The Role of External Expansion and Large Volume Fat Grafting in the Breast


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Abstract

Introduction: Due to the problem of overcrowding and the limitations of fat grafting in injecting smaller amounts and multiple session treatments; now the use of external expansion allows larger volumes of fat to be injected in the breast.

Aim of Work: To assess the efficacy of external expansion in facilitating large volume to be injected.

Patients and Methods: In this study we operated upon 40 patients that were divided into 2 groups, Group A (20 patients): We used the water jet device for harvesting the fat Group B (20 patients): We used the BRAVA device with the water jet device.

Results: Difference between breast circumference and chest circumference were recorded at 1 month, 3 months, 6 months and 1 year. There was an initial drop in the breast measurements between 1 month and 3 months which then stabilized up to one year. The mean difference in breast measurements drop was highest in Group B and lowest in Group A.

Conclusion: The use of the BRAVA device and large volume fat grafting is an effective method in Breast augmentation allowing more fat to be introduced. Compliance is the most significant issue in patient selection.

Key Words: Large volume fat grafting in the breast – BRAVA.

The earliest reports of fat transplantation were when Neuber transplanted fat from the arm to harmonize a facial deformity [1]. In 1895, Czerny accomplished the earliest breast augmentation by transferring a lipoma to a breast defect [2]. In the early twentieth century Lexer placed a graft “as large as two fists” into a breast [3].

With the introduction of liposuction by Illouz [4], fat grafting started come into favor.

However, due to the negative stance of the ASPRS towards fat grafting in the breast in 1987 [5] the technique hasn’t gained wide popularity till 2009 when the ASPRS changed its position [6].

After that a lot of surgeons started to use the fat as an alternative for implants and there was a massive wave of popularity of fat grafting with the publication of research of many prominent surgeons in this field such as von Chajchir [7], Coleman [8], Delay [9], and Riggotti [10]. More recently numerous groups of researchers in different countries have experimented with autologous fat transplantation in the breast.

After an external breast tissue expander (BRAVA) was introduced as a nonsurgical alternative to breast augmentation some surgeons combined the BRAVA device with large volume fat grafting [11].

Patients and Methods

A total of 40 non-smoker patients between the age of 25 and 49 were operated upon at the Plastic Surgery Department, Faculty of Medicine, Cairo University during a period of 2 years starting 2013. All of them didn’t want any insertion of implants. All patients received detailed explanation of the procedure including any possible complications such as oil cysts and calcifications.

Preoperative measurements of chest circumference and breast circumference were recorded, the difference between the two measurements were also recorded as this will be compared to the increase in that difference postoperatively at 1 month, 3 months, 6 months and 1 year.
Also all patients received a baseline mammogram/ultrasound preoperatively.

Group A underwent fat harvesting using the water jet. (20 patients).

In this group the water jet device is used. The liposuction procedure involved the application of a pulsing water jet on the body jet® device—with the setting at level-and constant irrigation with tumescence solution and negative pressure, which was limited to –0.5 bar. The cannula used was the 3.8m body jet® Rapid cannula with effective suction apertures of 0.9mm. These narrow apertures enable harvesting of equally small fat cell structures which also integrate well.

The same step includes the separation of the fat in the Lipo Collector™ from the aqueous elements so that the amount of residual fluid in the mixture was equivalent to that after 1 min decanting. The Lipo Collector™ basically consists of a pre filter to remove fibrous elements which could choke the thin injection cannulas. The fat flushed out by continual irrigation is separated from the excess fluid by means of a sieve in the Lipo-Collector. The fluid is then suctioned off and the separated washed fat remains sterile in the collector for later use.

Patients were allowed to go home the next day and wearing a bra for 7 days as a method for immobilization of the grafts to improve takes.

Group B consist of 20 patients who used the BRAVA device and water jet for harvesting.

The method of harvesting is exactly the same as the other group but the only difference is patients were asked to wear the BRAVA device for 8-10 hours per day for 3-12 weeks or until the desired breast volume is attained then the fat grafting procedure is started.

Patients were allowed to go home the next day and returned to using the BRAVA for an additional 7 days as a method for immobilization of the grafts to improve take.

Follow-up at 1 week, 1 month, 3 months, 6 months and 1 year.

The difference between the breast circumference and chest circumference were recorded each visit.

This difference between the two groups was then compared.

### Results

**Group A:**

Table (1): Age and liposuction volume in Group (A).

