NUCLEAR MEDICINE CONTRIBUTION TO THE MANAGEMENT OF BREAST CANCER PATIENTS

ESSAY
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Presented by
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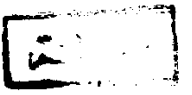

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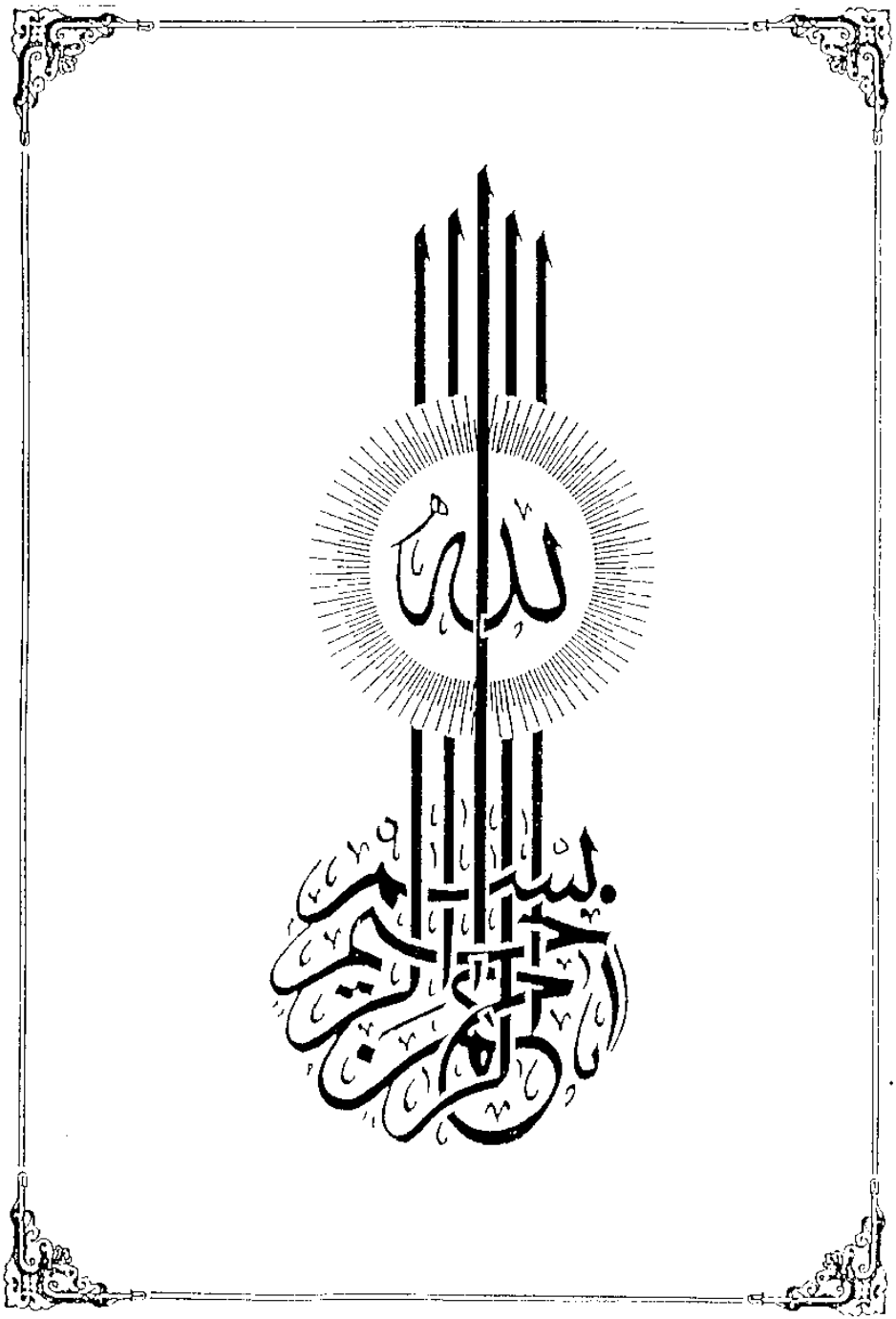

Acknowledgment

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INTRODUCTION AND AIM OF THE WORK

The role of nuclear medicine is well established towards the diagnosis of bone metastases from breast cancer or from any other primary tumour being the most sensitive imaging modality for early detection of osseous deposits. Its role in hepatic metastases from cancer breast is complementary to ultrasound and the latter is the investigation of first choice owing to its simplicity and low cost.

