NEW TRENDS IN DIAGNOSIS OF

BREAST CANCER

Essay submitted for partial fulfilment of Master Degree
in General Surgery

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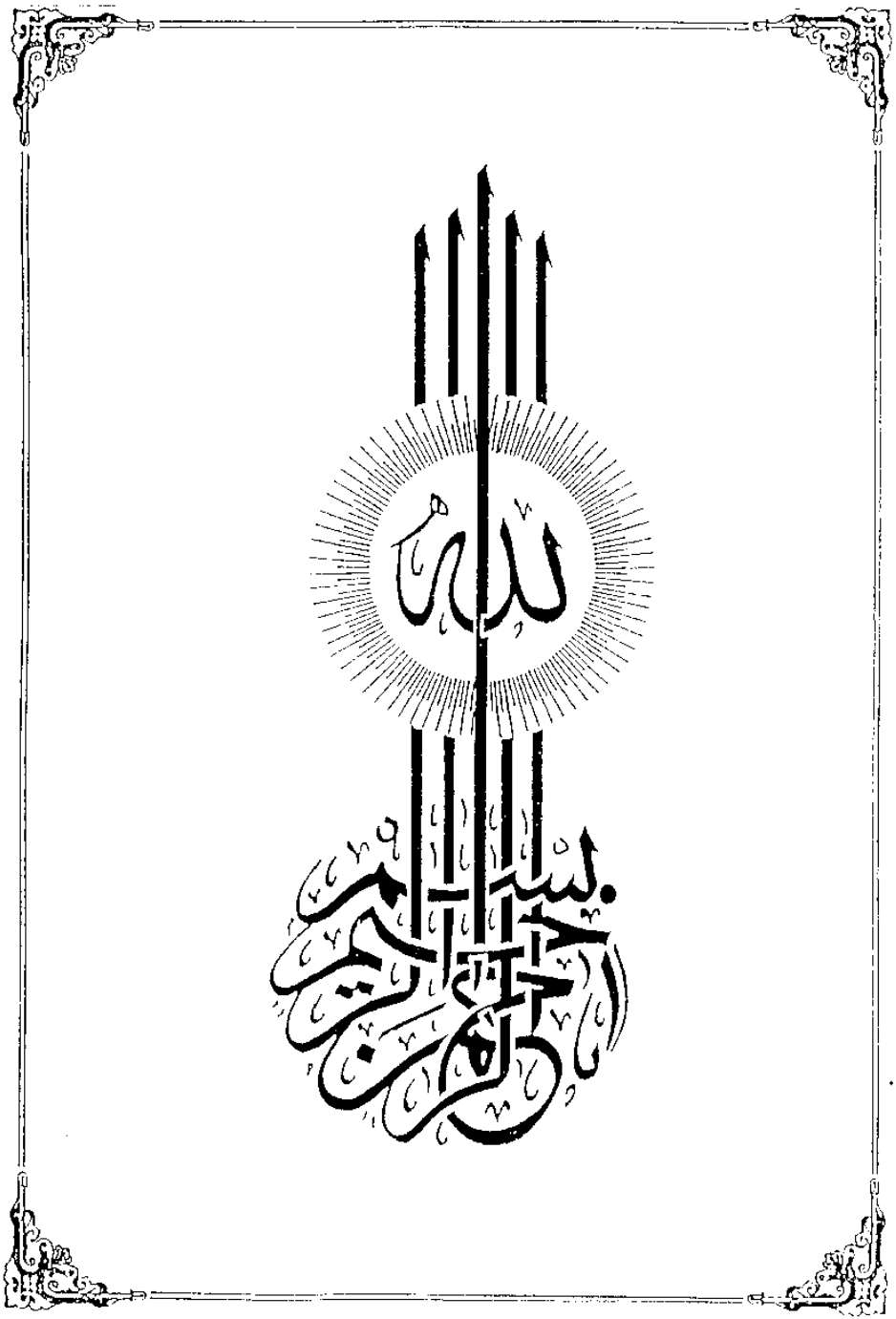
ACKNOWLEDGEMENT

I would like to express my deep gratitude to DR. EL ZARIEF ABDEL NABI ALI, Assistant Professor of General Surgery, Ain Shams University, for his continuous guidance, encouragement, supervision and kind help which mad this work possible.

I would like also to express my sincere thanks to DR. REDA MAHMOUD MOSTAFA Assistant Professor of General Surgery, Ain Shams University, for his kind help and advice.

A feeling of gratitude is expressed also to DR. MOHAMED ABDEL MONEM, Lecturer of General Surgery, Ain Shams University.

I wish to thank EVERY ONE who contributed with help in this work.



