Introduction

The breast's main function is to produce, store and release milk to feed a baby. Milk is produced in lobules throughout the breast when they are stimulated by hormones in a woman's body after giving birth. The ducts carry the milk to the nipple. Milk passes from the nipple to the baby during breast-feeding. ***(Burstein et al., 2008)***

Mammary discharge occurs when a milk duct beneath the nipple widens, the duct walls thicken and the duct fills with fluid. The milk duct may become blocked or clogged with a thick, sticky substance. The condition often causes no symptoms, but some women may have nipple discharge, breast tenderness or inflammation of the clogged duct (peri-ductal mastitis). Mammary duct ectasia most often occurs in women of premenopausal age, around 45 to 55 years, but it can happen after menopause also, the condition sometimes improves without treatment while if the symptoms persist, antibiotics may be needed or possibly surgery to remove the affected milk duct. ***(Da Costa, et al., 2007)***

Complications of nipple discharge are usually minor and often more bothersome than serious. Nipple discharge can be frustrating. There are many different types of

discharges; cloudy white color which can be galactorrhea, clear or light white in pregnancy, red most often due to breast infection or intra-ductal papilloma but can be breast cancer as well. The discharge can also be whitish yellow, yellow or green pus due to infection and can cause redness, swelling and tenderness around nipples. A bacterial infection (peri-ductal mastitis) may develop in the affected milk duct, sometimes causing pain in or around the nipple; untreated infection could lead to an abscess. ***(Hou et al., 2001).***

Treatment of nipple discharge often depends on the condition causing it. Treatment options for nipple discharge may include: Certain medications may be used to treat hormone-related problems or endocrine gland disorders; Bromocriptine is a drug that blocks the release of the Prolactin hormone from the pituitary gland. Prolactin affects the menstrual cycle and milk production. Antibiotics are the usual treatment for breast infections. If an abscess is present, it may need to be drained. ***(Simmons et al., 2003).***

Duct excision is surgical removal of breast tissue specifically targeting the milk duct. This is performed on women who have abnormal nipple discharge that happens spontaneously and without manipulation or squeezing of the

breast. The duct excision procedure involves making a small incision along the side of the nipple. The abnormal duct and a small amount of surrounding tissue are removed. ***(Goksel et al., 2005).***

Worldwide, classical Hadfield's operation is recognized as the main surgical procedure for Major Duct Excision. However, this operation can suffer from certain complications such as the loss of nipple sensation and in some cases skin necrosis and skin loss may take place as a result of nerve cutting and decreased blood supply of the nipple and areola complex. There is a modified Hadfield's technique and there is new technique as inframammary approach for major duct excision. ***(Duchesne et al., 2005).***

Aim of work

This is a prospective study to compare between the classic HADFIELD's operation and the inframammary approach for major duct excision in the management of duct ectasia as regard operative time and postoperative outcome with special concern to postoperative complications such as the loss of nipple sensation, the cosmetic appearance, wound infection and recurrence.

Anatomy of the Breast

Anatomy of the breast consists of embryology, parts of the gland, architecture of the gland, blood supply of the gland, lymph drainage of the gland and congenital anomalies. ***(Jatoi et al., 2006)***

Embryology:

Breast is considered to be a modified sweat gland; it arises from the milk line or mammary ridges that extend from the axilla to the mid inguinal point; Figure (1). In human, the middle part of the upper third of each forming the breast while the rest disappears, the breast lies between skin and pectoral fascia. ***(Jatoi et al., 2006)***

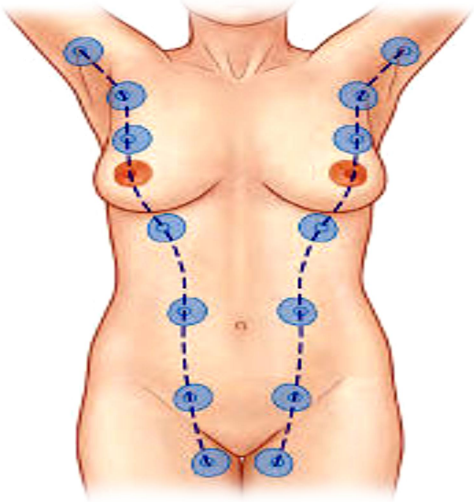

Figure (1): The milk line. Mammary glands usually develop in humans from the pectoral portion of the line ***(Jatoi et al., 2006)***.

