EVALUATION OF FINDLAY MODIFICATIONS IN VERTICAL MAMMAPLASTY AND MASTOPEXY

Thesis

Submitted for Partial fulfilment of the M.D. Degree in General Surgery

By

TAREK MOHAMMAD AHMAD ABOUZAYED

Supervised by:

Prof. Dr. **AHMAD ADEL NOUREDDIN**

Professor of General Surgery, Cairo University.

Prof. Dr. **KHALID MAKIN ELRIFAEI**

Professor of General Surgery, Cairo University.

Prof.Dr. **AHMAD MOHAMMAD SOBHI**

Assist. Professor of General Surgery, Cairo University.

Faculty of Medicine

Cairo University

2007

ACKNOWLEDGMENT

It is with great honour that I take this opportunity to record my appreciation to the noble character and gentle behaviour of ***Prof. Dr. Ahmad Adel Noureddin****, Professor of General Surgery, Cairo University; whose suggestion and criticism have been of inestimable value in the preparation of this thesis.*

I would like to express my deepest feelings and indebtedness to ***Prof. Dr. Khalid Makin Elrifaei,*** *Professor of General Surgery, Cairo University; for his invaluable help and assistance.*

I wish also to thank ***Dr. Ahmed Mohammad Sobhi,*** *Lecturer of General Surgery, Cairo University; for his constant supervision, and honest assistance, without which this work would not come to light.*

Last, but certainly not least, my gratitude and appreciation to ***Dr. Elizabeth Hall Findlay****, whom I was lucky to meet at the start of my work, it's her help and support that enabled me to proceed with this work.*

ABSTRACT

Minimizing scaring is an important issue specially in this area of the world where we deal with darker skin types, and hyperactive scars and keloids are not uncommon.

Findlay modifications for reduction mammaplasty and mastopexy provide good projection that lasts long, with preservation of sensation and ability of lactation.

In this study the results of Findlay technique were good in large breasts. This extend the applicability of the technique to large breasts as a safe reliable method with good aesthetic results that last long.

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Introduction

For many years most of the candidates for breast reduction were only concerned in the diminution of the size of their breasts. This was also the main concern for plastic surgeons, who did not give much thought to the resulting scar. For several years now; candidates for this operation have been demanding more ***(Lassus, 1998)***

The main goals of a breast reduction are, by decreasing importance, reduction of volume, good shape and symmetry, minimal scaring, maintenance of nipple sensitivity and possible lactation ***(Lejour, 1998).*** Reduction of volume has been obtained safely by a number of current techniques. Shape, however, remains a concern because late results often show breasts that are too broad, too flat, and too law. Also the horizontal inframammary scar, which could be wide, raised, thick and slow to mature ***(Findlay, 1999)***

Vertical mammaplasty is a versatile technique that seemed initially to have the main advantage of reduced amount of scarring, as this technique avoids the submammary scars. With more experience, the major advantages seem to be its adaptability to breasts of various sizes and shapes and its good, consistent and stable result ***(Lejour*, 1999)***

When Lassus performed his technique, he felt secure when the nipple areola complex has to climb up to 9cm, beyond this there is too important twisting of the pedicle which brings trouble to the blood return with possible necrosis of the complex ***(Lassus, 1996)***

Lejour has modified this technique to improve the quality of the scar and to adapt it to all breast reduction patients, these modifications include: a larger pedicle to the areola in larger breasts to preserve its blood supply and innervation,

a reduced and predetermined length of the periareolar circumference with no undermining of the surrounding skin to increase the quality of periareolar scarring, a strong suturing of the lower gland to create a stable shape and eliminate tension on the vertical scar, no reliance on the skin envelop to shape the breast, a wide lower skin undermining to allow gathering of the skin along the vertical suture reducing its length, and liposuction to make modelling of the breast easier and safer ***(Lejour, 1994)***

Although Lejour technique satisfied concerns regarding horizontal scaring and maintenance of shape, some problems still existed. The superior pedicle was, at times, difficult to inset, and it was too long to ensure adequate blood supply to the nipple areola complex in larger breast reductions. Extensive skin undermining led to wound healing problems ***(Findlay, 1999)***

To minimize the problems, Findlay made the following modification:

- The medial (or lateral) pedicle solves the problem of insetting, especially with large reduction.
- Elimination of skin undermining has facilitated skin closure and reduced some healing problems.
- Avoiding pectoralis fascia sutures has facilitated the insetting of the pedicle.
- Avoidance of routine liposuction has reduced bruising and shortened recovery time ***(Findlay, 1999)***

Reduced scarring, improved shape, long term shape retention, and good nipple sensation are advantages of the medial pedicle vertical breast reduction of Findlay. The technique precludes the concept of the skin brassiere as holding breast shape and discards the 5cm vertical rule and the chasing of dog ears. These modifications enabled Findlay to extend the applicability of the procedure to larger breast reductions.

