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ORIGINAL ARTICLE

Added Value of Magnetic Resonant Imaging In Differentiating Indeterminate Intra-ductal Breast lesions detected by Ultrasound

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ABSTRACT

Background: Ductal disease is a significant, frequently missed & poorly understood problem in breast imaging that causes delays in diagnosis and patient management. The most common reported symptom among ductal lesions is pathological nipple discharge.

Objective: The study aimed to find out the accuracy of MRI in the evaluation of Indeterminate intra ductal breast lesions (BIRADS 3, 4 and 5) using pathological examination as the golden standard.

Methods: Thirty female patients were subjected to this prospective cross-sectional study; they were referred to the radio diagnosis department from the surgery department in our hospital. All patients have a full clinical examination, ultrasound evaluation, pre and post-contrast dynamic MRI, and pathological evaluation.

Results: There was a remarkable variation ($p<0.05$) between benign and malignant lesions regarding size, margin, and shape. There was a highly significant variation ($p<0.001$) between malignant and benign lesions regarding MRI features of intra-ductal lesions **(**pattern of enhancement, dynamically enhanced curve, Diffusion weighted imaging (DWI), and MRI criteria). Concerning the validity of MRI in the diagnosis of the malignant intraductal lesion, where, sensitivity was 100%, specificity (89.5%), positive predictive value (84.6%), negative predictive value (100%), and accuracy (93.33%).

Conclusions: The present findings revealed that dynamic contrast enhanced MRI (DCE-MRI) and DWI-MRI have a significant accuracy in predicting the upgrade risk of US indeterminate intra ductal breast lesions, and it can decrease overtreatment and misdiagnosis.

Keywords: DCE-MRI; DWI-MRI; intra-ductal lesion; MRI**.**

INTRODUCTION

Ductal disease is a significant, frequently missed & poorly understood problem in breast imaging that causes delaying in diagnosis and patient management[1]. Benign ductal lesions include duct ectasia, inflammatory changes, fibrocystic changes, intraductal papilloma, and papillomatosis. Invasive ductal carcinoma and ductal carcinoma in situ are two types of malignant ductal lesions. Patients with ductal lesions can present with a variety of symptoms, the most common reported symptom is pathological nipple discharge [2].

With a prevalence of 4.8-7.4 percent, nipple discharge is regarded as the third most frequent complaint after breast pain and breast lump , Nearly 80% of women with pathologic nipple discharge have a benign condition, most commonly papilloma (35–56%) or benign duct ectasia (6–59%), while it can also be a sign of an underlying malignancy (5–23%) such as invasive ductal carcinoma or ductal carcinoma in situ [3].

MRI can be used in conjunction with breast imaging to enhance sensitivity, particularly in patients for whom the status of breast lesions is yet unknown. According to the cited literature**[**4**]**, MRI can distinguish between the causes of nipple discharge and exhibits a high sensitivity value in diagnosing ductal illness. Nipple discharge should therefore be taken into account as a reliable reason to undergo an MRI, especially when other modalities are normal **[**4**].**
MRI is more accurate than ultrasound and mammography for assessing the intraductal component, displaying multifocality, and invasive tumor size [5].
Diffusion-weighted MRI (DWI-MRI) is a sophisticated MRI method that was developed in the middle of the 1980s. It can outline the microscopic anatomy of the targeted organ or tissue and allows for the non-invasive mapping of in vivo water diffusion processes. In comparison to standard MRI, it is more sensitive and specific in identifying worrisome breast illness at a minimum size of 1 cm [6].
To increase specificity and prevent unnecessary biopsies in benign enhancing breast lesions, DWI is a critical addition to the standard breast MRI technique and is now frequently used. [7].
ADC values from breast lesions can be used to provide numerical data, which allows for a more precise prediction of the lesions' likelihood of being malignant before histological sampling, which is a significant benefit of DWI [8].
To clear out inspissated secretion and intraductal mass lesion, particularly in younger females, MRI might add additional reasons for pathologic nipple discharge. This is necessary to maintain the duct system and to distinguish between benign lesions and cancer[9].
The study aimed to find out the accuracy of MRI in the discriminating indeterminate Intra ductal breast lesions detected by US (BIRADS 3, 4& 5) using pathological examination as the golden standard.