Supernumerary mammary structures may develop from other positions along the line. ***(Skandalakis, 2009)***

The breast develops as invagination of the chest wall ectoderm, which forms a series of branching ducts. Shortly before birth, this site of invagination everts to form the nipple. The epithelial lining of the breast ducts and acini is developed from ectoderm, and the supporting tissue is derived from the mesenchyme**,** the underlying mesenchyme proliferates and the depressed ectodermal thickening becomes used to form the nipple; Figure (2). At the 5th month, the areola is recognized as a circular pigmented area of skin around the future nipple. ***(Snell, 2004)***

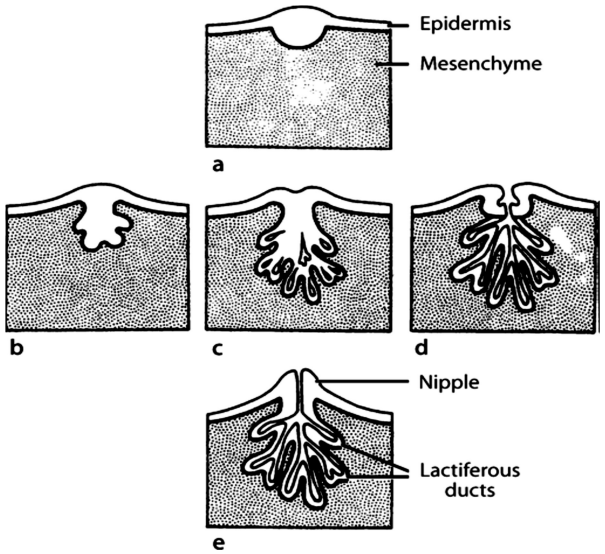

Figure (2): Development of the breast. **A–D** Stages in the formation of the duct system and potential glandular tissue from the epidermis. Connective tissue septa are derived from mesenchyme of the dermis. Eversion of the nipple near birth. ***(Skandalakis, 2009)***

Timeline of breast development:

- 4th–6th fetal week: Development of milk lines or mammary (ectodermal) ridges.
- 10th fetal week: Atrophy of the proximal and distal part of the milk lines; the middle (pectoral) part is responsible for the genesis of the breast.
- 5th fetal month: Development of the areola and 15–20 solid cords.
- Later: Lactiferous ducts; mammary glands develop from the milk lines.
- After birth: Nipple is visible.
- Puberty: Ducts develop acini at their ends.

(Skandalakis, 2009)

Gross anatomy:

Base which extends From sternal line medially to mid-axillary line laterally, From 2nd rib above to 6th below It lies on the following 3 muscles (deep relations):Pectoralis major (superior medial 2/3), Serratus anterior (inferolateral 1/3) and External oblique; Figure (3). Apex which is formed by the nipple which lies opposite to the 4thintercostal space, It is devoid of fat but contains smooth muscle fibers which allow

the nipple to be erect during suckling. It is surrounded by the areola. Axillary tail of Spence which is a prolongation of the base of the gland which passes upwards and laterally through an opening in the deep fascia "foramen of Langer" at the level of the 3rd rib, it is the only part of the breast that passes deep to the deep fascia. ***(Morrow, et al., 2006)***

