Preservation of the Nipple Areola Complex in Breast Cancer

Thesis
Submitted for partial fulfillment of the
Master degree in General Surgery

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Abstract

There are two methods to treat cancer breast surgically while preserving the NAC. These are nipple sparing mastectomy with immediate reconstruction and breast conservative therapy (BCT) using oncoplastic procedures. Few studies compare both methods directly. This is especially important in the Egyptian population, due to different tumour biology, different radiotherapy technique, and different body habitus. The goals are to compare NSM with autologous reconstruction versus oncoplastic breast surgery regarding the aesthetic and oncologic outcome.

Key Words:

Breast cancer - General surgery- Plastic Surgery
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LIST OF ABBREVIATIONS

- BCS: Breast Conservation Surgery
- CBC: Complete Blood Count
- DIEP: Deep Inferior Epigastric Perforator
- ECG: ElectroCardioGraphy
- IDC: Invasive Duct Carcinoma
- IGAP: Inferior Gluteal Artery Perforator
- IM: Internal Mammary
- LAP: Lumbar Artery Perforator
- LD: Latissimus Dorsi
- LHOFP: Laparoscopically Harvested Omental Flap
- LIQ: Lower Inner Quadrant
- NAC: Nipple Areola Complex
- NSM: Nipple Sparing Mastectomy
- OBS: Oncoplastic Breast Surgery
- OPS: Oncoplastic Surgery
- SGAP: Superior Gluteal Artery Perforator
- SIEP: Superficial Inferior Epigastric Perforator
- SSM: Skin Sparing Mastectomy
- SSN: SupraSternal Notch
- TDAP: Thoraco-Dorsal Artery Perforator
- TRAM: Transverse Rectus Abdominis Myocutaneous
- TUG: Transverse Upper Gracilis
- UIQ: Upper Inner Quadrant
- UOQ: Upper Outer Quadrant
Introduction
Breast Cancer Surgery

Introduction

Breast cancer usually presents as a lump. Other less common ways that it can present are nipple distortion, skin dimpling or other changes in the skin, unilateral (one-sided) breast pain, breast asymmetry or nipple discharge. Breast cancer may also be detected by mammographic screening.

Once a diagnosis is made, a treatment plan is formulated for each individual patient. The multidisciplinary approach for breast cancer is used in planning treatment and all available options are considered in order to optimize cancer control. This may involve surgery, endocrine therapy, chemotherapy and radiotherapy. Adjuvant therapies are usually offered after surgery but can sometimes be given beforehand when it is termed neoadjuvant.

Surgical treatment is aimed at removal of the whole tumour with clear margins. Breast conserving operations remove the tumour with a rim of the surrounding normal tissue and leave behind the rest of the breast tissue. Mastectomy is recommended for large tumours, widespread, multifocal or advanced local disease. Removal of lymph nodes from the axilla (armpit) on the side of the tumour is used to determine further treatment and prognosis.
Introduction

Reconstruction of the partial defect after wide local excision or mastectomy is possible. Also preservation of the nipple areola complex (NAC) is possible for some cases in which the NAC is not involved as a part of improving the aesthetic outcome and minimizing the adverse psychological effect of the disease and surgery over the patient. The most common operations offered for breast cancer are:

- Breast conserving procedures:
  - Wide local excision
  - Lumpectomy
  - Quadrantectomy or Segmentectomy

- Mastectomy(radical, modified radical, skin-sparing & nipple-sparing)

- Reconstruction of the defect after cancer excision

- Axillary lymph node removal

**Aim of the work:**

The goals are to review and study nipple sparing mastectomy (NSM) with autologous reconstruction as well as oncoplastic breast surgery regarding the aesthetic and oncologic outcome hoping to conclude the best choices of management.
Review of Literature
Chapter 1

Anatomy of the Adult Female Breast
Anatomy of the adult female breast

General Anatomy

The adult breast sits atop the anterior chest wall (Figure 1). Superiorly, the breast extends to the second intercostal space, while inferiorly it extends to the infra-mammary fold, located at the sixth or seventh intercostal space. The medial margin is at the lateral margin of the sternum, and the lateral margin sits at the midaxillary line. The shape of the breast is not spherical, but rather that of a teardrop, with an extension of breast tissue toward the axilla known as the tail of Spence. This is an important concept to keep in mind when performing a mastectomy. *(Bloom et al. 2000)*

