

Dedication

To give me a drop of love To

My Parents...

My sisters...

And my brothers...

Acknowledgements

In the name of Allah, the Most Gracious and the Most Merciful Alhamdulillah, all praises to All ah for the strengths and His blessing in completing this project. Special appreciation goes to my supervisor,

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Abstract

Diffusion-weighted magnetic resonance imaging (DW-MRI) provides image contrast through measurement of the diffusion properties of water within tissues.

The purpose of this study is to evaluate the use of diffusion-weighted imaging (DWI) for the detection and characterization of breast lesions compared with dynamic contrast-enhanced MRI, dynamic curve, ultrasound, mammography and biopsy.

Included fifty cases from adult women with 50 breast lesions, their ages were between 26 and 80 years (mean age: 41.78 ± 12.48 years). All patients were examined on MRI protocol: T1, T2 weighted images, Diffusion weight image (DWI), dynamic contrast enhancement (DCE-MRI) and BI-RAD. Of these 50 patients, 18 underwent breast MRI with ultrasound, mammography and biopsy. 21 patients underwent breast MRI, ultrasound and mammography. 28 patients underwent MRI and biopsy. The study took place during the period from June 2013 up to June 2014, at Dr. Suleiman AL Habib Medical Center-Olaya.

The results of histopathology examination were chosen as the reference standard for lesion evaluation. Findings could either be benign or malignant, and the lesion type was recorded. Findings were

15 benign lesions out of 28 including :breast hematoma ,breast cyst, degeneration, fibroadenoma, fat necrosis, fibrocystic change, myxoid fibroid, papilloma and pseudoangiomatous hyperplasia .Malignant lesions totaled 13 out of 28, including : infiltrating ductal carcinoma , ductal papillary carcinoma and breast calcification.

The average of diameter of the benign lesions was 1.7x1.5cm and that of breast malignant lesions was 2.1x2.0cm.The diagnostic assessment of breast lesions in combination with the assessment of signal intensity and lesion morphologic features showed that the correlation is significant at P value <0.05 in both T2 and (DWI) as 0.017and 0.000 respectively. In hematomas T1 images should be evaluated together with (DWI) to avoid misdiagnosis. Lesions were classified according its shape as regular and irregular, the correlation was found to be significant between the MRI diagnosis and the lesion morphology at $p=0.014$.The (DWI), DCE-MRI, BI-RADS, and dynamic curve assessment with detailed histopathology for each lesion showed significant relationship at P - Value <0.05 as 0.002, 0.005, 0.001,0.000 respectively. Histological results and MRI Findings shows sensitivity of 82%, specificity of 71%, accuracy of75% and positive predictive value (PPV) of 64%.The additive diffusion-weighted imaging, Contrast enhancement MRI, Dynamic curves and BIRADS values to T1, T2-weighted MR imaging, for the assessment of breast lesions, will be useful in the analysis of breast MR images.

It is likely that diffusion weighted breast imaging will be revealed to have an acknowledged task in breast MRI without the need of the invasive unnecessary biopsies.

ملخص الدراسة :

الغرض من هذه الدراسة هو تقييم استخدام التصوير مرجع نشر للكشف وتوصيف آفات الثدي مقارنة مع وسيط التباين للتصوير بالرنين المغناطيسي، ومنحنى الديناميكية، والموجات فوق الصوتية، والتصوير الإشعاعي للثدي، وعينات من الأنسجة.

شملت 50 حالة من النساء البالغات معدل أعمارهن ما بين 80 و 26 عاماً (متوسط العمر: 41.78 ± 12.48 سنة) تم فحص جميع المريضات على بروتوكولات الرنين المغناطيسي. من هؤلاء المريضات الخمسين، هناك 18 من خضعن للتصوير بالرنين المغناطيسي مع الموجات فوق الصوتية والتصوير الإشعاعي للثدي وأخذ عينة من الأنسجة. وخضعت 21 مريضة للتصوير بالرنين المغناطيسي والموجات فوق الصوتية والتصوير الإشعاعي للثدي. وخضعت 28 مريضة للتصوير بالرنين المغناطيسي وأخذ عينة من الأنسجة.