METHODS

This prospective cross-sectional study was done between March 2021 and March 2022. Thirty female patients were subjected to the stud. They were referred to the radio diagnosis department from the surgery department in our hospital. Written informed consent was obtained from all participants and the study was approved by IRB unite of Faculty of Medicine , Zagazig University (#6829, 25-3-2021). The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans. All cases have a full clinical assessment, ultrasound examination, pathological analysis, conventional MRI and post-contrast dynamic MRI.
We included patients with suspected intra ductal breast lesions (BIRADS 3, 4 & 5) on basis of clinical & US evaluation and are willing to complete the study, we excluded the Patients who are unwilling to complete the study and patients with any contraindications to MRI and patients with severe renal impairment.

Ultrasound examination*:*

All patients were examined by breast ultrasound examination using a superficial probe (frequency5-12 MHz) at ultrasound system of (Logiq S7 expert, Logic3 expert, and Toshiba sonolayer SSA-270A)**,** with the patient's arms lifted above their heads, an ultrasound of both breasts was done, with each breast being scanned in transverse and sagittal alignment. The inner and outer breast parts were examined in supine and oblique positions, respectively.

MRI Technique :

Breast MRI was conducted on all cases using 1.5 Tesla equipment (Siemens, Aera 1.5 Tesla). Dedicated breast coils were used to inspect each patient while they were lying in prone position.

I. ***Standard MR protocol was:*** Axial non fat saturated TIWI which was obtained by FSE with following parameters (TR 450 ms, TE 14 ms, slice thickness 3 mm, field of view (FOV) 300-360 mm and matrix was 512x512). The STIR sequence was obtained with the following parameters: (TR 7000- 9000 ms, TE 70 ms & inversion time (TI) was 150 ms, slice thickness was 3- 4 mm, (FOV) 300- 360 mm and the matrix was 512 x 512).

II. ***Dynamic study:***

All dynamic investigations were conducted in the axial plane while using pulses that were saturated in fat to suppress fat. The FLASH 3D GRE-T1W1 sequence was employed, and its parameters were as follows: TR 4-8 ms, TE 2 ms, flip angle 20-25 degrees, slice thickness 2 mm with no interslice gap, the field of view (FOV) 300-360 mm, and a matrix of 512 X 512.

A 20-second pause is taken between the pre-contrast and post-contrast studies in the dynamic study, which comprises one pre-contrast and five post-contrast series.

III. Diffusion-weighted Image:

DWI was performed before contrast injection using single-shot echo planner imaging at b values (0,300,1000 s/mm^2), TR/TE:1800/75, slice thickness:3mm with no gap, FOV 350 mm, DWI examination lasted for 2 minutes. The ADC Map was performed and the ADC value was calculated. The qualitative assessments were performed by combined analysis of tumor morphology and visual diffusion signal pattern in the DWI and ADC maps using high b value. Measurements of the apparent diffusion coefficient (ADC) provided quantitative information. The lesions that showed a high signal on high b values series with ADC value equal to or below 1x 10^{-3} mm^2 /s were considered restricted.

Standard of reference:

All of the patients had a targeted second look ultrasound after performance of MRI. Thirteen patients underwent core needle biopsy using 14 Gauge automated biopsy gun or semi-automated biopsy gun, Five underwent FNAC under an ultra sound guidance and twelve patients underwent surgery (excisional biopsy including the 7 cases with non-mass like enhancement on MRI). The outcomes of the histopathological studies had been used as the standard of reference.

STATISTICAL ANALYSIS

Data was collected and analyzed using SPSS software (IBM, Version 20.0). For characterization of quantitative data (IQR): mean, range, median, and standard deviation were used. For categorical variables: the Chi-square test was utilized. All of the tests were two-sided. As long as the probability was less than 0.05 and the significance level was less than 0.001, it was regarded as statistical significant and high statistically significant respectively.