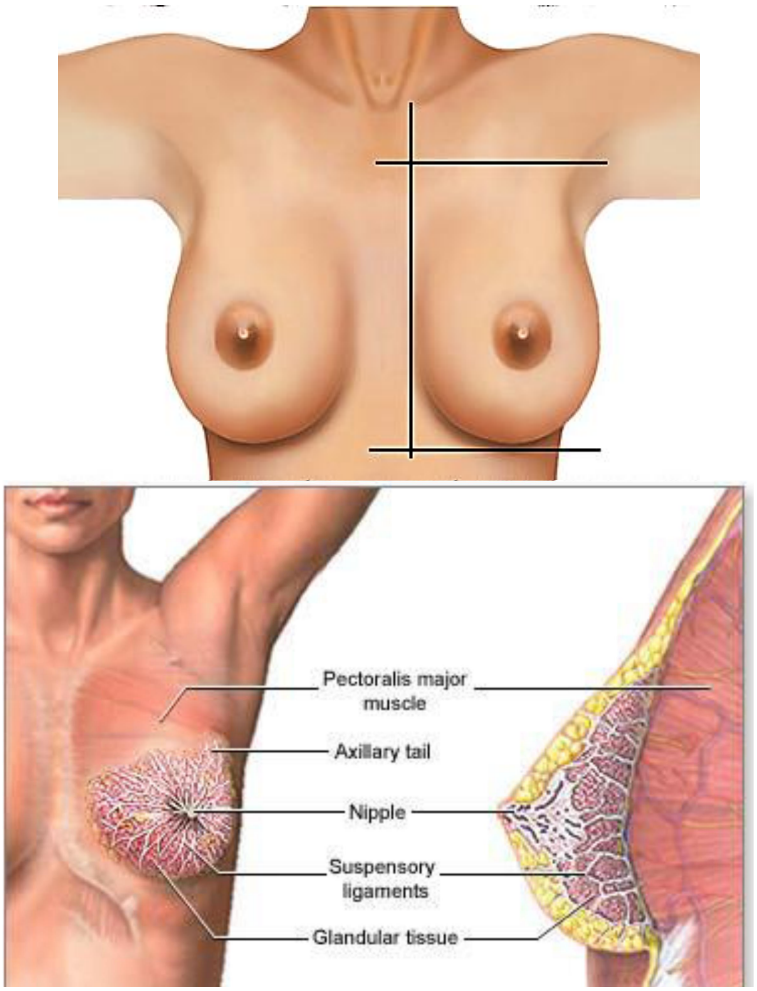

Figure (3): Anatomy of female breast. ***(Jatoi et al., 2006)***

Internal structure (Architecture of the gland):

The size of the adult female breast varies widely among individuals, and considerable discrepancy in breast size is seen between the breasts of an individual woman. The breast is composed of skin, subcutaneous tissue, and breast tissue. **(*Morrow, et al., 2006)***

Architecture of the gland is formed of epithelial elements which is responsible for milk secretion and transport. Each breast consists of 15-20 radially arranged lobes each is drained by a lactiferous duct that dilates before its end forming lactiferous sinus that opens into the nipple, Each lobe is made of 20-40 lobules each is made of 10-100 alveoli. Alveoli and ducts are lined by single layer of epithelium. They are surrounded by myoepithelial cells which contract under stimulation of oxytocin causing milk ejection. Fibro-fatty tissue which is formed of fibrous septa (Cooper's ligaments) that extend between skin and pectoral fascia are responsible for division of parenchyma into lobes; Figure (4). The breast has no capsule but is embedded in fatty tissue which is responsible for shape of the breast. **(*Morrow, et al., 2006)***

The heterogeneous distribution of glandular and adipose tissue in the breast has hindered measurement of these tissues. However, the ratio of glandular to adipose tissue estimated by mammography is 1:1 on average, and it is well documented that the proportion of glandular tissue declines with both advancing age and increasing breast size. ***(Iglehart, et al., 2008)***

Surgical anatomy application as lobes and ducts are arranged radially so in abscess drainage: radial incision is made in order to decrease damage of lobes and ducts. Any fibrosis affecting breast: In cooper's ligament causing dimpling, in lactiferous duct causing retracted nipple. Normally the breast moves easily on the underlying muscles but in advanced malignancy of breast it becomes fixed to the muscles. Breast of newborn contains lactiferous duct but no alveoli. ***(Jatoi et al., 2006)***

