges may discourage the reconstructive surgeon from performing simultaneous contralateral procedures to avoid the theoretical increase in operating time, blood loss and post-operative complications. In addition, partial or complete flap failure or radiotherapy damage may result in difficulties to match an already reduced contralateral breast rather than having the opportunity to start with a clean sheet. With the gained experience, the senior surgeon (M.-H. C.) is confident to complete the DIEP or SIEA flap within 6-8 hours. When the partner surgeon (J.-J. H) joined to complete the flap harvest as a two-team approach, the senior surgeon can move to complete the balancing procedure in 1-1.5 hours after the recipient site preparation. Therefore, the total operation time in this series is within an acceptable range. Another concern is the potential volume of
blood loss in bilateral breast operations. Compared to Caucasian women, relatively small reduction volume is required in Asian patients, with an average weight of 173.6 ± 101 gm (range 85 to 355 gm) removed to produce an aesthetically pleasing breast, usually achieving a “C” to “D “cup according to patient’s expectation.

Haykal described ‘success’ as achieving a pleasing result within one anesthesia and failure if a second anesthetia (15). To obtain more objective measures, the total operating time when contralateral procedures were performed was compared with DIEP only cases that subsequently required a contralateral breast reduction (the two-stage group). There was no direct comparison made between operative times for DIEP and simultaneous contralateral procedures and the remaining 266 flap reconstruction-only cases, as the earlier cases required a learning curve and longer operating times. The total operative time in this series of 10 hours and 54.5 minutes, however, was not significantly longer than our usual practice. Another objective measurement was obtained from the weight of flap-used in Group A. The mean flap-used weight of Group A was 568.5 ± 128.6 g (345 to 810 g) which was not statistically different from the mean flap-used weight of 486 ± 158 g (170 to 975 g) in Group C (p<0.05, Fischer’s exact test). A similar amount of flap used implies an appropriate breast size was obtained following breast reconstruction and contralateral reduction without the need for secondary revision. There was also no significant difference between the amount of flap used when compared to the Group C (n=3). On the other hand, the transferred flap may need up 742.1 gm (568.5 + 173.6 gm) to
symmetrize the contralateral breast mound if the patient did not receive contralateral breast reduction/mastopexy. The transferred flap may include all the 4 zone of lower abdominal tissue, which may encounter more partial flap loss and fat necrosis.

Ultimately, the decision to operate on the contralateral breast rests with the patient, although the limitations of achieving symmetry with a unilateral reconstructive procedure are emphasized. As presented in this small series, a simultaneous contralateral reduction mammaplasty did not increase the incidence of complications. Furthermore, the same aesthetic results could be obtained regarding to the reconstructed breast and the breast symmetry between bilateral breasts. The doctor-patient consultation in this setting is complex and multi-factorial, and often reflects the need to understand the conservative socio-economic culture of Asian women and their reluctance to consent for surgery to a ‘normal’ breast purely for the sake of cosmesis. However, with careful preoperative counseling and a well intraoperative setting, a satisfactory result of unilateral breast reconstruction and simultaneous contralateral reduction mammaplasty could be obtained.

**Conclusions**

Contralateral balancing procedures including reduction/mastopexy in carefully selected patients, can be performed in one-stage with unilateral breast reconstruction in careful pre-operative planning and team work.
REFERENCES


Legends

Fig 1: A 36-year-old female with left breast ductal carcinoma in situ with diffuse microcalcification. Left simple mastectomy was indicated. She also presented with right breast ptosis and therefore an immediate left breast reconstruction with free deep inferior epigastric artery perforator flap (DIEP) and a simultaneous right breast mastopexy were planned. (A) Pre-operative anterior view. (B) Pre-operative left lateral view (C-E): Postoperative appearance, anterior view, right lateral view and left lateral view.

Fig 2: A 38-year-old patient with left breast cancer. She presented with bilateral hypertrophy and ptotic breasts. Left breast mastectomy and immediate reconstruction with free DIEP flap was planned. Because of the hypertrophy and ptotic breasts, a simultaneous contralateral breast reduction was suggested. (A) Preoperative appearance, anterior view. An inverted T incision was designed in bilateral breasts. (B) Preoperative appearance left lateral view. After right breast reduction of 85 gram and mastopexy and left breast reconstruction with free DIEP flap, she presented with bilateral symmetric and pleasing breasts. (C-E) Postoperative appearance in anterior, left lateral and right lateral view.

