Technique of immediate reconstruction with tissue expanders after mastectomy for breast cancer

Michael Friedrich* and Stefan Krämer
Department of Obstetrics and Gynaecology with Breast Cancer Center, HELIOS-Hospital, Lutherplatz 40, 47805 Krefeld, Germany

Abstract
Tissue expanders are regarded as a simple method for immediate breast reconstruction following mastectomy. However, to achieve a satisfying cosmetic result and avoid complications associated with the procedure several technical aspects and a careful selection of patients is required. 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 started no earlier than wound healing is completed, and viability of mastectomy flaps is secured. 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 get 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. It is mandatory to leave the suction drains until drainage is less than 20cc for 2 consecutive days. This avoids seromas which are related to a higher risk for capsular fibrosis.

*Correspondence to: Michael Friedrich, Department of Obstetrics and Gynaecology with Breast Cancer Center, HELIOS-Klinikum, Lutherplatz 40, 47805 Krefeld, Germany, E-mail: michael.friedrich@helios-gesundheit.de

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lower than the existing fold. The shape and contour of the new breast is outlined in accordance to the contralateral breast (Figure 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 subcutaneously 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,e).

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.

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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 50cc of saline are left within the expander and this aids in implant insertion. The prosthesis is brought in the submuscular pocket and oriented by help 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 sutures Vicryl 4-0 can be used for adapting the subcutaneous tissues and monocryl 4-0 for non-interrupted intracutaneous sutures. A bandage may be used for 3 weeks to keep the expander in place.

**Expander inflation**

The expander may be inflated immediately with saline (100 – 300cc) depending on the quality of the soft tissue coverage. Expansion begins 2-3 weeks following surgery but depends on the skin flap viability and

![Figure 1. Preoperative drawings](image1)

![Figure 2a. Following mastectomy the viability of the skin flaps and the integrity of the pectoralis major muscle are evaluated](image2a)

![Figure 2b. The pectoralis major muscle is incised laterally](image2b)

![Figure 2c. A subpectoral pocket is prepared. The muscle is dissected medially and in the inframammary fold](image2c)

![Figure 2d. The serratus muscle is dissected from the thoracic wall](image2d)

![Figure 2e. The serratus muscle is mobilized that it can be sutured to the pectoralis major muscle to get a total submuscular pocket](image2e)

![Figure 2f. The expander is completely evacuated of air using a butterfly needle](image2f)

![Figure 2g. The prosthesis is brought in the submuscular pocket and oriented by help of markers on the implant surface](image2g)

![Figure 2h. 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](image2h)
The reconstruction of the nipple-areola complex is performed 3 – 6 months later.

**Tips and tricks**

- 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 started no earlier than wound healing is completed and viability of mastectomy flaps is secured.

**Expander to implant exchange**

Expansion is maintained 2-6 months. In case 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 put 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 capsulotomie (either circumferential or only in the inferior pole, with or without radial incisions) is done 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,f). A bandage may be used for 3 weeks to avoid cranial displacement of the implant.
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- 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 get 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
- Leave the suction drains until drainage is less than 20cc for 2 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.

References


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