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# Principles of reconstruction with tissue expanders as immediate reconstruction after mastectomy for breast cancer

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## Summary

The aim of reconstruction with expanders is to restore breast shape and volume as close as possible to the contralateral breast and to reconstruct the inframammary fold with adequate ptosis.

*Key words:*

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## Introduction

Tissue expanders are regarded as a simple method for immediate breast reconstruction following mastectomy [1, 2]. However, to achieve a satisfying cosmetic result and avoid complications associated with the procedure, several technical aspects and a careful selection of patients are required [3-6]

After the completion of mastectomy, a tissue expander is inserted under a muscular pocket and then inflated to expand the dermo-muscular layer. When the expansion is completed, the device is changed to a permanent implant.

Today textured surface anatomical breast-shaped expanders or permanent expander implants (adjustable saline filled inner volume, silicone gel outer volume), which avoid the need of an exchange of the expander to a permanent implant [7-9].

## Indication

Immediate reconstruction with expanders is recommended in patients: with small or moderate-sized breast with minimal or no ptosis; who prefer minimal scarring and no additional donor-site morbidity; with no prior radiation/ no postoperative radiation planned; who are not worried about a silicone implant; who are unwilling or unfit to undergo autologous tissue reconstruction; and undergoing bilateral reconstruction (and meet the criteria mentioned above).

In most patients a contralateral mastopexy / reduction is required for symmetry.

## Contraindication

Reconstruction with expanders is not recommended in patients: with poor quality of the soft tissue coverage (skin and muscle) does not allow expansion; with large/ptotic breasts; with prior radiation or radiation planned after surgery; that are obese/with large chest wall diameters; with low patient compliance for the expansion process; with unrealistic cosmetic expectations; that are young (relative contraindication for more re-operations may be required during life-span).

## Materials and Methods

### *Preoperative drawings*

The type mastectomy and the amount of skin to be excised should be determined prior to surgery. Skin-sparing techniques are preferred as they leave a skin envelope which aids in reconstruction. Skin very close to or infiltrated by the tumor is excised and narrow skin bridges should be avoided to ensure adequate blood supply of the skin flaps.

The central midline, the vertical breast axis, and both inframammary folds are outlined with an additional line on the mastectomy side at one cm lower than the existing fold. The shape and contour of the new breast is outlined in accordance to the contralateral breast. (Fig-

ure 1). Base width and height of the contralateral breast are measured and transferred to the tumor side (the markings may also be drawn using manufacturer's templates).

### Surgery

After completion of the (skin-sparing) mastectomy, the viability of the skin flaps and the integrity of the pectoralis major muscle are assessed. (Figure 2A). Nonviable skin is excised and lesions in the muscle are fixed before insertion of the expander.

### Insertion of the expander

The lateral border of the pectoralis major muscle is incised (Figure 2B) and a submuscular pocket is created with the pectoralis major muscle released medially from the third intercostal space down and inferiorly (Figure 2C). The inferior part of the dissection is either subcutaneous or includes the anterior rectus sheath which is then elevated in continuity with the pectoralis major muscle. When total muscular coverage is planned, the serratus anterior muscle is elevated from the chest wall to provide lateral coverage (Figure 2D, 2E).

The size and type of expander used depend on the width and height of the contralateral breast and the volume may be estimated by the weight of the mastectomy specimen. The size of the expander is smaller when a contralateral breast reduction is planned or larger in case of a large or ptotic breast.

The expander is completely evacuated of air using a butterfly needle (Figure 2F). It is then partially inflated with sterile saline (may contain methylene blue to assure puncturing the expansion chamber during the expansion process) to assure that there is no leakage. About 50 cc of saline are left within the expander and this aids in implant insertion. The prosthesis is brought in the submuscular pocket and oriented with the assistance of markers on the implant surface (Figure 2G).

Drains are placed in the submuscular pocket and subcutaneously. The submuscular pocket is closed suturing the serratus and pectoralis muscle with interrupted vicryl 3-0 sutures, which are pre-inserted before placement of the prosthesis to minimize risk of perforation of the implant by the needle (Figure 2H). Interrupted vicryl 4-0 sutures can be used for adapting the subcutaneous tissues and monocryl 4-0 for non-interrupted intracutaneous sutures. A bandage may then be used for three weeks to keep the expander in place.

