بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

A THESIS FOR PARTIAL FULFILMENT OF M.D. DEGREE IN RADIODIAGNOSIS

Title of the Thesis: Diagnostic Accuracy of Diffusion Weighted Breast MRI Compared to Contrast Enhanced Mammography in the Detection of Cancer Breast in Dense Breasts

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عنوان الرسالة: مقارنة دقة التشخيص بواسطة الرنين المغناطيسي من خلال التصوير بخاصية الانتشار بالتصوير الماموجرافي الرقمي للثدي بالصبغة في كشف سرطان الثدي في الثدي الكثيف.

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2021

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلِ اعْمَلُوا فَسَيَرَى اللَّهُ عَمَلَكُمْ وَرَسُولُهُ وَالْمُؤْمِنُونَ

صَدَقَ اللَّهُ الْعَظِيم

[التوبة:105]

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Introduction

Breast cancer is considered a major public health problem in women all over the world. It represents for 22.9% of all new female cancers. In Egypt breast cancer is accounting for 37.7% of the total new cancer cases and it is the leading cause of cancer related mortality accounting for 29.1% of the cancer related deaths ***(Zeeneldin et al., 2013).***

Mammographic screening has been shown to be useful in the reduction of breast cancer mortality; however, the limitations of mammographic screening, particularly in women with dense or non involuted breasts, are well established ***(Kuhl et al, 2017).***

Breast density represents the relative amounts of fibroglandular (dense) tissue to fat (transparent) tissue in the breast. Reduced sensitivity of mammography in women with dense breasts is most likely caused by a masking effect due to the high amount of fibroglandular tissue ***(Emaus at al., 2015).***

If breast density is associated with more aggressive breast cancer phenotypes, it may suggest that the breast tissue environment underlying breast density allows for more growth and increased proliferation, than in more fatty breasts. In addition, because mammographic sensitivity decreases with increasing breast density, aggressive cancers occurring in denser breasts go undetected for longer periods permitting these already rapidly proliferating tumors to be larger at presentation ***(Yaghjyan et al., 2011).***

Contrast enhanced (CE) digital mammography is a relatively new breast imaging modality in which contrast enhancement is used with digital mammography to depict tumor vascularity. Contrast enhanced spectral mammography (CESM) has been confirmed to be more sensitive than mammography for the diagnosis of breast cancer in dense breasts ***(Sogani et al., 2017).***

Breast magnetic resonance imaging (MRI) is the most sensitive method for detecting breast cancer, with widespread applications for screening of high-risk patients and preoperative planning. In younger females having dense breasts, MR imaging detect additional disease that is hidden at mammography and ultrasonography ***(Lacconi et al., 2015).***

Diffusion-weighted imaging (DWI) is one of the most promising MRI techniques which improves the diagnostic specificity of breast MRI without injection of the contrast material ***(Hahn et al., 2016).***

The application of diffusion-weighted imaging in whole-body imaging has a considerable attention; after the advance of new magnetic resonance (MR) imaging technologies and providing stronger diffusion gradients, especially in the oncology field. When diffusion-weighted imaging is used in combination with apparent diffusion coefficient mapping, it provides a valuable information about the functional environment of water in tissues, thus, enforcing the morphologic information which is yielded by the conventional MR imaging ***(Malayeri et al., 2011).***

However, MRI may have several obstacles mainly due to its high cost and also to its limitation in claustrophobic, excessively obese patients or with a certain type of extra-breast prostheses, pacemakers or foreign bodies among others ***(Travieso et al., 2014).***

Aim of the work

The aim of this work is to compare the accuracy of diffusion weighted MRI with contrast enhanced mammography in the detection of breast cancer in dense breasts and correlate the findings with the histopathological results.

Anatomy of the breast

General anatomy:

The breast extends from the second to sixth ribs on the anterior chest wall. It is hemispherical with an axillary tail (of Spence) and consists of fat and a variable amount of glandular tissue **(fig. 1)**. It is completely contributed by the fascia of the chest wall, which parts into anterior and posterior layers to encompass it. The fascia forms septa called Cooper's ligaments, which attach the breast to the skin anteriorly and to the fascia of pectoralis posteriorly ***(Ryan et al., 2004).***

The mammary gland shows firm attachment to the dermis of the overlying skin, especially by substantial skin ligaments (L. retinacula cutis), the suspensory ligaments (of Cooper). These condensations of fibrous connective tissue, particularly well developed in the superior part of the gland, help support the mammary gland lobules ***(Moore and Dalley, 2006).***

Lobular structure:

The breast is composed of 15-20 lobes, each of which is drained by a solitary major lactiferous duct that ends in the nipple. Each lobe is comprised of several lobules, each of which drains several acini. The lobules drain via a branching arrangement of ducts to the single lobar duct. Each lobule is draining several acini - these are blind saccules into which milk is discharged during lactation. The glandular tissue of the acini and the ductal tissue draining them contain the breast parenchyma ***(Ryan et al. , 2004).***

The mammary glands are considered modified sweat glands; thus, they have no capsule or sheath. The rounded contour as well as most of the volume of the breasts are produced by subcutaneous fat, except during pregnancy when the mammary glands enlarge and new glandular tissue forms. The milk-secreting alveoli are ordered in grape-like clusters ***(Moore and Dalley, 2006).***

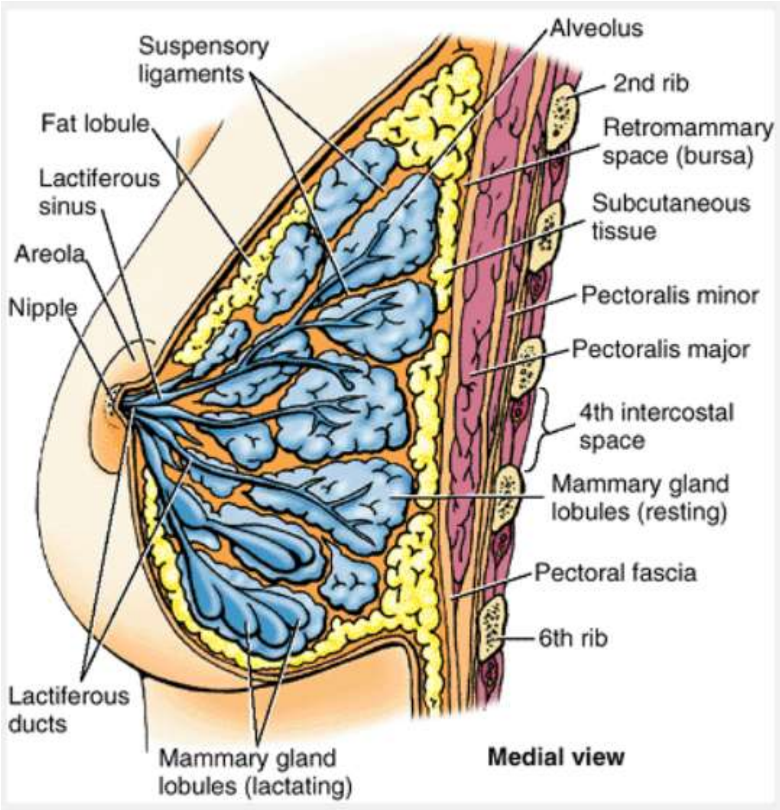

Fig. 1: Sagittal section of female breast and anterior thoracic wall *(Moore and Dalley, 2006).*

Changes in the breast:

During puberty (ages 8-15 years), the breasts normally increase in size, due to glandular development but primarily from increased fat deposition. The areolae and nipples also enlarge. Breast size and shape depend on genetic, ethnic, and dietary factors ***(Moore and Dalley, 2006).***

The areolae comprise numerous sebaceous glands, during pregnancy they increase in size and secrete an oily substance that act as a protective lubricant for the areola and nipple, which reduces irritation and chaffing as mother and baby begin the nursing process. The nipples are conical or cylindrical prominences in the centers of the areolae. The nipples contain no fat, hair, or sweat glands. The tips of the nipples are pierced with the lactiferous ducts opening into them. The circularly arranged smooth muscle fibers seen in the nipples squeeze the lactiferous ducts during lactation and erect the nipples in response to stimulation, as when a baby begins to suckle ***(Moore and Dalley, 2006).***

Breast Quadrants:

For the description of tumors and cysts, anatomically the surface of the breast is divided into four quadrants: superior and inferior (medial and lateral) **(fig. 2)**. As an example, a physician might describe the lesion as follows: A hard irregular mass was felt in the superior medial quadrant of the right breast at the 2 o'clock position, approximately 2.5 cm from the margin of the areola ***(Moore and Dalley, 2006).***