RESULTS

This study included 30 female patients. The mean age of the patients with benign lesions was found to be 43.21 year old, most of them (78.9%) had a negative family history. On the other hand, the mean age of patients with malignant lesions was 48.09 year, the majority of malignant cases (81.8%) had a positive family history, and more than a fifth of them (27.3%) had palpable mass or mass with discharge. There was no remarkable variance ($p>0.05$) between benign and malignant lesions as regard the age of the patients, presenting data, and the affected side, while, there was a considerable difference ($p<0.05$) between benign and malignant lesions regarding the family history.

Tissue pathology was performed to all patients. .Histopathological study revealed 19 benign lesions(63.3%)and 11 malignant lesions (36.7%). Malignant lesions were; two atypical ductal hyperplasia (ADH) (6.7%) (figure 1), 7 duct carcinoma insitue (DCIS) (23.3%) (figure 2) and 2 invasive ductal carcinoma(IDC) (6.7%) (figure 3), while, the benign lesions were; 3 inflammatory ductectasia (10%), 9 ductal hyper plasia (30%) and 7 intra ductal papilloma (23.3%) (figure 4).

Depending on the correlation between US findings and histopathological results, US defined 8 true malignant ductal breast cases, 9 true benign ductal breast cases, 10 false malignant ductal breast cases and 3 false benign ductal breast cases who were missed by US , so the statistical analysis revealed a sensitivity at 72.7%, specificity (47.4 %), positive predictive value (PPV) (44.4%), negative predictive value (NPV) (81.8%), and accuracy (56.7%).

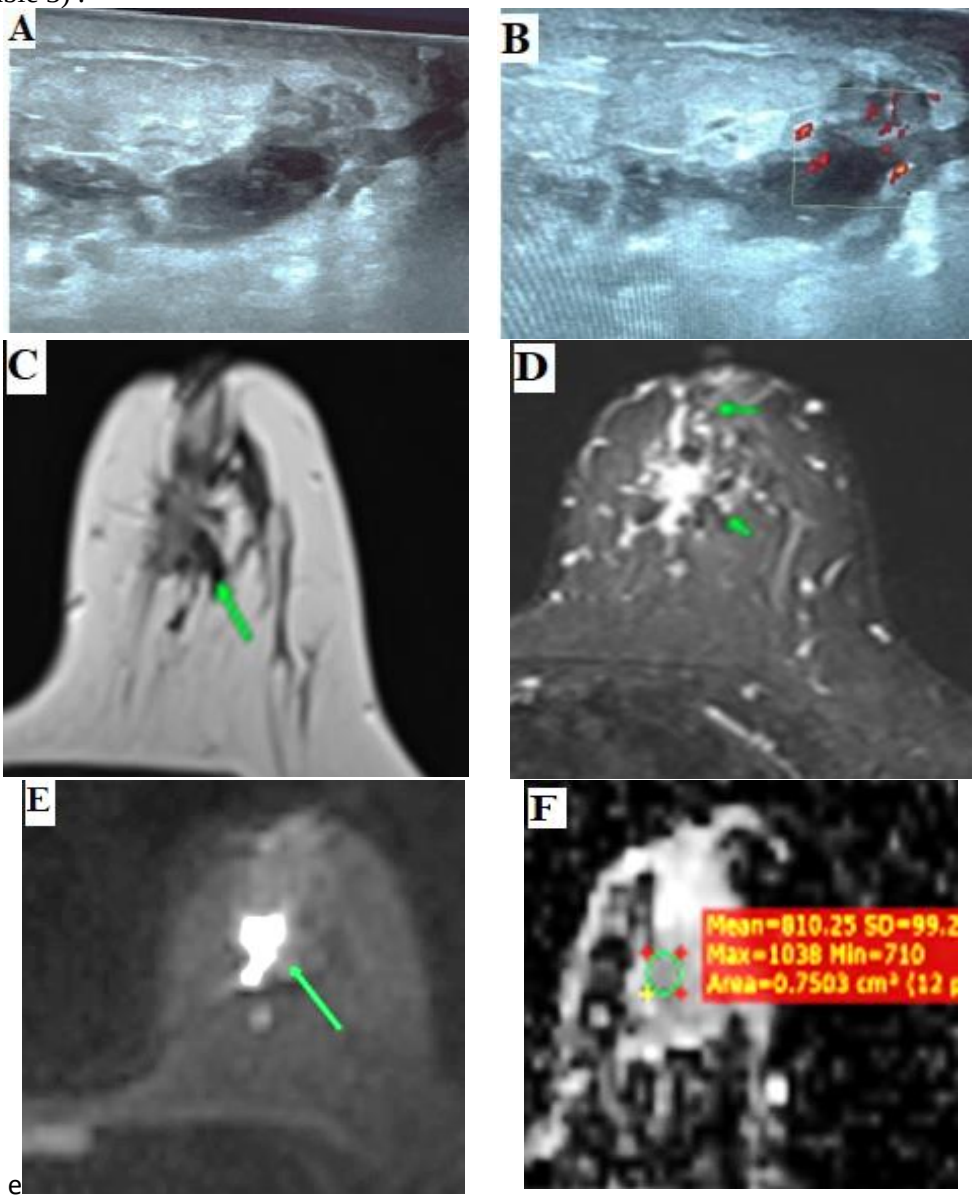
all cases with BIRADs 3 and more underwent MRI evaluation. There was a highly statistically remarkable difference ($p<0.001$) between benign and malignant lesions regarding MRI features of intra-ductal lesions (Size, margins, shape of the lesions, pattern of enhancement, dynamic curve pattern and DWI (Table 1).