For mastopexy the pedicle of choice is lateral for nipple areola and medial for the inferior and lateral breast tissue, which is recruited, mobilized, and rotated up under the pedicle to give a form of auto-augmentation ***(Findlay, 2002)***

EMBRYOLOGY

The mammary gland is a modified apocrine sweat gland that is contained within the cutaneous envelope of the breast ***(Vorherr, 1974).*** Breast development is first apparent in the foetus at the 5th week when an ectodermal streak of tissue called the milk line appears bilaterally **(fig. 1),** extending from the axilla to the inguinal region. The adult breast will develop along this line, usually at the level of the fourth intercostal space. At the 6th week, the overlying ectoderm thickens and by the 10th week the ectoderm has burrowed into the mesenchyme under the influence of maternal and placental hormones to form the mammary bud. The remainder of the milk line then regresses. Shortly thereafter, vasculogenesis begins around this mammary bud, and at the 15th week epidermal sprouts appear. In the absence of testosterone these sprouts become the mammary ducts.

Ductal development continues in the 20^{th} – 32^{nd} week under the influence of estrogens, insulin, and glucocorticoids. During this time the ducts become canalized and lengthen. From 32-40 week, the straight milk ducts branch into the lobular-alveolar system under the influence of progesterone, while oestrogen, insulin, and glucocorticoids play a permissive role ***(Vanik et al., 1987).***

The epithelial lining of the ducts and acini of the breast is developed from ectoderm and the supporting tissue is derived from the mesenchyme. The nipple is either flat or depressed at birth, but later it projects beyond the surrounding skin ***(Decker et al., 1986).***

At birth the mammary glands are alike in their stage of development in both sexes, and in both some transient secretory activity may be observed due to circulating prolactin in mother. In males, thereafter, the mammary glands remain undeveloped, but in females at puberty, in late pregnancy and during the period

of lactation they undergo further hormone dependent developmental changes ***(Williams et al., 1989).***

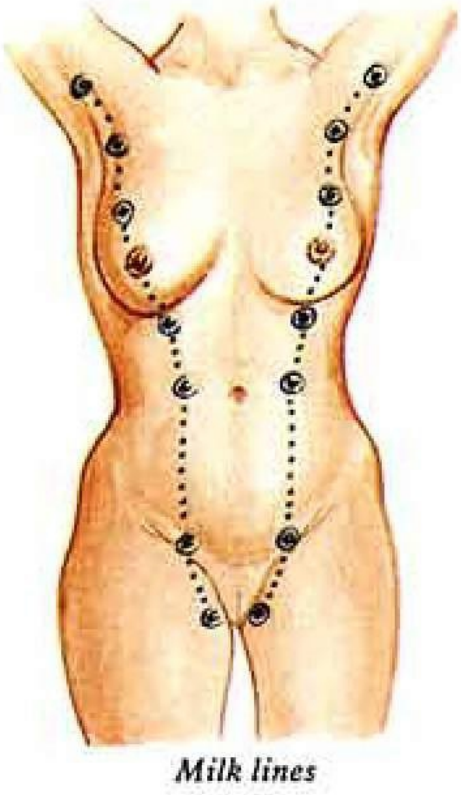

Figure (1): Milk lines. ***Developed from; Decker et al., (1986)***

In the presence of prolactin or growth hormone, the rising oestrogen levels at puberty stimulate the ductal system to elongate and branch while vascularity, stroma, and fat deposition all increase until the characteristic ductal spacing of the adult breast has occurred. When balance of the hypophyseal-pituitary-ovarian axis is established and ovulatory cycles begin, the breast comes under the influence of progesterone from the corpus luteum which stimulates development of the acinar or milk-secreting structures. With continued cyclic fluxes of ovarian hormones, the breast continues to develop until approximately age 30 ***(Vanik et al., 1987).***

ANATOMY

The adult female breast is located within the superficial fascia of the anterior chest wall. The base of the breast extends from the 2nd rib above to the 6th or 7th rib below, and from the sternal border medially to the midaxillary line laterally. Two thirds of the base of the breast lies anterior to the pectoralis major muscle; the remainder lies anterior to the serratus anterior muscle. A small part may lie over the apponeurosis of the external oblique muscle ***(Skandalakis et al., 2000).***

The deep surface of the breast is slightly concave and separated from these muscles by the deep fascia, and between the breast and the deep fascia there is a zone of loose areolar tissue called the retro mammary space, which allows the breast to be movable on the deep fascia covering the muscle ***(Williams et al., 1989).***

In about 95 percent of women, there is a prolongation of the upper lateral quadrant toward the axilla. This tail "of Spence" of the breast enter a hiatus "of Langer" in the deep fascia of the midaxillary wall. This is the only breast tissue found beneath the deep fascia ***(Skandalakis et al., 2000).***

The glandular tissue may reach the clavicle above, the epigastric region below, the median plane medially and the edge of the latissmus dorsi laterally. The mammary gland consists of varying proportions of glandular tissue proper, connective tissue and adipose tissue that is different from one woman to another and in the same woman at different stages of the reproductive period.