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<thead>
<tr>
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<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
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<tr>
<td>Age</td>
<td>20</td>
<td>25.</td>
<td>49.</td>
<td>34.46</td>
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<td>Liposuction volume</td>
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<td>700</td>
<td>1500</td>
<td>1108</td>
</tr>
<tr>
<td>Right</td>
<td>20</td>
<td>350</td>
<td>750</td>
<td>538.34</td>
</tr>
<tr>
<td>Left</td>
<td>20</td>
<td>350</td>
<td>750</td>
<td>551.67</td>
</tr>
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<td>Valid N (list wise)</td>
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</table>

The mean age of the patients was 34.4 (range, 25-49). The mean total volume of fat harvested via liposuction for grafting was 1108ml (range, 700-1500ml), which was obtained from the thighs, waist, abdomen, and upper arms. The mean volumes of fat graft injected were 538.3ml (range, 350-750ml) into the right breast and 551.6ml (range, 350-750ml) into the left breast.

**Group B:**

The mean age of the patients was 36.2 (range, 25-49). The mean total volume of fat harvested via liposuction for grafting was 1095ml (range, 650-1500ml), which was obtained from the thighs, waist, abdomen, and upper arms. The mean volumes of fat graft injected were 528ml (range, 300-750ml) into the right breast and 532ml (range, 300-750ml) into the left breast.

Table (2): Age and liposuction volume in Group (B).

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<tr>
<td>Age</td>
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<tr>
<td>Liposuction volume</td>
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<tr>
<td>Left</td>
<td>20</td>
<td>300</td>
<td>750</td>
<td>532</td>
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<td>Valid N (list wise)</td>
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The mean preoperative difference in breast, 7.2cm for Group A and 6.3cm for Group B, whereas 1 year after surgery it was 10.1 cm for Group A and 10.4cm for Group B, an increase of 2.9cm for Group A and 4.1 cm for Group B cm. A minor decrease in breast measurement was noted 3 months after surgery, with it subsequently remaining stable with no further decrease in size.

Table (3): Follow-up of the studied cases.

<table>
<thead>
<tr>
<th></th>
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<th>1 month</th>
<th>3 months</th>
<th>6 months</th>
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<td>11.09</td>
<td>10.11</td>
<td>10.11</td>
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<td>11.3</td>
<td>10.42</td>
<td>10.42</td>
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</table>
Discussion

Basically any patient could undergo the procedure but there is a favored patient where very good results could be anticipated and the least favored patient where mediocre or barely acceptable results could be expected; between these two patients lays a spectrum.

Among the favored patients is the mature multiparous woman most probably presenting due to post-lactational atrophy with no ptosis or minimal ptosis. This patient usually has a lot of abundant fat that could be harvested and there is usually plenty of room in the breast for this large volume to be injected except in patients who need expansion for more volume to be injected in a 2nd or 1st session. Furthermore the psychological status of this patient affects the outcome, as those patients often are stable and mature psychological with realistic and reasonable expectations they know that it is practically impossible to create the same result as the implant, they are often patient and compliant with the process of expansion.

Unlike the other pole of the spectrum, with a young thin nulliparous girl requesting breast enlargement due to micromastia. This patient usually has little fat to be harvested and these patients almost always need expansion. Furthermore the psychological status of the patient consists of instant gratifications, expectations of instant results, unpatient and little compliance to the expansion process. Which could be a relative contraindication for the procedure.

The advantages associated with fat grafting to the breast are it seems to have less complication when compared to other breast surgeries.

An added benefit of this procedure is body contouring with the removal of fat.

Breast augmentation using fat grafting is not associated with implant related problems such as implant leakage or deflation, visible or palpable implants, or the development of breast capsular contracture.

Fat grafting has a better advantage than breast implants, due to the flexibility of fat that can be harvested and grafted, and that the procedure can be done multiple times.

There is a more natural appearance and consistency. Unlike the implant, where the patient can feel it and sometimes see its visible edge.
There is the added benefit of no scars which is very appealing to young girls who haven’t married yet.

Sometimes the procedure is done with liposuction where the patient would request to inject the liposuctioned fat instead of it being thrown away, often these patients are misinformed and those patients should be well informed by the surgeon of the potential benefits and complication of the procedure, but in cases where they still decide to continue with the procedure after informed consent the fat grafting could be considered an added benefit for the liposuction procedure.

Few complications are associated with the procedure with very minimal morbidies especially when compared with other breast procedures. Some of the common complications are bruising, hematomas, contour irregularities in the donor sites.

Oil cysts, fat necrosis and calcification were found with 2 patients treatment usually was aspiration of the cyst where they didn’t recur.

The use of the BRAVA device allows injections of larger volumes as was apparent between the two groups where the difference in breast measurements was larger in the group which used the BRAVA device.

Conclusion:
The use of BRAVA device allows for more volumes of fat to be injected, the use of BRAVA and fat injection is a safe alternative for patients refusing implants. Compliance and patient expectations is the most significant factor contributing to the efficacy of the procedure.

References