Fig 3: A 43-year-old patient with the history of left breast cancer received right breast modified radical mastectomy. She visited for delayed breast reconstruction. (A and B) Preoperatively, a right breast defect and left breast
ptosis were noted. Right breast reconstruction was accomplished with free DIEP flap. She also received simultaneous left breast mastopexy. (C-E) Postoperative anterior, right lateral and left lateral view after right breast, nipple and areolar reconstruction and left mastopexy

Fig 4: A 51-year-old lady presented to us with left breast defect after modified radical mastectomy for breast cancer treatment. Left breast reconstruction with free DIEP flap was planned. She had a hypertrophy and ptotic right breast and therefore a contralateral breast reduction was suggested. (A) Preoperative anterior view of her chest wall revealed a left breast defect and a hypertrophic and ptotic right breast. An invert T incision was planned for right breast reduction simultaneously with the breast reconstruction using free DIEP flap. (B) Immediate postoperative appearance of bilateral breasts after left breast reconstruction with free DIEP flap and right breast reduction mammaplasty. (C-E) Postoperative view, anterior, right lateral and left lateral. After nipple and areolar reconstruction, patient was satisfied with her symmetric and projected breasts.

Table 1

The average age, BMI, and used flaps in three different groups
Table 2

Acute and chronic complications among three different groups

Table 3

Cosmetic results evaluated by seven plastic surgeons

Table 4

Results of survey for quality of life post breast reconstruction with simultaneous contralateral balancing reduction/mastopexy
Table 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
<th>n (%)</th>
<th>Mean ± SD</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Age (y)</td>
<td>BMI (kg/m²)</td>
<td>History of Radiation</td>
<td>Flap-used Weight (gm)</td>
<td>Reduction Weight (gm)</td>
</tr>
<tr>
<td>A: One stage (n=22)</td>
<td></td>
<td>45.4 ± 7.5</td>
<td>23.3 ± 4.4</td>
<td>2 (9.1%)</td>
<td>568.5 ± 128.6 *</td>
<td>173.6 ± 101</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(range:34~65)</td>
<td>(range:18~30)</td>
<td></td>
<td>(range:345~810)</td>
<td>(range:85~355)</td>
</tr>
<tr>
<td>B: Two stage (n=3)</td>
<td></td>
<td>52.7 ± 6.7</td>
<td>24(n=1)</td>
<td>1 (33.3%)</td>
<td>472.5 ± 173.2 *</td>
<td>Missing data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(range:47~60)</td>
<td></td>
<td></td>
<td>(range:350~595)</td>
<td></td>
</tr>
<tr>
<td>C: Control Group</td>
<td></td>
<td>44.7 ± 8.2</td>
<td>22.2 ± 3.3</td>
<td>26 (9.8%)</td>
<td>486 ± 158</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(range:26~75)</td>
<td>(range:13.3~36.6)</td>
<td></td>
<td>(range:170~975)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>44.9 ± 8.2</td>
<td>22.3 ± 3.3</td>
<td>29 (10%)</td>
<td>492 ± 157.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(range:26~75)</td>
<td>(range:13.3~36.6)</td>
<td></td>
<td>(range:170~975)</td>
<td></td>
</tr>
</tbody>
</table>

| p-value             | 0.22            | 0.64            | 0.55            | 0.03*     |

