Role of Tomosynthesis in Detection and Characterization of Breast Masses

Essay

Submitted to partial fulfillment of master ***degree of Radiodiagnosis***

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List of Abbreviations

ACR	:	American College of Radiology
CAD	:	Computer-aided detection or diagnostic
CADe	:	Computer-Aided Detection
CADx	:	Computer-Aided Diagnosis
CE-DBT	:	Contrast-enhanced DBT
2D	:	2-dimensional
3D	:	3-dimensional
DBT	:	Digital Breast Tomosynthesis
DCIS	:	Ductal carcinoma in situ
FA	:	Fibroadenoma
FDA	:	Food and Drug Administration
GCT	:	Granular cell tumor
IARC	:	International Agency for Research on Cancer
IDC	:	Invasive ductal cancer
IMLN	:	Intramammary lymph node
LCIS	:	Lobular carcinoma in situ
PACS	:	Picture archiving system
PT	:	Phyllodes tumor
RS	:	Radial scar

List of Abbreviations (Cont.)

TDLU	:	Terminal duct lobular unite
UOQ	:	Upper outer quadrant

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Introduction

Breast cancer is the most common cancer in women worldwide, second most common cancer overall and the principle cause of death from cancer among women globally according to International Agency for Research on Cancer (IARC),so close clinical breast examination, imaging, and tissue sampling are needed for a definitive diagnosis **(Ferlay et al., 2013).**

Nowadays there are many imaging tools used for both screening & diagnosis of breast cancer aiming at early detection of breast cancer, increasing the probability of cure and reducing breast cancer mortality. These tools include: conventional mammography, sonography, combination of both, MRI and recently tomosynthesis **(Drukteinis et al.,2014).**

Tomosynthesis or Digital Breast Tomosynthesis (DBT) is a new technology that has been developed to improve detection and characterization of breast lesions especially in women with dense non-fatty breasts **(Helvie,2010).**

Tomosynthesis is a simple and relatively inexpensive method of producing section images using conventional digital x-ray equipment. It is a form of limited angle tomography that produces section, or "slice" images from a series of projection images acquired as the x-ray tube moves over a prescribed path. **(Dobbins, 2009).**

A successful breast cancer screening requires increased sensitivity and specificity and ideally limiting both financial cost and radiation burden, so tomosynthesis is currently FDA approved as an adjunct to standard

mammography in screening programs for its promising role in increasing specificity in mammographically detected masses, reducing recall rates on screening mammography and reducing false negative examinations **(Drukteinis et al.,2014).**

Trials to get the maximum benefit from DBT never stopped,"the new digital mammography systems" is one of these trials, which include combining digital mammography with other imaging technology such as ultrasound or combining it with contrast enhancement techniques producing contrast enhanced digital mammography (CEDM) **(Helvie,2010).**

Aim of the Work

This work aims to declare the beneficial role of Digital Breast Tomosynthesis (DBT) in the detection of breast masses and distinction of malignant ones; and shows its great advantages over other investigation tools used nowadays for the same purpose.

Anatomy of the Breast

Surface anatomy of the breast

Breasts are modified skin glands, located on the anterior and also partly the lateral aspects of the thorax. Each breast extends superiorly from the second rib to the sixth costal cartilage inferiorly, medially to the sternum, and laterally to the mid-axillary line **(fig.1-1)**.The nipple–areola complex is located between the fourth and fifth ribs **(Jesinger,2014).**

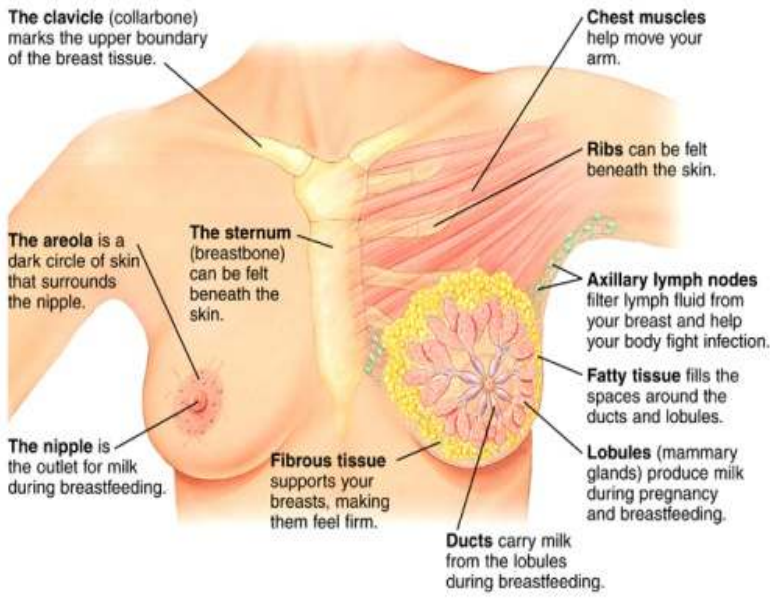

Fig.(1-1) Surface anatomy of the breast **(Jesinger,2014)**

Structural Anatomy of the Breast

The breasts are composed of lobes (15-20 per each breast) which contain a network of glandular tissue consisting of branching ducts and terminal secretory lobules(20-40 in each lobe) in a connective tissue stroma. The terminal duct lobular unit (TDLU) **(Figs.1:2-3)** is the