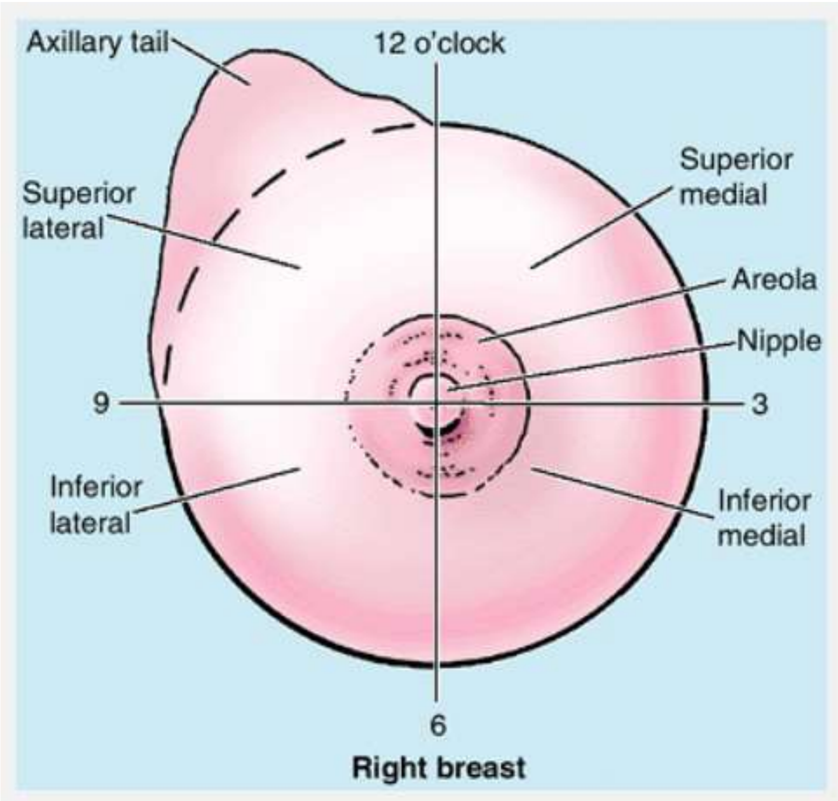

Fig. 2: Breast Quadrants *(Moore and Dalley, 2006).*

Blood supply:

The blood supply to the breast **(fig. 3)** is composed of the following:

• Branches of the internal mammary (thoracic) artery penetrate the intercostal spaces and cross pectoralis muscle to supply approximately 60% of the breast mainly medial and central;

• The lateral thoracic branch of the axillary artery supplies 30%, mainly upper outer quadrant; and

• Perforating branches of the anterior intercostal arteries.

Venous drainage accompanies the arteries to the axillary and subclavian veins and the azygos system ***(Ryan et al., 2004).***

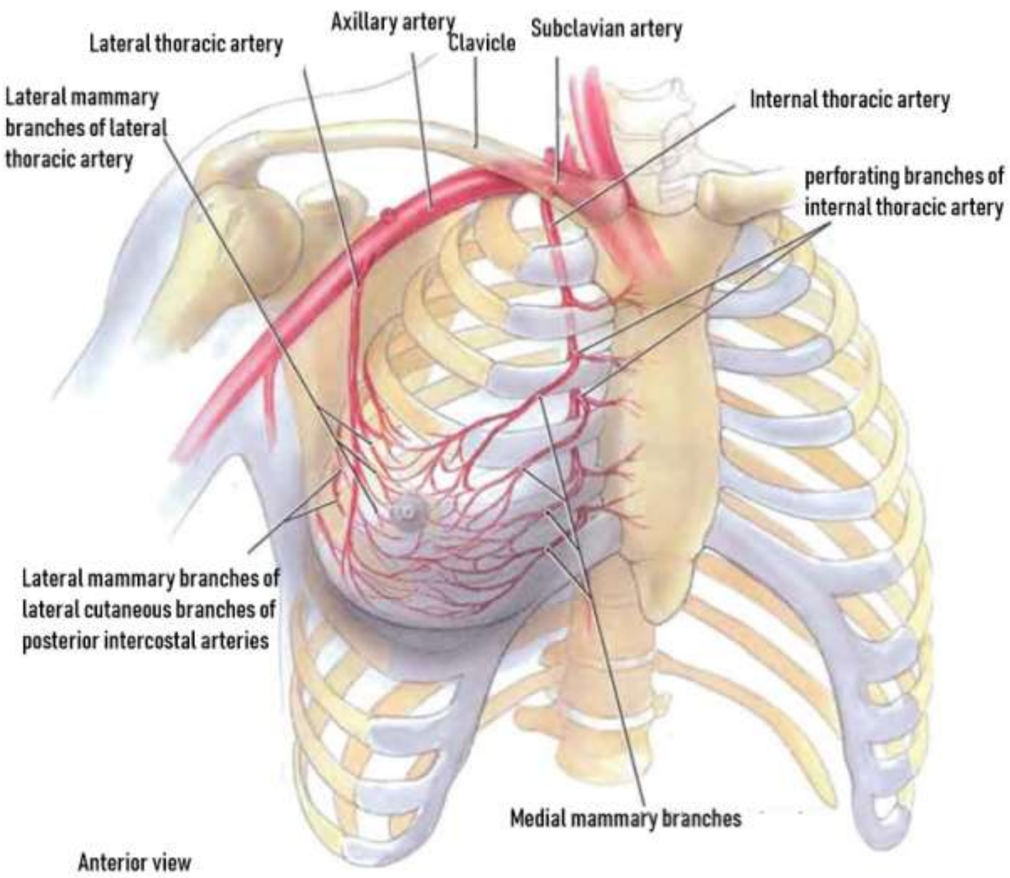

Fig. 3: The arterial supply of the breast ***(Agur and Dalley, 2009).***

Lymphatic drainage:

Lymph drained from the upper limb and breast passes through nodes arranged irregularly in groups of axillary lymph nodes: (a) pectoral, along the inferior border of the pectoralis minor muscle; (b) subscapular, along the subscapular artery and veins; (c) humeral, along the distal part of the axillary vein; (d) central, at the base of the axilla, embedded in axillary fat; and (e) apical, along the axillary vein between the clavicle and the pectoralis minor muscle. Most of the breast is drained by the pectoral, central, and apical axillary nodes to the subclavian lymph trunk, which joins the venous system at the junction of the subclavian and internal jugular veins. The medial part of the breast drains to the parasternal nodes, which are located along the internal thoracic vessels **(fig. 4)** ***(Agur and Dalley, 2009).***

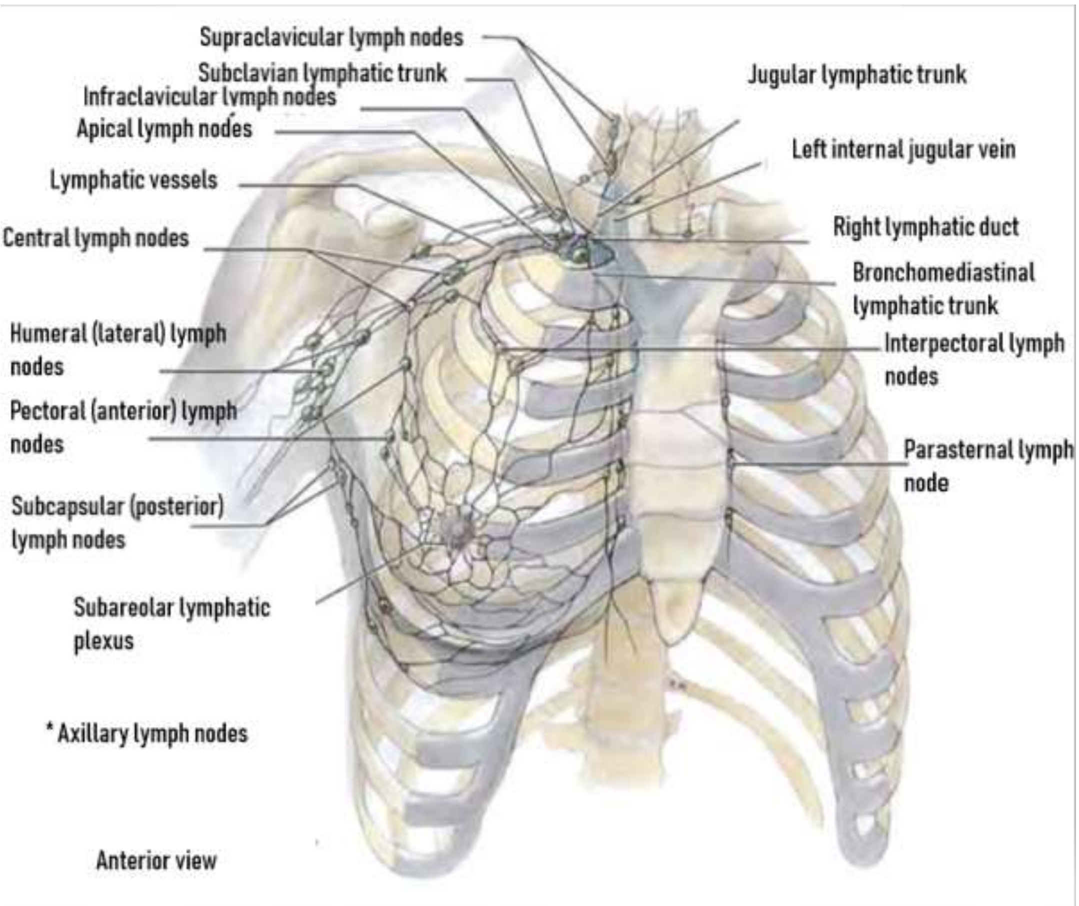

Fig. 4: The lymphatic drainage of the breast ***(Agur and Dalley, 2009).***