BREAST RECONSTRUCTION AFTER SKIN SPARING MASTECTOMY FOR EARLY BREAST CANCER

Essay

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General Surgery

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List of Abbreviations

ADM	Acellular Dermal Matrix
DIEP	Deep Inferior Epigastric Artery
IBR	Immediate Breast Reconstruction
LD	Latissimus Dorsi
LR	Local Recurrence
NAC	Nipple and Areolar Complex
SIEA	Superficial Inferior Epigastric Artery
SSM	Skin Sparing Mastectomy
TCPM	Titanium Coated Polypropylene Mesh
TRAM	Transverse Rectus Abdominis Myocutaneous

Introduction

Breast cancer is the most common malignant tumor among women; approximately 12.5% of all women in the industrialized countries will develop breast cancer in their lives. **[Willet; et al., 2004**]

Advances in medical research have dramatically improved the treatment of this disease over the last 50 years. In addition to chemotherapy and radiation therapy, partial and complete mastectomy of diseased and contralateral breasts has become more frequent. However, these surgical modalities often leave patients with anatomical deformities and altered body image, along with the psychological impact. [**Choi; et al., 2006]**

Breast-conserving surgery with adjuvant radiotherapy is a safe alternative to mastectomy for the majority of women with early breast cancer (BC). **[Fisher; et al., 2002]**

However, up to one third of patients require a mastectomy for large or multi-focal tumors (particularly where breast conservation would lead to a poor cosmetic outcome), local recurrence after previous radiotherapy and patient preference. **[NICE Guideline CG80 (2009)]**

Skin-sparing mastectomy (SSM), a type of mastectomy where incisions are planned to maximize skin preservation and facilitate breast reconstruction, was described by Toth and Lappert in 1991 **[Toth and Lappert, 1991]**. SSM involving enbloc removal of the breast gland, nipple-areola complex (NAC), may also include previous biopsy sites and

the skin overlying superficial tumors. The native breast skin envelope and infra-mammary fold are preserved. **[Carlson, 1996]**

Using the native skin envelope optimises the final contour of the reconstructed breast reducing the need for contralateral breast adjustment in order to achieve symmetry. Scarring and donor skin requirements (e.g. in flap based reconstructions) are minimized. **[Simmons and Adamovich, 2003]**

Acceptance and popularity of SSM and IBR are increasing amongst patients and many surgeons. A 2008 survey of Californian surgeons performing surgery for breast cancer has demonstrated a change in attitudes towards SSM. Ninety per cent of those surveys were satisfied with the oncological adequacy of the technique in early breast-cancer and 70% in agreement that the cosmetic results of SSM with IBR are superior to standard mastectomy. **[Shen; et al., 2008]**

However the flaps of the skin envelop of breast may contain glandular breast tissue and may harbour residual disease thus raising questions regarding the oncological safety of SSM. There has been no single randomized controlled trial comparing oncological outcome of SSM versus non-SSM and such trials are not currently feasible due to ethical and methodological considerations. **[Kasem; et al., 2014]**

In addition to survival and the risk of local recurrence (LR), post-operative morbidity, local control, cosmesis, patient satisfaction and an assessment of functional disturbance and psychological morbidity are important outcome measures. **[Gendy; et al., 2003]**

Aim of the work

To study the recent different methods of breast reconstruction following skin-sparing mastectomy for management of early breast cancer.

History of breast reconstruction

Breast reconstruction began as a means to reduce chest wall complications and deformities from mastectomy, with the goal to recreate symmetry and contour while avoiding delay in adjuvant cancer treatment. **[Losee and Gimbel, 2010]**

Dating back to the late 1800s, procedures performed to reconstruct the breast included the introduction of foreign material and the transfer of healthy (and at times pathologic) autogenous tissues. Beginning in the late 19th century, physicians used techniques such as transferring healthy breast tissue on a pedicle to reconstruct the contralateral breast. The 20th century ushered in the use of flaps from the pectoralis and latissimus dorsi muscles for cosmetic improvement. In the late 1900s, musculocutaneous flaps were used and donor sites expanded beyond the pectoralis and latissimus dorsi muscles to include tissues from other areas, such as the abdominal wall, buttock, flank, and thigh. **[Bondurant; et al., 1999]**