The glandular tissue proper:

The breast is composed of acini which make up lobules, aggregation of which form the lobes of the gland. The lobes are arranged in a radiating fashion like the spokes of a wheel and converge on the nipple, where each lobe is drained by a duct. 15 to 25 collecting ducts "or lactiferous ducts" open onto the nipple, after exhibiting just beneath this a dilatation called "lactiferous sinus" which is the only site of actual milk storage **(fig. 2).** Each duct draining a segmental system of smaller ducts and lobules. The lactiferous ducts open to exterior by the lactiferous orifices. The ducts are surrounded by connective tissue which is characteristically loose and vascular in the distal ductules. Connective tissue and smooth muscle fibres secure the lactiferous ducts and act as milk duct sphincters ***(McCarty et al., 1983; Last, 1984; Decker et al., 1986; Williams et al., 1989; Skandalakis et al., 2000).***

Different portions of the duct system are associated with different diseases. The larger ducts are the site of duct papilloma and duct ectasia; the distal smaller ducts are the site of fibro-adenoma during development of the breast, and cyst formation and sclerosing adenosis during the involutional period. The majority of cancers of the breast arise from the intralobular portions of the terminal ducts ***(Decker et al., 1986).***

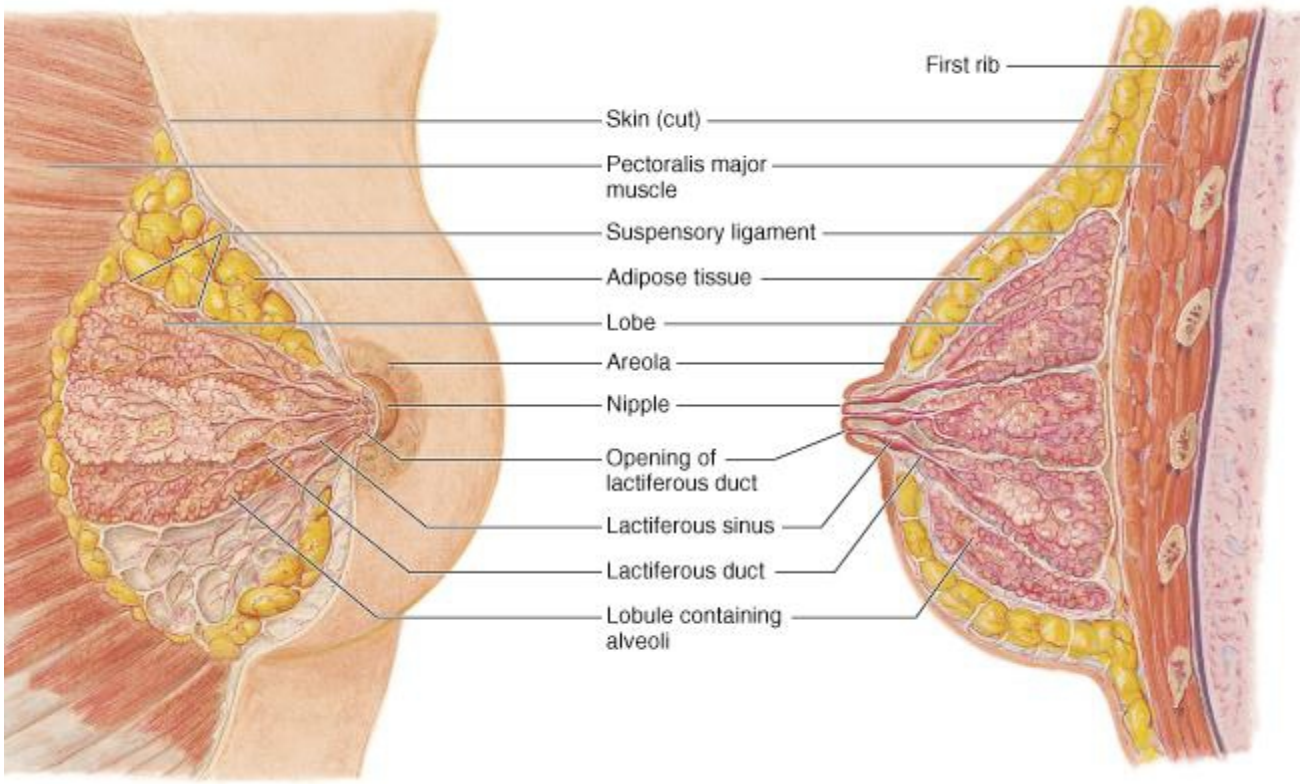

Figure (2): mammary gland. From internet @ www.breastanatomy.com

Adipose tissue:

The fat accounts for the smooth contour and most of breast bulk. *The breast has adipose tissue that is present in two forms:-*

1. Intraglandular fat:

The ectodermal embryologic origin implies that the glandular tissue is intermingled with the subcutaneous adipose tissue. The adipose lobules are present in variable amounts amidst the glandular tissue, the proportion varying with the degree of obesity, age, pregnancy and lactation.

Although every pubertal weight increase is not associated with mammary hypertrophy, a period of rapid weight gain at the time of puberty is associated with the development of hypertrophy of a predominantly fatty nature. This stresses the importance of monitoring the weight in this sometimes tricky period of reproductive life ***(Bricout, 1996).***

It has been observed that, on the average, a weight gain of one kilo makes each breast 20 grams heavier, that means in a very obese woman the breast could reach a considerable size merely by its fat content ***(Strombeck, 1983; Lejour, 1997).***

There are however certain observation about the amount of fat in female breasts. The age of the patient influence the amount of breast fat which increases with age and the amount of glandular and connective tissues decrease with age, the body mass index has more influence than age on the amount of breast fat ***(Lejour, 1997).***

2. Peripheral fat:

The adipose tissue is also present at the periphery of the gland, forming an anterior layer constituting the subcutaneous adipose sheet, and a thinner posterior retro-glandular layer. The thickness of the subcutaneous fatty layer varies with

the general degree of adiposity, and decreases from the periphery towards the areolar region, where the gland is now separated from the coverings of the areola and nipple only by a little connective tissue and the areolar muscle. Posteriorly, the adipose tissue is less thick. In any case, it remains intermingled with glandular tissue and is situated in front of the superficial fascia ***(Williams et al., 1989).***

When the patient is slender, and glandular tissue is predominant, in the midst of the gland, it is relatively easy to find a plane of cleavage between the subcutaneous fatty layer as such and the glandular tissue. This artificial plane is more difficult to find in an obese woman and when the breast exhibits some degree of fatty involution ***(Bricout, 1996).***

Connective Tissue:

Connective tissue makes up a large portion of the mature mammary gland and its surrounding structures. It attaches lobes to fat deep within the breast, encloses each lobule with a collagen rich capsule, and provides a well-defined basement membrane surrounding each acinus and collecting duct ***(McCarty et al., 1983).***

The suspensory ligament of Cooper form a network of strong connective tissue fibres passing between the lobes of parenchyma and connecting the dermis of the skin with the deep layer of the superficial fascia and pectoral fascia. These deep attachments to the pectoral fascia are not that taut allowing more breast mobility on the deep fascia during motion and activity. These suspensory ligaments can be stretched and elongated after pregnancy and from aging or weight fluctuation. Loss of elasticity on these connective tissues cause breast

ptosis and additional breast mobility ***(Cooper, 1840; Bostwick, 1990; Skandalakis et al., 2000).***

In cancer of the breast, the malignant cells may invade these ligaments and consequent contraction of these strands may cause dimpling of the skin or attachment of the underlying growth to the skin which then cannot be pinched up from the lump. This must not be confused with the retraction called peau d' orange secondary to lymphatic obstruction. This dimpling may also occur, however, in chronic infection, after trauma and very rarely in fibroadenosis, so that skin fixation to a breast lump is not necessarily diagnostic of malignancy. If cancer cells grow along the ligaments of Cooper binding the breast to the pectoral fascia, the breast becomes fixed to the pectoralis major. It cannot then "as normally" be moved in the long axis of the muscle ***(Decker et al., 1986; Ellis, 1992; Skandalakis et al., 2000).***

The ligamentous suspension has been found to comprise a horizontal fibrous septum originating from the pectoral fascia at the level of the 5^{th} rib and its vertical ligamentous extensions. The latter provide medial and lateral lines of fixation on either side of the septum. The medial vertical ligament stretches from the sternum along the 2^{nd} to the 5^{th} rib. The lateral vertical ligament attaches along the lateral border of pectoralis minor. Cranially, and in an anterior direction, the vertical ligaments merge into the capsule of the breast.

The ligamentous suspension also has a superficial part that arises from the same origin, but merges into the overlying skin. It thus defines the actual boundaries and the shape of the breast. The rather weak, medial superficial ligament stretches into the skin overlying the sternum. The lateral superficial ligament creates a strong connection between pectoralis minor and the skin and fascia of the axilla along the midaxillary line, thereby producing the axillary hollow.