CT is the main modality used to diagnose brain deposits from cancer breast and isotope scanning has a limited complementary role.

Regarding lung deposits from cancer breast the simple chest X-ray remains the first imaging procedure to be employed.

Lymphoscintigraphy is non-invasive, simple, accurate and less time demanding compared to the tedious radiographic lymphography. It can be usefully applied to stage cancer breast and to assess nodal spread *(Maisey et al., 1991)*.

Recently, the nuclear medicine has been shown to play an important role towards the diagnosis of the primary breast cancer and to differentiate benign from malignant breast lump.

This is very helpful in patients with equivocal and non-conclusive mammographic findings *(Abdel Dayem, 1995)*.

Thallium-201 was the first employed tracer and the reported results are very promising. Tc-99m Methyl Isobutyl isonitrile (MIBI), like thallium-201, is another myocardial perfusion agent that has been successfully employed to detect breast cancer *(Moustafa et al., 1995)*.

Very recently, Tc-99m tetrofosmin (myoview) has also been employed and the results are quite premature as further works are needed to prove its validity *(Rambaldi et al., 1994)*.

Accordingly, the aim of this work is to assess the role of nuclear medicine towards the diagnosis of breast cancer and its spread and particularly to highlight its recent application in differentiating benign from malignant breast masses.

CHAPTER I

ANATOMY OF THE BREAST

The breasts are modified sweat glands that have been specialized to secrete milk instead of sweat. Each gland develops in the subcutaneous fascia of the upper part of the anterolateral aspect of the thoracic wall *(Hamilton, 1976)*.

The breasts are present in both sexes, but usually become highly developed only in the female in response to estrogen stimulation from the ovaries *(Wilson, 1983)*.

Structure of the breast

The breast is composed of a mass of glandular tissue traversed and supported by strands of fibrous tissue. The glandular tissue forms a conical mass, the apex of which corresponds to the position of th nipple, while its base is loosely connected to the deep fascia on which the gland lies.

It is composed from fifteen to twenty lobes divided ito lobules, which make its superficial surface and edges very uneven-the inequalities of its surface being filled up by processes of the fatty tissue which covers the gland. The fatty covering is incomplete in the region of the areola, and here the lactiferous ducts pass into the nipple.

The lobes radiate from the nipple, each lobe being quite distinct from the others and possessing its own duct, the lobules are bound together and supported by a considerable amount of fibroareolar tissue, which forms the stroma of the gland (Fig.1.1).

The alveoli of the gland and the secretory epithelium which lines them vary much under different conditions. At puberty the glandular tissue is composed chiefly of the ducts; at that time the alveoli are small and few in number.

During lactation, when the gland is fully functional, the alveoli are enlarged, distended with fluid, and much more numerous. The epithelial cells are cubical and filled with fat globules.

When the gland is not secreting, the alveoli become small and reduced in number, and the cells of the lining epithelium, which are then small, do not contain fat globules *(Romanes, 1986)*.

The main lactiferous ducts number about fifteen; they open separately on the summit of the nipple. Each is dilated into an ampullar beneath the areola-Each main duct drains a lobe of the breast *(Snell, 1986)*.

In the male the various parts of the breast are represented in a rudimentary condition *(Romanes, 1986)*.

