RECENT ADVANCES IN BREAST RECONSTRUCTION AFTER MASTECTOMY

Essay

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List of Abbreviations

ALND..... Axillary lymph node dissection.

ASIS ..... Anterior superior iliac spine.

ADM ..... Acellular Dermal Matrix.

BC ..... Breast cancer**.**

BCS ..... Breast conserving surgery.

BCT..... Breast-conservation therapy.

CT ..... Computed tomography.

DIEA..... Deep Inferior Epigastric Artery.

DIEP ..... Deep Inferior Epigastric Perforator.

DIEV..... Deep Inferior Epigastric Vein.

FNA..... Fine-needle aspiration.

GAP..... Gluteal Artery Perforator.

IBC..... Inflammatory breast cancer.

IBR..... Immediate breast reconstruction.

IMF ..... Inframammary fold.

IGAP..... Inferior Gluteal Artery Perforator.

ITA..... Internal thoracic artery.

ITV..... Internal thoracic vein**.**

LD ..... Latissimus dorsi **.**

MRA ..... Magnetic resonance angiography.

MRI..... Magnetic resonance imaging.

MRM..... Modified radical mastectomy**.**

NSM ..... Nipple sparing mastectomy.

PAP ..... Profunda artery perforator.

PMRT ..... Post-mastectomy radiotherapy.

PRP ..... Platelet-rich plasma**.**

RCTs ..... Randomized controlled trials.

RT ..... Radiotherapy.

Sc-GAP ... Septocutaneous Gluteal Artery Perforator.

SGAP ..... Superior Gluteal Artery Perforator.

SIEA..... Superficial inferior epigastric artery.

SIEV..... Superficial Inferior Epigastric Vein.

SNB ..... Sentinel node biopsy

SSM..... Skin sparing mastectomy.

SVF ..... Stromal vascular fraction.

TRAM..... Transverse Rectus Abdominis Myocutaneous.

TUG ..... Transverse upper gracilis.

US ..... Ultrasound

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Introduction

Breast cancer is the commonest cancer in women worldwide, with almost 1.7 million new diagnoses in 2012, and the second leading cause of cancer mortality. Current data suggests that one in eight women in their lifetime will be diagnosed with breast cancer. Despite the progressive increase in the incidence of breast cancer over the past two decades, the mortality from breast cancer has dropped largely, overall breast cancer death rates declined 36% from 1989 to 2012, this is attributed to better detection and improved therapeutic interventions **(DeSantis, et al. 2016)**.

Unlike the enormous majority of cancers, breast cancer is unique in that the treatment usually yield in significant alteration of the overall body image and disfigurement of the breast, which is thought-out to be a considerable symbol of femininity and sexuality **(Ceradini & Levine, 2008).**

Surgical treatment options include breast-conserving surgery or mastectomy. Breast-conserving surgery is indicated in early stage invasive breast carcinoma but there is also a potential need for further surgery, possibly mastectomy in cases of local recurrence. Breast reconstruction is considered an option for women after mastectomy **(McCready, et al., 2005)**.

During the last century, breast reconstruction after mastectomy has become a vital part of comprehensive

treatment for patients with breast cancer. Breast reconstruction was originally initiated to lessen chest wall deformities and to decrease complications of mastectomy. Now, however, it is established that reconstruction can also boost the psychosocial well-being and quality of life of patients with breast cancer **(HU & Alderman, 2007).**

One of the aims of breast reconstruction is to ‘‘first do no harm.’’ Reconstruction after mastectomy should not hinder the patient’s oncologic treatment (i.e., delay administration of chemotherapy or radiation therapy), should not delay the diagnosis of a recurrence, or add an undesirable increase in operative morbidity or mortality. The specific surgical goals of the plastic surgeon are to enhance the aesthetic results while keeping in mind the patient’s preferences and surgical limitations **(HU & Alderman, 2007)**.

The primary reconstructive options involve the use of an implant with or without tissue expansion or with Alloderm slings, the patient’s own tissue (autogenous tissue reconstruction either pedicled flaps or free flaps), or both, and breast reconstruction using fat grafting (non-vascularized autologous lipoaspirate fat). The reconstructive process can start at the time of mastectomy (immediate reconstruction) or any time afterwards (delayed reconstruction) **(Ramakrishnan & Tare, 2007)**.

The commonly used autologous tissue flaps for breast reconstruction are Latissimus dorsi myocutaneous flap with implant, extended Latissimus dorsi flap without implant, pedicled Transverse Rectus Abdominis Myocutaneous (TRAM) flap and free TRAM flap **(Ramakrishnan & Tare, 2007).**

Refinements of these techniques led to the development of microsurgical perforator flaps, which have allowed the transfer of the patient's own skin and fat in a predictable manner with minimal donor site morbidity **(Allen et al., 2006)**.

Prior to surgery, patients should be informed about all treatment methods, including the different techniques of breast reconstruction to best personalize it. The patients also must know the advantages and disadvantages of any reconstructive choice, including the presumptively less complex implant-based technique that may yield in high temporary satisfaction without any donor site morbidity and likelihood of reoperation due to rupture or capsular contracture and the obviously more complicated flap-based procedures that will provide high long-term satisfaction but with the risk of donor site morbidity & flap associated complications **(Schmauss, et al., 2015)**.

