The role of Tissue Implant in Breast Reconstruction after mastectomy

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Conclusion & Summary

Breast reconstruction is a surgical procedure that restores shape of the breast after mastectomy. Different approaches for breast reconstruction include Using breast expanders, implants, using body's own tissue (autologous tissue reconstruction) or using a combination of tissue reconstruction and implants. Breast reconstruction is a complex procedure performed by a plastic surgeon **(Spear et al., 2007).**

Breast reconstruction with implants often requires the use of a tissue expander to create room for the implant before it can be placed as after mastectomy surgery there is less skin remains at the site of the breast than existed originally. For an implant to be comfortably placed, the surgeon first surgically inserts a balloon like tissue expander under the chest muscle. At weekly intervals - beginning two weeks after surgery - the surgeon injects saline solution into the tissue expander through a small valve located just below the surface of the patient's skin. Once the tissue expander has sufficiently stretched the skin, the surgeon replaces it with a breast implant **(Gamboa, 2006).**

There are several important characteristics to consider with regard to each implant. Of great importance is its "feel" or softness and how closely it mimics normal breast tissue. Of equal importance is how accurately and reliably the implant can produce the shape it is designed to simulate. As with every

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Introduction

Breast cancer (malignant breast neoplasm) is cancer originating from Breast tissue most commonly from the inner lining of the ducts or the lobules that supply the ducts. Prognosis and survival rate varies greatly depending on cancer type and staging. The treatment depends on staging as 10 years disease free survival varies from 10% to 98%. Treatment includes surgery, drugs (hormonal therapy and chemotherapy) and radiation **(Krueger et al., 2001).**

The treatment of breast cancer has undergone a trend away from radical surgery and the use of methods of breast preservation is becoming more widespread. Mastectomy may be indicated if conservation of the breast is inappropriate. An increase in the awareness of the psychological problems associated with such mutilating surgery has led to a growing interest in methods of breast reconstruction **(Gui et al., 2008).**

Breast reconstruction is a surgical procedure that restores shape of the breast after mastectomy. Different approaches for breast reconstruction include Using

breast expanders, implants, using body's own tissue (autologous tissue reconstruction) or using a combination of tissue reconstruction and implants. Breast reconstruction is a complex procedure performed by a plastic surgeon **(Spear et al., 2007).**

Surgeons may need two or more operations to achieve a correctly positioned and naturally appearing breast. However, breasts probably won't be completely symmetrical afterward. The breast reconstruction process can also entail reconstruction of the nipple and tattooing to define the dark area of skin surrounding the nipple (areola) **(Cunningham et al., 2007).**

Breast reconstruction may be performed at the time of mastectomy (immediate reconstruction) or at a later date (delayed reconstruction).there are multiple options available for the patient when considering breast reconstruction ranging from skin expansion and flap reconstruction to microsurgical free tissue transfer **(McLaughlin et al., 2007).**

Flap based breast reconstruction is a major procedure as it prolongs time of the operation and extends recovery time by several weeks. In addition to poor wound healing, hernia, seroma, infection and tissue necrosis due to insufficient blood supply **(Gamboa et al., 2006).**

Recovery from implant based reconstruction is generally faster than with flap based reconstructions but both take at least three to six weeks to recover and both require follow up surgeries in order to construct a new areola and nipple. All recipients of these operations should avoid strenuous sports, overhead lifting and sexual activity during the recovery period (three to six weeks). TRAM flap patients can show abdominal muscle weakness on EMG studies but clinically most patients who have undergone unilateral breast reconstruction return to normal activities after recovery **(Krueger et al., 2001).**

The Breast reconstruction by using implants carries the possibility of significant complications such as infection, implant rotation and capsular contracture of scar tissue that forms around the implant and compresses the implant and breast tissue into a hard or unnatural shape. Correcting any of these complications

may require additional surgery **(Disa et al., 2008).** Breast reconstruction with implants often requires the use of a tissue expander to create room for the implant before it can be placed as after mastectomy surgery there is less skin remains at the site of the breast than existed originally. For an implant to be comfortably placed, the surgeon first surgically inserts a balloon like tissue expander under the chest muscle. At weekly intervals - beginning two weeks after surgery - the surgeon injects saline solution into the tissue expander through a small valve located just below the surface of the patient's skin. Once the tissue expander has sufficiently stretched the skin, the surgeon replaces it with a breast implant **(Gamboa, 2006).**

Using a tissue expander is not necessary in some cases of breast reconstruction if the patient has enough skin to adequately cover the implant that can be placed at the time of the mastectomy. This technique is more convenient than other reconstruction procedures, since it done in one stage. The surgeon can perform a final operation to recreate the nipple and areola **(McLaughlin et al., 2007).**

Aim of the Work

The aim of this work is to study the benefits and complications of tissue implant in breast reconstruction after mastectomy.

Surgical Anatomy of the Female Breast

The female breast is one of the signs of femininity that consists of a group of highly specialized sweat glands. The shape of the breast is best represented by as a cone with a spherical surface contour, an arched base and an eccentrically situated top deviated fifteen degrees laterally ***(Peck, 1951)***.