### Expander inflation

The expander may be inflated immediately with saline (100 – 300 cc) depending on the quality of the soft tissue coverage. Expansion begins two to three weeks following surgery but depends on the skin flap viability and wound healing. The expander is gradually

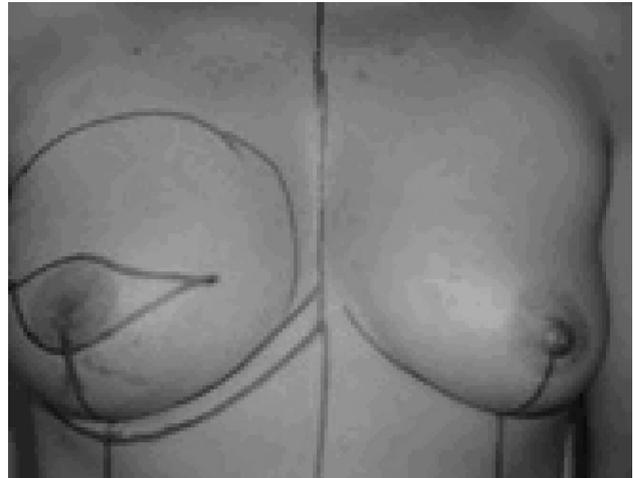


Figure 1. — Preoperative drawings.

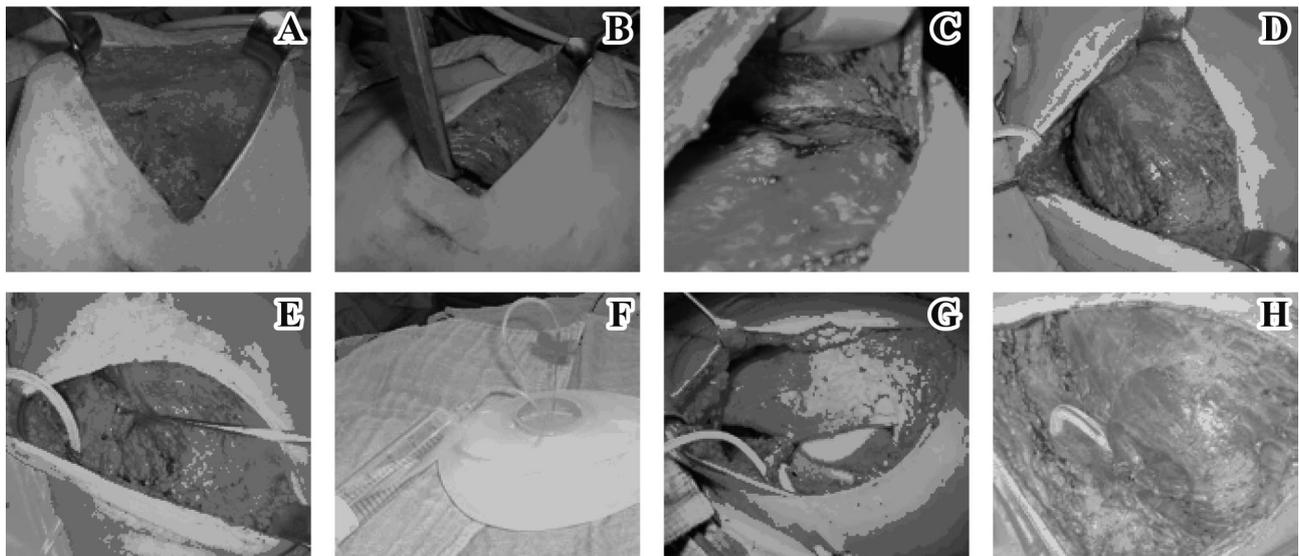


Figure 2. — A) Following mastectomy, the viability of the skin flaps and the integrity of the pectoralis major muscle are evaluated. B) The pectoralis major muscle is incised laterally. C) A subpectoral pocket is prepared. The muscle is dissected medially and in the inframammary fold. D) The serratus muscle is dissected from the thoracic wall. E) The serratus muscle is mobilized so that it can be sutured to the pectoralis major muscle to create a total submuscular pocket. F) The expander is completely evacuated of air using a butterfly needle. G) The expander is in the submuscular position. H) The submuscular pocket is closed.



Figure 3. — A) With the assistance of a magnetic port locator, the integrated valve is located for safe filling of the expander. B) The expander is filled with saline. C) The expander at the end of the expansion period (slightly overexpanded).