CONTENTS

	Page
- INTRODUCTION.....	1
- ANATOMY OF THE BREAST.....	2
- PATHOLOGY OF BREAST CANCER:	
o Aetiological Factors.....	8
o Incidence.....	14
o Pathological Classification & Types.....	16
o Spread of breast cancer.....	26
- EARLY DETECTION OF BREAST CANCER:	
o General Consideration.....	31
o Breast self-examination.....	34
o Mass Screening.....	42
- METHODS OF DIAGNOSIS OF BREAST CANCER:	
o Clinical diagnosis & staging.....	45
o Mammography.....	63
o Xerography.....	84
o Thermography.....	87
o Computed tomographic mammography.....	97
o Diagnosis by biopsy.....	102
- SUMMARY.....	114
- REFERENCES.....	121
- ARABIC SUMMARY.	

INTRODUCTION

Breast cancer is the most common cancer among women all over the world. One of every 11 females will develop the disease in her life time. In Egypt it varies from 27.2% to 34.8% of all cancers among Egyptian females.

In this essay we reviewed the anatomy of female breast, different aetiological factors related to this disease, different pathological classifications and histopathological features of its different types.

Recent advances in the methods used for early detection of the disease, as Breast self-examination and Mass screening, will be stressed upon as early detection is of great importance in improving the survival rate and control of the disease. The 5 - year survival rate was found to be 85% when the disease is local, 56% with regional spread and 20% with distant metastases.

This essay aim also to review the new trends in the diagnosis of the disease by mammography, xerography, thermography, computed tomographic mammography and biopsy with the principles, indications, advantages, limitations and effectiviness of each method aiming to detect or diagnose breast cancer as early as possible.

Anatomy Of The

Breast

ANATOMY OF THE BREAST

I. EMBRYOLOGY: (Williams & Warwick, 1973)

The mammary glands basically arise from the ectoderm which forms their ducts and alveoli, supported by vascularized connective tissue derived from the mesenchyme.

In Embryos at about the fifth or sixth week, two ventral bands of thickened ectoderm, the mammary ridges, extended from the axilla to the inguinal region are formed. These ridges are not prominant features, and a single pair only develops in the pectoral region. The ridges disappear later in the embryonic life, but before this, the cranial third of each begins to show proliferation to form the two rudiments of the glands. Other rudiments may form anywhere along the mammary ridges, and these may develop into actual mammae or accessory nipples. Later on, the ectodermal ingrowth branches into 15 to 20 solid buds of ectoderm which will become the lactiferous ducts and their associated lobes of alveoli in the fully formed glands. These are surrounded by mesenchyme which forms the connective tissue and fat. By proliferation, elongation and further branching the alveoli are formed and the duct system defined.

During the last 2 months of gestation the ducts become canalized, and the epidermis at the point of original development of the gland forms a small mammary pit, into which the lactiferous tubules open. Around the time of birth or slightly after it the nipple is formed by mesenchymal proliferation.

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 developmental changes.

II. GROSS ANATOMY:

Romanes (1976) said that the structure of the breast is made up of (1) the mammary gland, (2) the fatty superficial fascia in which the lobes and lobules of the mammary gland are embeded together with blood vessels, lymph vessels and nerves and (3) the overlying skin with the nipple and surrounding zone of pigmented skin, the areola. The gland has no capsule but its lobes are separated by fibrous strands of the superficial fascia which pass from the skin to the deep fascia.

Williams & Warwick (1973) said that the normal gland tissue consists of 15 to 20 lobes, and these are composed of lobules connected together by areolar tissue, blood vessels and ducts. The lobules open into the smallest branches of the lactiferous ducts which end in the terminal or lactiferous ducts, each of which drains a lobe of the gland. The lactiferous ducts hence also vary from 15 to 20 in number. They converge towards the areola and become dilated to form lactiferous sinuses which serve as reservoirs for milk or discharge. At the base of the nipple they narrow again to open separately on its apex.

- Site of the breast:

The base of the breast extends vertically from the second to the sixth ribs and at the level of the fourth costal cartilage it extends transversely from the side of the sternum to near the mid-axillary line. It lies on the pectoralis major muscle except inferolaterally where it extends on the origin of serratus anterior and external oblique muscle of the abdomen. The superolateral part of the breast is prolonged upwards and laterally into the axilla deep to pectoralis major muscle forming the axillary tail (Romanes, 1976).

The apex of the breast, the nipple, lies a little below the mid-point of the gland and approximately over the fourth intercostal space in nulliparous females. It is pink or light brown in colour and is traversed by 15 to 20 lactiferous ducts, which open by minute orifices on its wrinkled tip. The nipple is free of fat but contains non striated smooth muscle fibres arranged circularly and longitudinally and their contraction, when the nipple is mechanically stimulated (e.g. by suckling), causes erection and retraction respectively, thus it is an erectile structure and, for the convenience of the infant in arms, points forwards and outwards (Fraser, 1977).

Williams & Warwick (1973) added that the base of the nipple is encircled by a coloured area of skin called the areola which is rose-pink in colour in the nulliparous females. During pregnancy the colour of both nipple and areola becomes darker and never return to their original colour.

Fraser (1977) stated that the areolar epithelium contains numerous glands of three kinds, sweat glands, sebaceous glands and accessory mammary glands. The sebaceous glands (known as the glands of Montgomery) enlarge strikingly during pregnancy and serve to lubricate the nipple during lactation.