Fisher’s exact test was used for comparisons of history of radiation and One-way ANOVA and Bonferroni post-hoc for other variables between three Groups. The flap-used weight was statistically lower in the Group B than in Group A (p=0.03*). Group A had a significantly increased score in overall breast shape and symmetry than the other two Groups (p< 0.001**, and p=0.04***, respectively)
Fisher’s exact test was used for comparisons between three Groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Variables</th>
<th>Infection n (%)</th>
<th>Partial flap loss n (%)</th>
<th>Total flap failure n (%)</th>
<th>Fat necrosis n (%)</th>
<th>Total complications n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: One stage (n=22)</td>
<td></td>
<td>2 (11.1%)</td>
<td>1 (4.5%)</td>
<td>0</td>
<td>0</td>
<td>2 (11.1%)</td>
</tr>
<tr>
<td>B: Two stage (n=3)</td>
<td></td>
<td>1 (33.3%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (33.3%)</td>
</tr>
<tr>
<td>C: Control Group</td>
<td></td>
<td>17 (7.1%)</td>
<td>8 (3.3%)</td>
<td>4 (1.5%)</td>
<td>8 (3.3%)</td>
<td>30 (12.4%)</td>
</tr>
<tr>
<td></td>
<td>Total (n=291)</td>
<td>20 (6.9%)</td>
<td>9 (3.1%)</td>
<td>4 (1.4%)</td>
<td>10 (3.4%)</td>
<td>36 (12.4%)</td>
</tr>
</tbody>
</table>

p-value

0.36 0.81 0.88 0.61 0.64
Table 3.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Medial pole</th>
<th>Overall shape</th>
<th>Symmetry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
<td>Mean ± SD</td>
</tr>
<tr>
<td>A: Same time (n=22)</td>
<td>3.11 ± 5.4</td>
<td>3.53 ± 0.4**</td>
<td>3.34 ± 0.5***</td>
</tr>
<tr>
<td>(n=16)</td>
<td></td>
<td>(n=16)</td>
<td>(n=16)</td>
</tr>
<tr>
<td>B: Different time</td>
<td>2.93 ± 0.5</td>
<td>2.43 ± 0.2**</td>
<td>2.22 ± 0.91***</td>
</tr>
<tr>
<td>(n=3)</td>
<td>(n=2)</td>
<td>(n=2)</td>
<td>(n=2)</td>
</tr>
<tr>
<td>C: Control Group</td>
<td>2.91 ± 0.53</td>
<td>2.76 ± 0.56**</td>
<td>2.87 ± 0.62***</td>
</tr>
<tr>
<td>(n=266)</td>
<td>(n=114)</td>
<td>(n=114)</td>
<td>(n=114)</td>
</tr>
<tr>
<td>Total (n=291)</td>
<td>2.94 ± 0.52</td>
<td>2.84 ± 0.59</td>
<td>2.91 ± 0.63</td>
</tr>
<tr>
<td>(n=132)</td>
<td>(n=132)</td>
<td>(n=132)</td>
<td>(n=132)</td>
</tr>
<tr>
<td>p-value</td>
<td>0.37</td>
<td>&lt;0.01**</td>
<td>0.04***</td>
</tr>
</tbody>
</table>

Group A had a significantly increased score in overall breast shape and symmetry than the other two Groups (p< 0.001**, and p=0.04***, respectively)
<table>
<thead>
<tr>
<th>Changes attributed to the reconstruction</th>
<th>Patient responses (Number / Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Much better</td>
</tr>
<tr>
<td>Wearing clothes</td>
<td>10 (62.5%)</td>
</tr>
<tr>
<td>Body perception</td>
<td>5 (31.3%)</td>
</tr>
<tr>
<td>Ability to attract partner</td>
<td>2 (12.5%)</td>
</tr>
<tr>
<td>Personal charisma</td>
<td>1 (6.3%)</td>
</tr>
<tr>
<td>Intimacy / sexual experiences</td>
<td>1 (6.3%)</td>
</tr>
<tr>
<td>Whole life</td>
<td>4 (25.0%)</td>
</tr>
<tr>
<td>Life with other people</td>
<td>1 (6.3%)</td>
</tr>
<tr>
<td>Ability to remain active</td>
<td>1 (6.3%)</td>
</tr>
<tr>
<td>Physical health</td>
<td>4 (25.0%)</td>
</tr>
<tr>
<td>Ability to exercise</td>
<td>9 (56.3%)</td>
</tr>
<tr>
<td>Working capacity</td>
<td>2 (25.0%)</td>
</tr>
<tr>
<td>Shopping clothes</td>
<td>9 (56.3%)</td>
</tr>
<tr>
<td>Advantages to herself</td>
<td>6 (37.5%)</td>
</tr>
<tr>
<td>Meaningfulness of life</td>
<td>6 (37.5%)</td>
</tr>
<tr>
<td>The whole procedure</td>
<td>7 (43.8%)</td>
</tr>
</tbody>
</table>