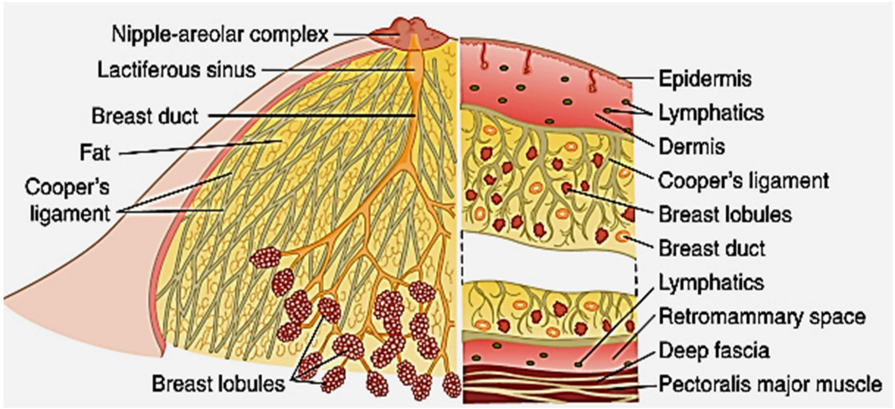

Figure (4): Cut-away diagram of a mature resting breast ***(Iglehart, et al., 2008)***

The fascial framework of the breast is important in relation to clinical manifestations of disease and surgical technique. . In between, condensation of this inter-lobar fascia gives rise to ligaments of Cooper, called suspensory ligaments because they provide a supporting framework to the breast lobes. In spite of these fibrous extensions, the superficial layer of superficial fascia gives a plane of dissection between the skin and breast. Likewise, the retro-mammary space provides a ready plane of dissection between the deep layer of superficial fascia and the deep fascia of pectoralis major and serratus anterior. This structural fascial support is so intimately connected to interlobular and intra-lobular fascia with their enclosed ductal units; no ready plane of dissection exists within the breast substance. **(*Wilkson, et al., 2009)***

Nipple (Mammary Papilla):

The nipple is located over the fourth intercostal space in the non-pendulous breast and is surrounded by a circular, pigmented areola; Figure (5). Beneath the nipple and areola are bundles of radially arranged smooth-muscle fibers that are responsible for the erection of the nipple in response to a variety of stimuli. The nipple and areola contain sebaceous

glands and apocrine sweat glands, but no hair follicles. In addition, the tubercles of Morgagni are nodular elevations formed by the openings of the Montgomery glands at the periphery of the areola. These glands are capable of secreting milk and are believed to represent an intermediate stage between sweat and mammary glands. The nipple and areolar region, as well as the remainder of the breast, is richly supplied with sensory innervations. **(*Morrow, et al., 2006)***

The diameters of the main ducts in the non-lactating breast as measured by ultrasound are between 1.2 mm and 2.5 mm in diameter. Dilated ducts in the non-lactating breast may be caused by conditions such as polycystic ovarian disease or duct ectasia. The nipple pores are 0.4 mm to 0.7 mm in diameter and are surrounded by circular muscle fibers. **(*Morrow, et al., 2006)***

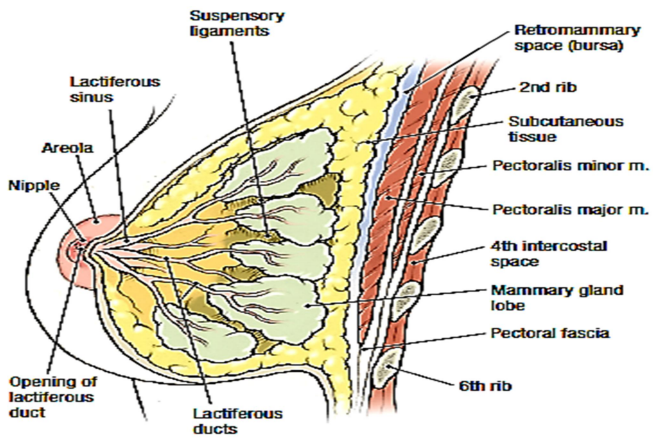

Figure (5): Breast in sagittal section **(*Moore Dalley , 2005)***

Areola:

The areola is a discoid area of skin which encircles the base of the nipple. Its color also varies from pink to dark brown, depending on parity and race. The nipple and especially the areola contains many sebaceous glands. Other glands (areolar glands of Montgomery) are intermediate in structure between lactiferous and sweat glands, when visible to the naked eye they are creamy in color. There is no adipose tissue immediately beneath the skin of the areola and nipple. ***(Sainsbury, 2004)***

Anatomy of the Axilla:

It is a pyramidal space between upper part of arm and thorax. Boundaries: Anterior wall composed from Pectoralis major muscle and Subcalvius muscle, Clavipectoral fascia, Pectoralis minor, Suspensory ligament of the axilla. Posterior wall composed from Subscapsular, Teres major and Latissimus dorsi muscles. Medial wall composed from Upper 4 ribs and serratus anterior muscle with long thoracic nerve running over it. Lateral wall composed from by narrow strip of the intertubercular groove of the humerus, with the origin of biceps and coracobrachialis muscles. Apex through which the neck (posterior triangle) is connected with the axilla as

the nerves and vessels pass through it. It bounded by; in front: middle 1/3 of the Clavicle, medially: outer border of the 1st rib and behind: upper border of the scapula. Base closed by the axillary fascia; Figure (6). ***(Bland KI, 2007)***

Its contents: Cords of the brachial plexus, Axillary vessels and several groups of LNs. ***(Bland KI, 2007)***

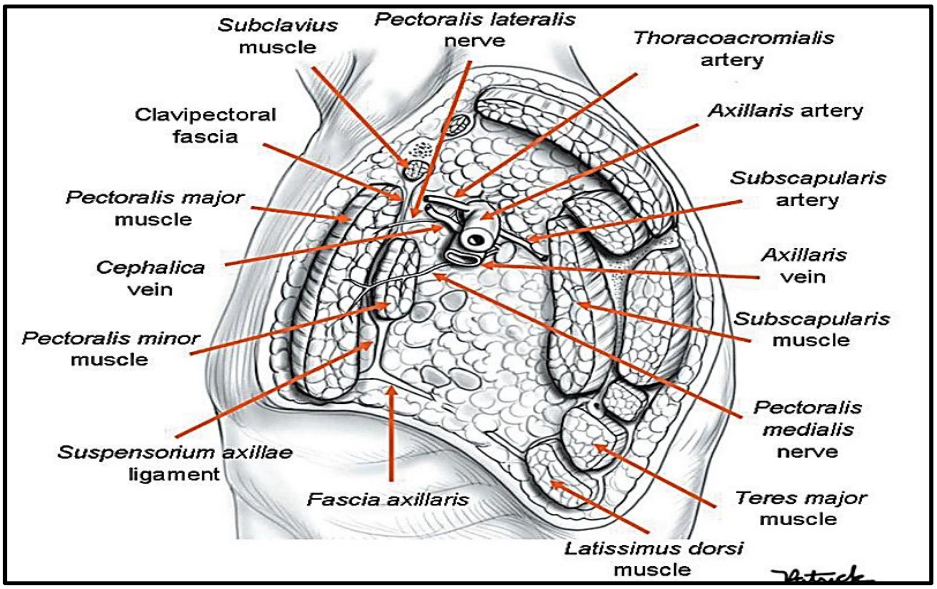

Figure (6): Anatomy of the Axilla***. (Macéa et al., 2006)***

Blood supply of the breast:

It is not derived from a single source. The principle vascular supply of the breast enters the gland from its superolateral and superomedial borders. Only scant vascularity is derived from inferior aspect of the gland. ***(Lawson et al, 2002)***

Arterial supply comes from three main sources in order of their contribution:

- **Internal mammary artery** which is a branch of 1st part of subclavian artery, gives medial perforators in 2nd, 3rd and 4th intercostal spaces, these branches should be ligated or clamped before their division in mastectomy otherwise cut ends will retract and bleed in mediastinum which is difficult to control.
- **The lateral thoracic artery** which is a branch of 2nd part of axillary artery. Pectoral branches of acromio-thoracic artery.
- **Intercostal arteries** which are branches of descending aorta and give lateral perforators in 2nd, 3rd and 4th intercostal spaces; Figure (7).

(Anne and Arthur, 2007)