- The ligaments of Cooper: (Fraser, 1977)

They are hollow conical projections of fibrous tissue filled with breast tissue, the apices of the cones being attached firmly to the superficial fascia and thereby to the skin overlying the breast. These ligaments accounts for the dimpling of the skin overlying a scirrhous carcinoma or other lesions of breast accompanied by fibrosis.

- Arterial supply of the breast : (Romanes, 1976)

(1) Medially: from perforating branches of the intercostal and internal thoracic arteries.

(2) Laterally: mammary branches from the lateral thoracic artery.

- Venous drainage of the breast: (Williams & Warwick, 1973)

The veins describe an anastomotic circle around the base of the nipple, the circulus venosus. From this circle and from the glandular tissue branches transmit the blood to the circumference of the gland, and end in the axillary and internal thoracic veins.

- Nerve supply of the breast: (Williams & Warwick, 1973)

The nerves are derived from the anterior and lateral cutaneous branches of the fourth, fifth and sixth thoracic nerves. These nerves convey sympathetic fibres to the breast, but its secretory activities are largely under the control of hormones of the ovary and pituitary gland.

- Lymphatic drainage of the breast:

Williams & Warwick (1973) and Romanes (1976) said that the lymphatics of the gland form a dense plexus under the areola which is known as subareolar lymphatic plexus, which communicates with another lymphatic plexus on the deep fascia of the pectoralis major underlying the breast (deep lymphatic plexus).

The lymphatics coming out of the breast radiate into many directions and drain into a large number of lymph nodes. The axillary lymph nodes receive more than 75% of the lymph from the breast, most of the remainder enters the parasternal nodes and few lymph vessels occasionally follow the lateral cutaneous branches of posterior intercostal arteries to the intercostal lymph nodes, so the lymphatic drainage can be classified as follows:

(1) Lymphatic vessels from the central and lateral parts of the breast drain into the pectoral group of the axillary lymph nodes.

(2) Lymphatic vessels from the upper part of the breast pierce the pectoralis major muscle and clavipectoral fascia to reach the apical group of axillary lymph nodes.

3) From the medial part of the breast some lymphatics run with the branches of internal thoracic artery to reach the parasternal lymph nodes.

4) Since there is communication of lymph vessels across the median plane, some lymphatics from the medial part of the breast drain with the lymphatics of the opposite breast.

5) Some lymphatics from the interolateral part of the breast anastomose with lymphatics of the linea alba and anterior wall of rectus sheath.

6) Few lymphatics from the inferomedial part of the breast may pass deeply to anastomose with the subdiaphragmatic plexus of lymphatics.

Williams & Warwick (1973) said also that the lymphatic drainage of the skin covering the breast occurs as follows:

(1) Lymph vessels from the skin covering the peripheral part of the breast and the subareolar plexus run backwards to the pectoral nodes.

(2) The lymph vessels from the skin covering the area near the sternum pass inwards to end in the parasternal nodes.

Pathology Of

Breast Cancer

AETIOLOGY OF BREAST CANCER

The exact aetiology of breast cancer is still unknown. However several possible aetiological and risk factors may be involved. These factors include:

(1) Lactation

Mothers who breast fed their babies were found to be 2-3 times less at risk of developing breast cancer than others who used artificial milk. This is due to inhibition of ovarian function by lactation (Zippin, 1969). However other studies done by MacMahon et al., in 1973 indicated little or no difference in the incidence of breast cancer among cancer patients and controls.

(2) Parity

In 1952 Smithers et al., reported that multiparity decreases the risk of developing breast cancer and in general the disease is more frequent in unmarried women.

It is also less common in women who have their first child at an early age than those whosefirst delivery is delayed untill the age of 35 or more (Lilienfeld et al., 1975).

In 1979, Zinns reported that the incidence of breast cancer during pregnancy is rare but if it is present prior to pregnancy, there will be rapid progress of the disease during pregnancy may be due to increased hormonal stimulation.

(3) Menstrual life

Bucalossi & Veronsi (1957) found that breast cancer is less common in females with late menarche and early menopause i.e. females with short menstrual life.

(4) Hormonal factors

Feinleib (1968) found that the incidence of breast carcinoma decreases after induction of artificial menopause by oophorectomy.

In 1971 Haagensen studied the aetiologic role of hormones in mammary carcinoma by administration of excessive and prolonged doses of oestrogen to female mice and he found that the disease appears at an earlier age. He also found that administration of androgen will prevent the development of mammary carcinoma due to suppression of ovarian function.

Hertz (1968) said that oestrogen-progesteron combination used in steroid contraceptive preparations produce more marked hormonal effect on the breast than that of the endogenous oestrogen and progesteron.

Vander & David (1977) noticed that there is increased incidence of breast cancer in women receiving thyroid hormone therapy than in those who have not, and this incidence was found to increase with increasing duration of thyroid hormone treatment specially in nulliparous women.