According to DEC we found a highly remarkable variation ($p<0.001$) between different types of specific pathology regarding type of the dynamic curve, as we found that typ1 curve was common in inflammatory duct ectasia, type 2 curve was common in ductal hyperplasia & IDP and type 3 curve was common in malignant ductal breast lesions DCIS&IDC (table 3).

Concerning DWI and ADC value, the mean ADC value of benign ductal breast lesion was (1.34x10-3 mm2/s ±0.33 SD), while the mean

ADC value of malignant ductal breast lesions was (0.69x10-3 mm2/s ±0.24 SD). We found that 100% of inflammatory duct ectasia, 77.8% of intra ductal hyperplasia, 57.1% of IDP and 50% of ADH showed high ADC values with facilitated diffusion. While 85.7% of DCIS and all IDC showed low ADC values with restricted diffusion. There was statically significant difference between benign and malignant intra ductal breast lesions (P <0.05) at a cut off 1x10-3mm2/s (table 3) .

The morphologic and kinetic features of findings were described by using the BI-RADS lexicon to differentiate benign from malignant ductal breast lesions and we found that there was a highly significant variation (p<0.001) between specific pathology types regarding ACR BI-RADS MRI lexicon with a sensitivity up to 100%, specificity (89.5%), PPV (84.6%), NPV (100%), and accuracy (93.33%) (Table 3).