![Figure 1 The breast tissue margins](From Bloom N, Beattie E, Harvery J. Atlas of cancer surgery. Philadelphia: Elsevier, 2000)
On average, the breast is 10 to 12 cm in diameter and 5 to 7 cm thick at its center. The volume of the breast can range from 21 to 2000 ml, with an average of 400 ml. The contour and volume of the breast, however, vary greatly among individuals, and may vary from left to right. *(Romrell & Bland, 2004)*

The breast comprises three major structures: the skin, the subcutaneous tissue, and the fibroglandular breast tissue (Fig. 1-2). *(Michael S. Sabel, 2009)*

The skin of the breast is thin and contains hair follicles, sebaceous glands, and eccrine sweat glands. The nipple-areolar complex is typically located over the fourth intercostal space (in the nonpendulous breast). Both the nipple and areola consist of a keratinizing stratified squamous epithelium with a dense basal melanin deposition, which accounts for the pigmentation. It can range from 15 to 60 mm in diameter. Within the nipple are multiple sensory nerve endings, including Ruffini-like bodies and end bulbs of Krause. Within the dermis are radially arranged smooth muscle fibers that contract with stimulation, hardening and elevating the nipple. *(Michael S. Sabel, 2009)*

Underneath the skin is the subcutaneous fat, which contributes to the size of the breast and which fluctuates with the amount of total body fat. Beneath this is the superficial pectoral fascia. The fibroglandular breast tissue lies within the superficial fascia, with the anterior layer between the skin and the mammary gland, and the posterior layer between the gland and the fascia of the pectoralis major muscle. Connecting these two fascial layers
are fibrous bands (Cooper suspensory ligaments). Cooper’s ligaments help give the breast its shape and anchor the gland to the skin. They are particularly dense at the lower periphery of the breast, where they maintain the inframammary fold. The fibroglandular tissue or parenchyma of the breast is divided into 15 to 20 segments that converge at the nipple in a radial arrangement. The upper half of the breast, particularly the upper outer quadrant, tends to contain more glandular tissue than does the remainder of the breast. *(Copeland & Bland, 2004)*

Between the posterior layer of the superficial pectoral fascia and the pectoralis major muscle fascia is a cleft known as the retromammary space, or retromammary bursa. The breasts maintain mobility on the chest wall because of the retromammary bursa. The deep surface of the breast rests on portions of the deep investing fasciae of the pectoralis major, serratus anterior, and external oblique muscles, as well as the upper extent of the rectus sheath. *(Osborne, 2004)*

*Figure 2 Tangential and sagittal view of the breast. (From Copeland EM III, Bland KI. The Breast, 3rd ed. Philadelphia: WB Saunders, 2004.)*
Fascia of the Breast and Chest Wall:

The proximity of the breast parenchyma to the skin is of critical importance to the breast surgeon. The ducts and lobules of the breast extend to the anterior layer of the superficial fascia and extend directly to the nipple-areolar complex. Preserving the nipple areolar complex, as is done in a “subcutaneous mastectomy” will leave breast tissue. For this reason the nipple-areolar complex is routinely removed with a mastectomy, although some surgeons have begun examining the possibility of preserving just the areola or the entire nipple-areolar complex. (Russo & Russo, 2004)

Raising a flap below the fascia will also leave residual breast tissue, which is often done when “thick flaps” are maintained. Leaving residual breast tissue has important implications if a mastectomy is being performed to prevent either a recurrence (as in the case with invasive or intraductal cancer) or a primary cancer (as with a prophylactic mastectomy). It is important that the surgeon operate between the dermis and the superficial fascia. This not only minimizes residual breast tissue, but allows the surgeon to operate in an almost bloodless plane, leaving the blood vessels and lymphatics passing in the deeper layer of the superficial fascia undisturbed. (Michael S. Sabel. 2009)

The deep pectoral fascia covers the pectoralis major muscle and is attached to the sternum and clavicle. As with the superficial fascia, the ducts and lobules are in close proximity to the deep fascia, so the fascia should be removed with a mastectomy (or during a lumpectomy for a posterior tumor).