This expansion of autologous tissue use has allowed for the development of a wide array of surgical options, i.e., transverse rectus abdominis myocutaneous (TRAM) flap, superficial inferior epigastric artery (SIEA) perforator flap, deep inferior epigastric perforator (DIEP) flap, thoracodorsal artery perforator flap, and others. **[Sigurdson and Lalonde, 2008]**

In addition to physicians using the body's tissues to reconstruct the anatomy, prosthetic alloplastic materials were implanted or injected to alter or restore the shape and size of the breast. The silicone breast

implant was introduced in 1962 and has steadily evolved since. Cronin and Gerow experimented with implantation of silicone shells filled with either dextran or electrolyte solution in dogs for days to months without complications.

[Bondurant; et al., 1999]

Anatomy of the Breast

Gross Anatomy Of Female Breast

The breasts are modified sweat glands. **[Ismail et al., 2006]** have a conical shape and are located, one on each side, within the subcutaneous layer of the thoracic wall, anteriorly to the pectoralis major muscle. **[Netter, 1996]**

It is made up of 15–20 lobules of glandular tissue embedded in fat. These lobules are separated by fibrous septa, the ligaments of Cooper, running from the subcutaneous tissues to the fascia of the chest wall. **[Ellis et al., 2001]**

Each lobule drains by its lactiferous duct on to the nipple, which is surrounded by the pigmented areola. **[Ismail et al., 2006]**

