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CASE REPORT
Breast

Total Breast Reconstruction with Fat Grafting Combined with Internal Tissue Expansion

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Summary: Breast reconstruction procedures are currently performed as standard practice and are an integral part of breast cancer treatment. The advantages and disadvantages of particular types of reconstruction are well known. Most of them require the woman to accept a different consistency of the reconstructed breast, as is the case with implants, or to have extra scarring in the donor site and a cutaneous island with a different texture in the recipient site, as is the case with TRAM, DIEP, and other flaps. This article presents the concept of breast reconstruction with fat grafting combined with internal tissue expansion. A 44-year-old woman after a right mastectomy for invasive carcinoma T1c, N0 (IIB) was presented. After unsatisfactory treatment with fat grafting supported by BRAVA system, she was qualified for breast reconstruction with fat grafting combined with tissue expansion. An anatomic 350 cm^3 breast expander with an integrated port was implanted. It was filled with saline solution up to volume of 380 ml. Then, 7 fat grafting procedures combined with gradual emptying of the expander were performed. The 50/70 principle was used, that is, 50 ml of physiological saline was removed from the expander and 70 ml of fat was injected into the subcutaneous tissue over the expander. Finally, the expander was removed and a satisfactory volume and completely natural consistency of the breast was obtained. Breast reconstruction with fat grafting combined with tissue expansion is a promising method of total breast reconstruction after mastectomy. *(Plast Reconstr Surg Glob Open 2019;7:e2009; doi: 10.1097/GOX.0000000000002009; Published online 2 April 2019.)*

INTRODUCTION

Breast reconstruction procedures are currently considered an integral part of breast cancer treatment.[1,2] Available options include implants,[1,2] fat grafting,[3] or flaps, such as LD, TRAM, or DIEP.[4] BRAVA (Brava)-assisted fat grafting is a recently developed alternative.[5] In this article, we present a concept of breast reconstruction with fat grafting combined with internal tissue expansion. This technique has not been well described yet.[6,7]

CASE REPORT AND SURGICAL TECHNIQUE

A 44-year-old woman was admitted for a reconstructive procedure 1 year after the total mastectomy for invasive carcinoma T1c, N0, M0 (IIB) of the right breast. Because there was no metastasis to the sentinel lymph node, the oncologic surgery was augmented by intraoperative radiotherapy. A complementary chemotherapy was also used. The patient recovered well; mild ptosis of the contralateral breast was present (Fig. 1). Initially, the patient was qualified for reconstruction using the BRAVA system applied for 12 hours per night over 2 months and 4 subsequent fat grafting procedures at 2 month intervals. The procedures were performed under local anesthesia by harvesting fat from the abdomen and hips. Fat tissue was collected using the Coleman technique,[8] with a 3-mm multiport cannula featuring several sharp side holes of 1 mm in diameter (Tulip Medical Products, San Diego, Calif.) at −0.75 atm of suction pressure. After centrifugation, the fat tissue was injected subcutaneously in front of the pectoralis major muscle. Although a total of 280 ml fat was transplanted, the result was not satisfactory and the patient was tired of using the BRAVA system (Fig. 2).

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Fig.1. A 44-year-old woman after right mastectomy for invasive carcinoma.

Fig. 2. The patient after 4 fat grafting procedures and a total of 280 ml fat transplant—the result was not satisfactory and the patient was tired of using the BRAVA system.

The decision was made to reconstruct the breast using a combined tissue expander—fat grafting technique.[6,7] The study was approved by the ethics committee of our institution and the patient gave informed consent for documentation and publication of the reconstructive technique; principles outlined in the Declaration of Helsinki have been followed.

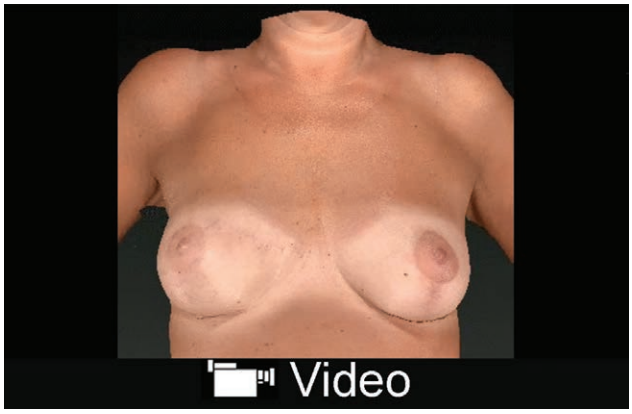
Initially, an anatomic 350-ml breast tissue expander with an integrated port (Mentor Worldwide LLC) was implanted through an inframammary fold incision under general anesthesia and placed under the pectoralis major muscle. After wound closure, the expander was filled with saline up to a volume of 150 and 70 ml of fat graft harvested the same way as previously[8] was injected into the subcutaneous space of the right breast. Two weeks later, the expander was filled up to 380 ml through the integral port.

Next, at 2 month intervals, 5 fat grafting procedures (as previously described) combined with gradual emptying of the expander were performed under local anesthesia in an outpatient setting.[8] During each course, 50 ml of fluid was removed and 70 ml of fat was injected into the subcutaneous tissue over the expander. The breast volume remained constant, but the consistency of the breast gradually changed. We did not observe any complications, and after each procedure, the patient was able to return to normal activity after 1–2 days. When the expander was emptied down to 130 ml, it was removed through an incision in the inframammary fold and 70 ml of fat were transplanted. In total, the patient had 11 fat grafting procedures performed during 15 months (Table1).