Aim of the Work

To have an overview on different modalities of breast reconstruction after mastectomy and highlighting the recent advances in breast reconstruction, their benefits and drawbacks.

Anatomy of the Female Breast

Embryogenesis

The mammary gland is a modified and highly specialized type of apocrine sweat gland. During the fourth week of gestation, paired ectodermal thickenings termed mammary ridges or milk lines develop on the ventral surface of the embryo and extend in a curvilinear fashion convex towards the midline from the axillae to the medial thigh, these ridges disappear except at the level of the fourth intercostal space on the anterior thorax, where the mammary gland subsequently develops. These buds continue lengthening and branching **(Gabriel & Maxwell, 2015)**.

During the 20th week, small lumina develop within the buds that coalesce and elongate to form the lactiferous ducts. At term, approximately 15-20 lobes of glandular tissue have formed, each containing a lactiferous duct. Support for the breast comes from both the skin envelope and the fibrous suspensory ligaments of Astley Cooper that anchor the breast to the pectoralis major fascia **(Gabriel & Maxwell, 2015).**

Each of the 15-20 lobes of the mammary gland has an ampulla with an orifice opening into this mammary pit. Stimulated by the inward growth of the ectoderm, the mesoderm surrounding this area proliferates, creating the nipple with circular and longitudinally oriented smooth

muscle fibers. The surrounding areola is formed by the ectoderm during the fifth month of gestation. The areola also contains other epidermal glands, including glands of Montgomery (sebaceous glands that serve to lubricate the areola) **(Gabriel & Maxwell, 2015).**

Anatomy of the breast:

The breasts are located on the anterior and also partly the lateral aspects of the thorax. Each breast extends superiorly to the second rib, inferiorly to the sixth costal cartilage, medially to the sternum, and laterally to the mid-axillary line, the nipple–areola complex is located between the fourth and fifth ribs. Natural lines of skin tension, known as Langer lines, extend outwards circumferentially from the nipple–areola complex **(Jatoi, et al. 2006)**.

Two thirds of the breast lies anterior to pectoralis major, the reminder lies anterior to the serratus anterior. A prolongation of the upper outer quadrant of the breast extends to the axilla referred to as the tail of Spence **(McGuire, 2016)**.

The contour should be neither concave nor convex, but a plane that extends out to the point of maximum projection of the breast at the level of the nipple. In the ideal breast form, the nipple areolar complex should be cephalad to the level of the inframammary fold **(De la Torre & Davis, 2013)**.

Statistical standards for the dimensions of the breast have been analyzed and reported by various authors. The distance from the sternal notch to the nipple and the distance from the midclavicular line are each 19–21 cm. The distance from nipple to the inframammary fold is 5–7 cm. The distance from the nipple to the midline is 9–11 cm (Fig.1). These measurements offer guidelines for altering the breast, which must be individualized, based on proportionality, variances in chest wall anatomy, posture and patient preference **(De la Torre et al, 2013)**.

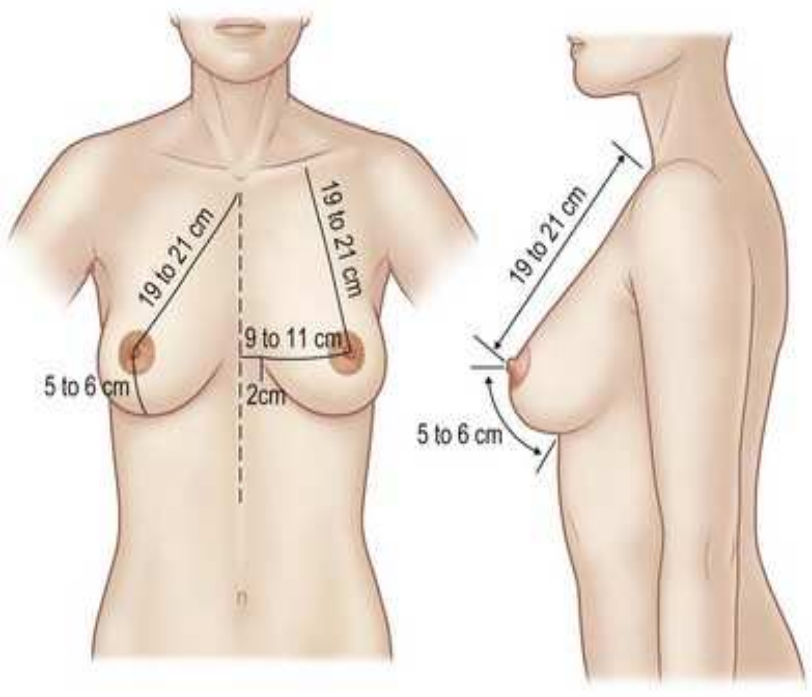

Figure 1: Statistical standards for the dimensions of the breast **(De la Torre & Davis, 2013).**