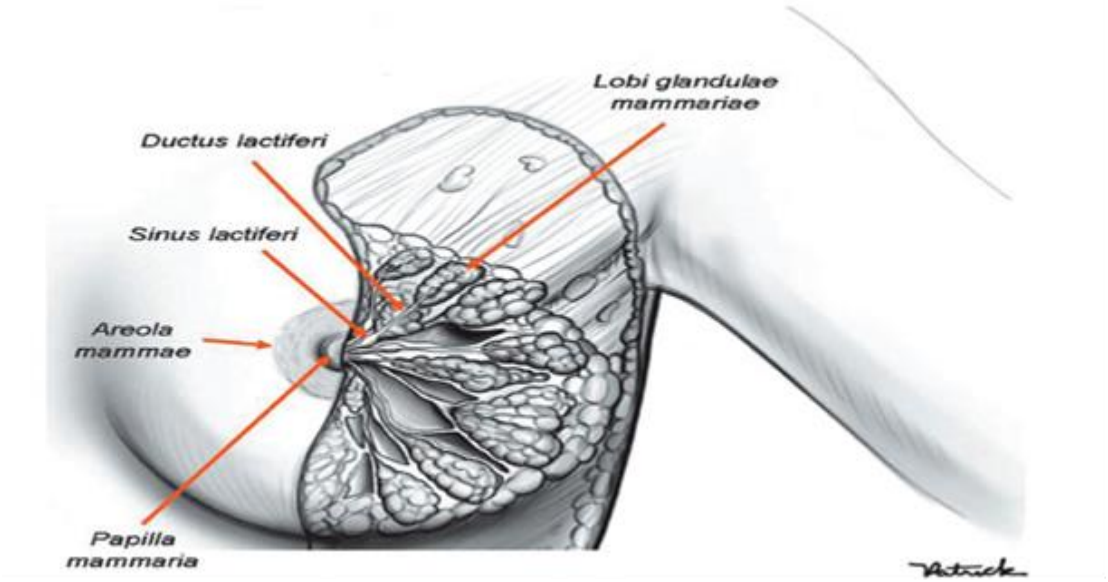

Figure (1): Form and components of the breast **[Ramselaar, 1988]**

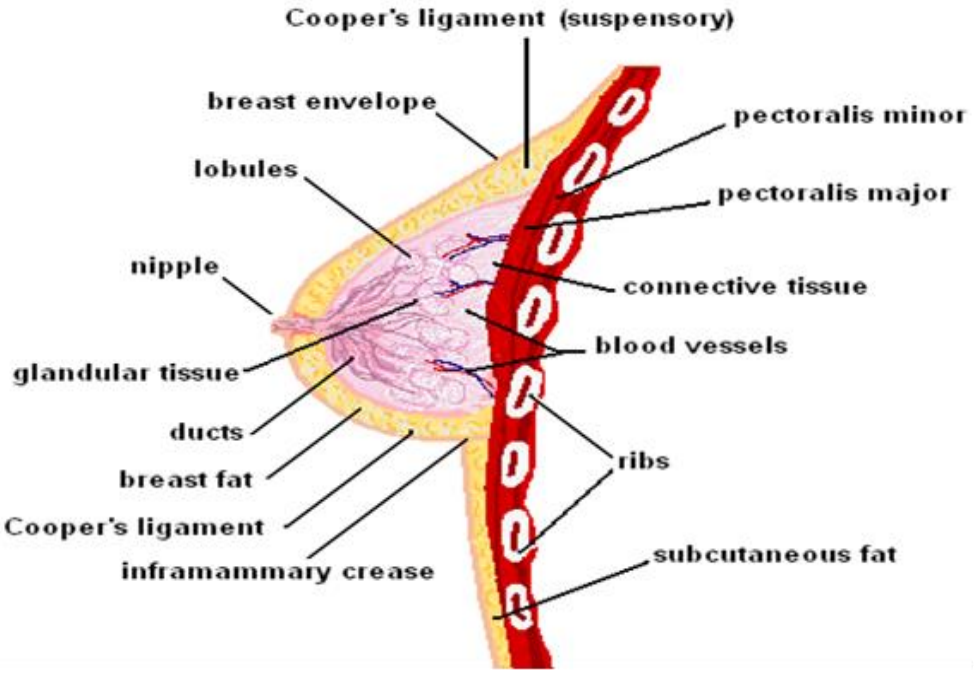

Figure (2): Microscopical anatomy of the breast **[Cuschiere and Preece, 1995]**

A distinct space, the retromammary bursa, can be identified surgically on the posterior aspect of the breast between the deep layer of the superficial fascia and the deep investing fascia of the pectoralis major and contiguous muscles of the thoracic wall. The retromammary bursa contributes to the mobility of the breast on the thoracic wall **[Romrell, 1991],** so, advanced mammary carcinoma may by invasion, fix the breast to the pectoralis major. **[David et al., 2005]**

-Extent and location

They extend superiorly as far as the level of the second rib, inferiorly as far as the level of the sixth or seventh ribs, laterally as far as the anterior axillary line (sometimes as far as the middle axillary line) and medially they reach the lateral margin of the sternum. Posteriorly, they make contact with the fascia of the pectoralis major, serratus anterior and external oblique muscles and the most cranial portion of the rectus abdominis muscle. **[Netter, 1996]**

Natural lines of skin tension, known as Langer's lines, extend outwards circumferentially from the nipple–areola complex. The lines of Langer assume particular clinical significance for the surgeon. **[Ismail et al., 2006]**

The superolateral quadrant is prolonged superolaterally towards the axilla, as the axillary tail of Spence, along the lower border of pectoralis major. **[Romrell, 1991]**

-Blood Supply of Female Breast:

1- Internal Mammary (Thoracic) Artery

Origin: this arises inferiorly from the 1st part of the subclavian artery, about 2 cm above the clavicle's sternal end, opposite the root of the thyrocervical trunk. It descends behind the upper six costal cartilages about one cm from the lateral sternal border; at the level of the 6th intercostal space it divides into musculophrenic and superior epigastric branches.**[Ismail; et al., 2006]**

It gives anterior perforating branches that penetrate each intercostals space, supply the inner quadrants medially and the overlying pectoralis major muscle origin along the lateral sternal border. Arteries of the 2nd and 4th spaces provide the predominant supply. **[John; et al., 2002]**

2. Lateral Intercostal Vessels

Origin: posterior intercostal artery. There are eleven posterior intercostal arteries on each side. The 1st & 2nd posterior intercostal arteries arise from the supreme intercostal artery, a branch of the costocervical trunk of the subclavian artery. The lower nine arteries are the aortic