A month later, the left breast was lifted by a vertical technique. After 3 months, a reconstruction of the right nipple was performed using a star flap. Six weeks later, micropigmentation (tattooing) of the nipple/areola complex was performed. Six months after the end of the treatment, Vectra imaging (Canfield Scientific) confirmed satisfactory shape on both breasts with similar linear and

Table 1. The Pros and Cons of Breast Reconstruction Combined with Internal Tissue Expansion

Pros	Cons
The method is very safe.	The method can only be applied to patients with appropriate body structure that ensures sufficient volume of the donor site for fat grafting.
The treatment involves short procedures mostly performed under local anesthesia and in an outpatient setting.	Long treatment time.
The method does not require any complicated devices and extra equipment in the operating room.	More time-consuming than the implant-based reconstruction.
The method does not require an extensive donor site like TRAM or DIEP flaps.	The need to perform many procedures.
More natural consistency than in implant-based reconstruction.	Strong patient motivation is required.
It provides the ability to convert to breast reconstruction with an implant at every stage of the treatment.	A lot of doctor's patience is required.
Quick effects allow the patient to function normally.	
A very good mental effect builds positive motivation in the patient.	
There is only minor disruption to the patient's normal professional and personal life.	
The completely natural consistency of the reconstructed breast.	
There are no additional scars.	
The positive effect of the fat graft on the condition of the mastectomy scar.	
An easier process of symmetrization.	
Lower treatment cost.	



Video Graphic 1. See video, Supplemental Digital Content 1, which displays 6 months after the end of treatment, Vectra imaging confirmed symmetrical and satisfactory shape on both breasts. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or available at ***http://links.lww.com/PRSGO/B37***.

Fig. 3. Six months after the end of the treatment, MRI studies demonstrated that the structure and vascularization of the reconstructed breast (right site) were comparable to the contralateral side (left site).

volume symmetry (**Video 1**). (**See** video, Supplemental Digital Content 1, which displays 6 months after the end of the treatment, Vectra imaging confirmed symmetrical and satisfactory shape on both breasts, ***http://links.lww.com/PRSGO/B37***.) MRI studies done on the same time demonstrated that the structure and vascularization of the reconstructed breast were comparable to the contralateral side (Fig. 3).

One year after the end of the treatment, the final effect was stable and satisfactory for the patient (Fig. 4). The natural consistency was also restored (**Video 2**). (**See** video, Supplemental Digital Content 2, which displays 1 year after the end of the treatment the natural consistency of restored breast was obtained, ***http://links.lww.com/PRSGO/B38***.)

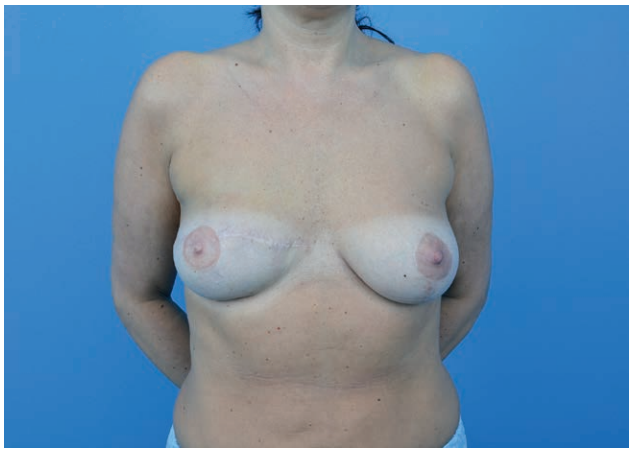


Fig. 4. One year after the treatment, the final result of right breast reconstruction and left mastopexy is stable.

Video Graphic 2. See video, Supplemental Digital Content 2, which displays, 1 year after the end of the treatment, the natural consistency of restored breast was obtained. This video is available in the "Related Videos" section of the Full-Text article on PRSGlobalOpen.com or available at ***http://links.lww.com/PRSGO/B38***.

DISCUSSION

Breast reconstruction is an integral part of breast cancer treatment[1,2]; however, all currently available techniques have some disadvantages.

Reconstruction with implants allows for a quick volume and shape restoration but at the expense of different consistencies.[1,2,9,10]

Fat grafting over the implant significantly improved this state.[11,12] However, leaving the implant in the reconstructed area of the breast is always associated with the risk of a capsule formation around the implant.[13,14]

LD, TRAM, or DIEP flaps are methods of choice in some cases[15]; however, these extensive procedures require microsurgical skills and longer hospitalization.

Reconstruction with fat grafting in conjunction with the BRAVA system became popular in recent years; however, the use of the external expansion is burdensome and

requires strong motivation.[3,5] Although concerns exist regarding graft viability, especially in patients after radiotherapy,[16,17] some reports demonstrated good fat viability in poorly vascularized areas.[18]

This type of clinical experience has been the inspiration to use fat grafting combined with internal expansion for breast reconstruction. Injecting fat directly after reducing the expander's pressure on the recipient site is conducive to its integration, as was the case in the experimental study.[18,19] In contrast to fat grafting augmented with the BRAVA system, this protocol is less demanding for the patient. Rapid restoration of breast volume after implantation of the expander and subsequent gradual change of the breast consistency and shape encourage return to professional and intimate life seem to motivate the patient to continue the treatment.

Although we demonstrated successful breast reconstruction using this method, due to lack of data from the literature, we cannot equivocally determine possible benefits and risks of this protocol.

After appropriate preparation, the method can be used by surgeons experienced in fat grafting under standard conditions. In combination with further studies on fat tissue physiology, this may be a promising direction in breast reconstruction.

CONCLUSIONS

This study demonstrated a successful breast reconstruction using fat grafting and expander implantation. This simple, inexpensive technique does not require microsurgical skills. It allows restoring natural breast consistency and volume with minimal scarring. Although this protocol may be an interesting alternative for many patients, subsequent studies are needed to verify all potential benefits and complications.

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ETHICS

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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