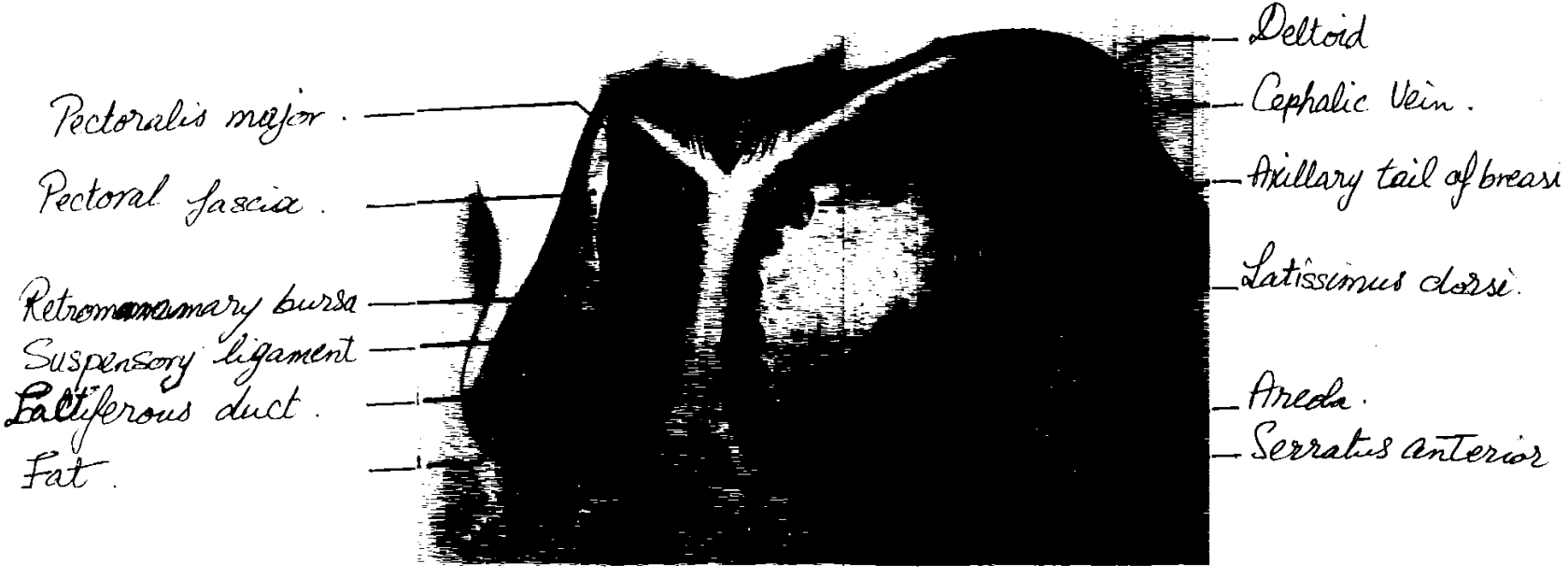

Fig.1.1: Superficial dissection of the pectoral region of the female (Agur, 1991).

Support of the breast

The young breast is protuberant, the older breast pendulous. The former is supported by fibrous tissue strands connecting the deep fascia with the overlying skin (dermis), these are the ligaments of Astley cooper, when atrophic they allow the organ to droop, when contracted from the fibrosis around a carcinoma they cause pitting of the skin *(Romanes, 1986)*.

Surface anatomy of the mammary gland

The mammary gland lies in the superficial fascia covering the anterior chest wall.

In the female after puberty it enlarges and assumes its hemispherical shape. In the young adult female it overlies the second to the sixth ribs and their costal cartilages and extends from the lateral margin of the sternum to the mid axillary line *(Snell, 1986)*.

It lies on the pectoralis major and, to a lesser extent, on the obliques externus abdominis and the serratus anterior. A part of the gland extends towards the axilla partly under cover of the lateral border of the pectoralis major, and is known as the axillary tail. The nipple is situated near the summit of the breast, and tends to lie at the level of the fourth intercostal space in the midclavicular line, though this is very variable, the lactiferous ducts open on it by minute apertures, and it is surrounded by a coloured, circular area of skin called the areola (Fig.1.2).