جرت الدراسة خلال الفترة من يونيو عام 2013 حتى يونيو عام 2014، في مستشفى الدكتور سليمان الحبيب الطبي (المركز الطبي) العليا.

وقد تم اختيار نتائج الأنسجة كمعيار مرجعي لتقييم الآفة. يمكن أن تكون النتائج إما حميدة أو خبيثة، وتم تسجيل نوع الآفة. وكانت النتائج 15 آفات حميدة من أصل 28 بما في ذلك: ورم دموي الثدي، والكيس الثدي، انحناء، ورم ندي ليفي، نخر الدهون، وتغير الليفي، الورم الليفي مخاطية، الورم الحليمي والزائفة تضخم وعائي. وبلغ مجموع الآفات الخبيثة 13 من أصل 28، بما في ذلك: التسلسل سرطان الأبقية، الأبقية حليمي سرطان الثدي وتكلس.

وكان متوسط قطر الآفات حميدة 1.5×1.7 سم وذلك من الآفات الخبيثة الثدي كان 2.0×2.1 سم. وأظهر التقييم التشخيصي للآفات الثدي في تركيبة مع تقييم كثافة الإشارة وملامح التشكل الآفة أن ارتباط مهم في قيمة $P < 0.05$ في كل من T2 ومرجع النشر 0.017 و 0.000 على التوالي. ويجب تقييم الصور من T1 جنباً إلى جنب مع صور النشر المرجع لتجنب التشخيص الخاطئ.

تم تصنيف الآفات حسب شكله كما المنتظمة وغير المنتظمة، وتم العثور على علاقة ذات دلالة بين التشخيص بالرنين المغناطيسي والشكل الآفة $P = 0.014$. والنشر المرجع، ووسط التباين، وبيانات وتقارير صور الثدي، وتقييم معنى الديناميكية مع التشريح المفصل لكل آفة وأظهرت علاقة ذات دلالة إحصائية في P -القيمة $P < 0.05$ كما 0.002، و 0.005، و 0.001، و 0.000 على التوالي. النتائج النسيجية ونتائج التصوير بالرنين المغناطيسي يظهر حساسية 82٪، خصوصية فيما 71٪، دقة 75٪ والقيمة التنبؤية الإيجابية (PPV) من 64٪. وجميع هذه البيانات ستكون مفيدة لتقييم الآفات في صور الرنين المغناطيسي للثدي

فحص مرجع النشر لديه دور كبير في تشخيص صور الرنين المغناطيسي للثدي ففي بالغرض دون الحاجة إلى أخذ عينة نسيجية غير ضرورية.

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List of Abbreviations:

(DW-MRI)	Diffusion- weighted MRI.
(ADC)	Apparent diffusion coefficient.
(SS SE EPI)	Single-Shot Spin-Echo Echo-Planar Imaging Sequence.
(B-value)	Indicates the strength of the diffusion sensitizing gradient and proportional to the gradient amplitude, the duration of the applied gradient, and the time interval between the paired gradient. Diffusion come above 1000s/mm b-values.
(SNR)	Signal-to-noise ratio.
(EPI)	Echo-planar imaging sequence.
(TE)	Echo time.
(Breast lesion)	Stands for abnormal growth, sores, wounds, cyst or general tissue damage in the breast.
(Malignant)	Malignant neoplasm, and malignant tumor are synonymous with cancer.
(Benign)	That is harmless in the long run. The opposite of benign is malignant.
(Lesion)	Refers to any abnormal growth on the surface of an organ.
(BI-RADS)	Breast Imaging Reporting and Data System.
(BSE)	Breast self-exam.
(CBE)	clinical breast examination
(BRCA)	The BRCA gene test is a blood test that uses DNA analysis to identify harmful changes (mutations) in either one of the two breast cancer susceptibility genes — BRCA1 and BRCA2.