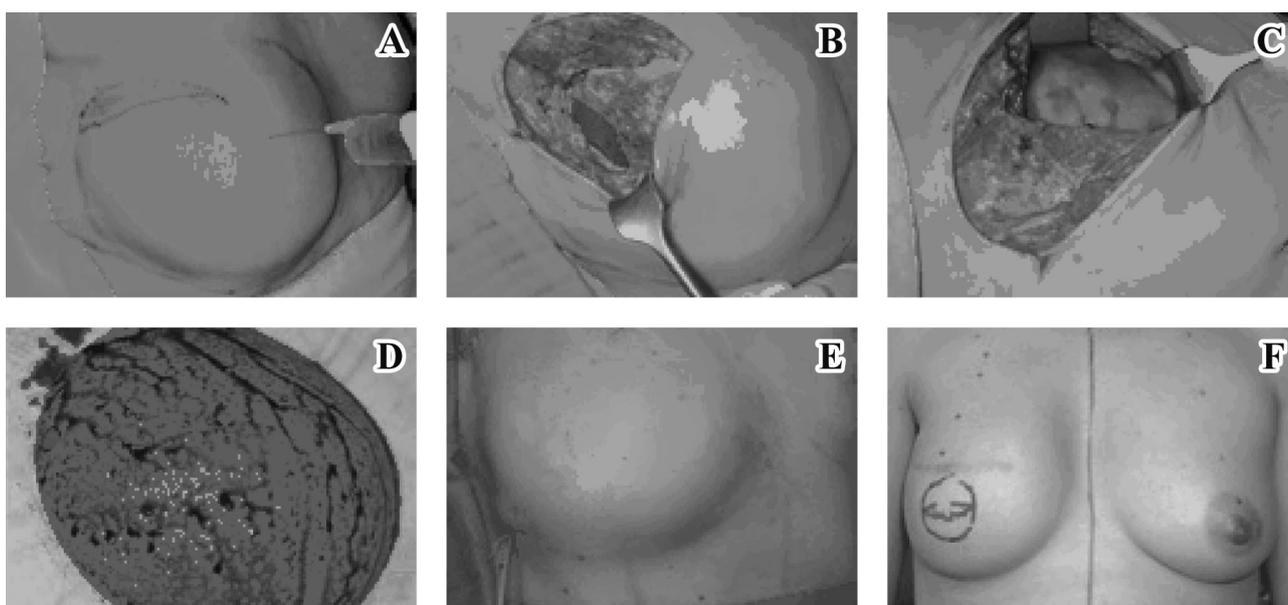


Figure 4. — A) The patient is placed in a sitting position and saline is aspirated from the expander until symmetry to the contralateral breast is reached. B) The expander is removed through the previous incision. C) A capsulotomy is performed to release tension and enlarge the pocket. D) For the permanent implant, an anatomically shaped implant has been selected and the implant is rinsed in betadine solution. E) Final result following insertion of the permanent implant. F) Late postoperative view. Reconstruction of the nipple-areola complex is performed at three to six months after exchange of the implant.

expanded using magnetic port locators with 50 – 100 cc of saline every two to three weeks until the desired volume is reached (Figures 3A–C). Usually the expander is slightly overexpanded to gain more tissue for creating a more natural ptosis.

#### *Expander to implant exchange*

Expansion is maintained for two to six months. In case that a permanent expander implant has been used, the volume is adjusted according to the contralateral breast by aspirating saline. The fill tube is removed later under local anaesthesia.

In case of a temporary expander, the patient is placed in a sitting position and saline is aspirated from the expander until symmetry to the contralateral breast is reached (Figure 4A). The expander is removed through the previous incision (Figure 4B) and a capsulotomy (either circumferential or only in the inferior pole, with or without radial incisions) is performed to release tension and enlarge the pocket (Figure 4C). The volume of the permanent implant is chosen according to the expander volume after symmetry has been reached or may be tested with sizers. Whether to choose an anatomic or a round shaped implant depends on the shape and the upper pole fullness of the contralateral breast (Figure 4D)

A drain is placed into the pocket and the incisions are closed. Final symmetry is evaluated in a sitting position (Figure 4E). A bandage may be used for three weeks to avoid cranial displacement of the implant. The reconstruction of the nipple-areola complex is performed three to six months later.

## Results

Early complications of tissue expansion are skin necrosis with wound dehiscence and implant extrusion. In case the viability of the skin flaps is in doubt, the expansion process should be delayed and any nonviable tissue should be excised early to allow secondary wound healing. The expansion is commenced no earlier than wound healing is completed and viability of mastectomy flaps is secured.

## Conclusions

Complete muscular coverage of the expander reduces the risk for expander extrusion in case of wound infection or wound dehiscence. In case of ptosis of the contralateral breast, overexpansion is needed to achieve an acceptable ptosis. If necessary the mobilisation of the lower part can be extended downwards to the rectus sheath to gain an excess amount of skin which is used to create a submammary fold. When the expansion is finished, the excess amount of skin is fixed to the muscle fascia. Another possibility is to overexpand and exchange the expander to a slightly smaller implant.

In large or ptotic breasts, a skin-reducing mastectomy or a mastectomy by a vertical elliptical incision is done to reduce the amount of skin. Suction drains are left until drainage is less than 20 cc for two consecutive days. This avoids seromas which are related to a higher risk for capsular fibrosis.

Most women require a contralateral mastopexy/reduction for symmetrization. Concomitant chemotherapy may negatively influence the expansions process.

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