Using the nipple as a reference point, each breast is divided into four quadrants, superio- lateral, superior- medial, infero- lateral and infero- medial, in addition to the retro-areolar area and axillary tail ***(Peck, 1951).***

There is a tremendous variation in the size and the weight of the female breast. The base of the cone is roughly circular, measuring 10-12cm in diameter. ***(Moore and Keith, 1992)***

Despite the individual variation in size the extent of the base is fairly constant: from the sternal edge to near the midaxillary line, and from the 2^{nd} to 6^{th} ribs overlying the pectoralis major and overlapping onto the serratus anterior and a small part of rectus sheath and external oblique muscles. The pectoralis fascia is a deep fascia enclosing the pectoralis major muscle. Superiorly it is attached to the clavicle while

posteroinferiorly it extends to the scapular region forming the axillary fascia. In the axilla it is pierced by the axillary tail of Spence of breast at the level of the 3rd intercostal space, the opening created there is referred as foramen of Langer ***(Monsen, 1992).***

The nulliparous females have typical hemispherical configuration, whereas the multiparous females, who experienced hormonal stimulation associated with pregnancy and lactation, have pendulous and larger breasts. Postmenopausal, the breast usually decreases in volume. The typical non-lactating breast weights between 150-225gm, whereas the lactating one exceeds 500gm ***(Cody et al., 1984).***

The nipple is a conical or cylindrical prominence that is located in the center of the areola. In nulliparous females, the nipples are usually situated at the level of the fourth intercostal spaces. However, the position of the nipples varies even in the same woman. The tip of the nipple is formed of circularly arranged smooth muscle fibers that compress the lactiferous ducts and erect the nipple when they contract ***(Moore and Keith, 1992).***

The female breast is practically enveloped by the superficial fascia of the anterior chest wall which is continuous with the superficial abdominal fascia of Camper below and the

superficial fascia of the neck above, merging anteriorly with the dermis of the skin ***(Skandalakis et al., 1995).***

The superficial fascia completely envelops the lobes of the breast. Each is formed by 15–20 lobes of glandular tissue. Each lobe is made up of clusters of lobules and each lobule is comprised of clusters of alveoli. The lobes are drained by lactiferous ducts which open into the rough ended tip of the nipple. At the base of the areolar the lactiferous ducts expand forming the lactiferous sinus which acts as a reservoir for milk during lactation. Strands of fibrous tissue forming the suspensory ligaments of Cooper connect the dermis of the overlying skin to the ducts of the breast and the superficial fascia which is condensed to form the posterior capsule. The posterior capsule helps maintain the protuberance of the female breast ***(Kirby, 2007).***

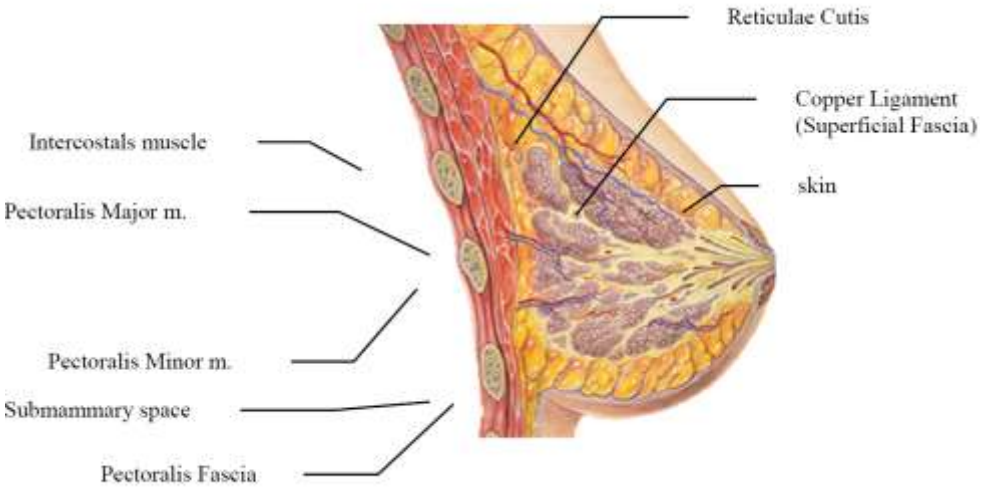

Fig. 1: Diagrammatic sagittal section through the non-lactating female breast and anterior thoracic wall showing the anatomy of the breast. ***(Skandalakis et al., 1983)***

The deep layers of superficial fascia that lies upon the posterior surface of the breast fuses with the deep (pectoral) fascia of the chest wall. The deep fascia envelops the pectoralis major muscle and travels below with the deep abdominal fascia. A posterior extension of this fascia is continuous with the fascia of the latissimus dorsi and forms the so-called suspensory ligament of the axilla. The suspensory ligament is found in the retromammary space which is a bloodless plane ***(Colborn et al., 1993)***. Another bloodless plane lies just deep to the dermis, in thin individuals 2-3 mm deep to the skin ***(Iglehart, 1991).***

VASCULAR SUPPLY OF THE BREAST :

The blood of the breast skin depends on the sub dermal plexus, which is in communication with underlying deeper vessels supplying the breast parenchyma which include:

1) Lateral Thoracic Artery:

It is the main blood supply of the breast which is a branch from the second part of the axillary artery. In its absence, the thoracodorsal artery, which is the continuation of the subscapular artery from the third part of the axillary artery, becomes the main source of blood supply ***(Monsen, 1992).***

2) Internal Mammary Arteries:

The internal mammary arteries are branches from the first part of the subclavian artery. They course downwards along the lateral border of the sternum, sending branches through the intercostal spaces, to supply the medial part of the breast. The second and the third spaces arteries are the largest ***(McMinn, 1994).***

3) Intercostals artery perforators

The 2nd perforating artery is usually the largest supplying the upper region of the breast, the nipple, areola and adjacent breast tissue ***(Bannister, 1999).***