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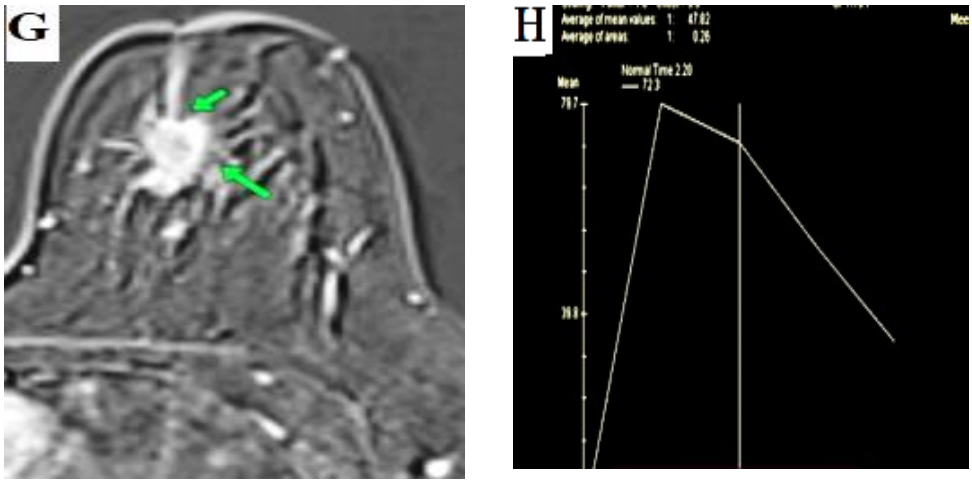
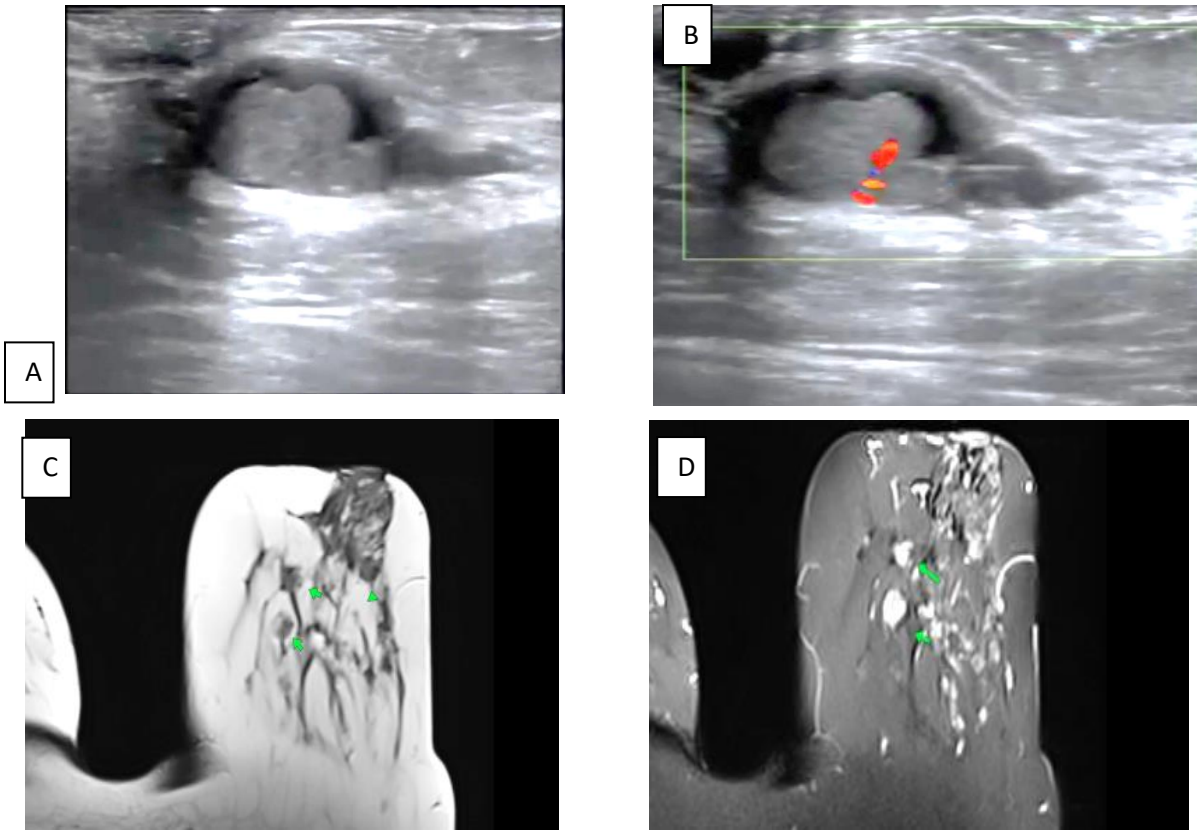
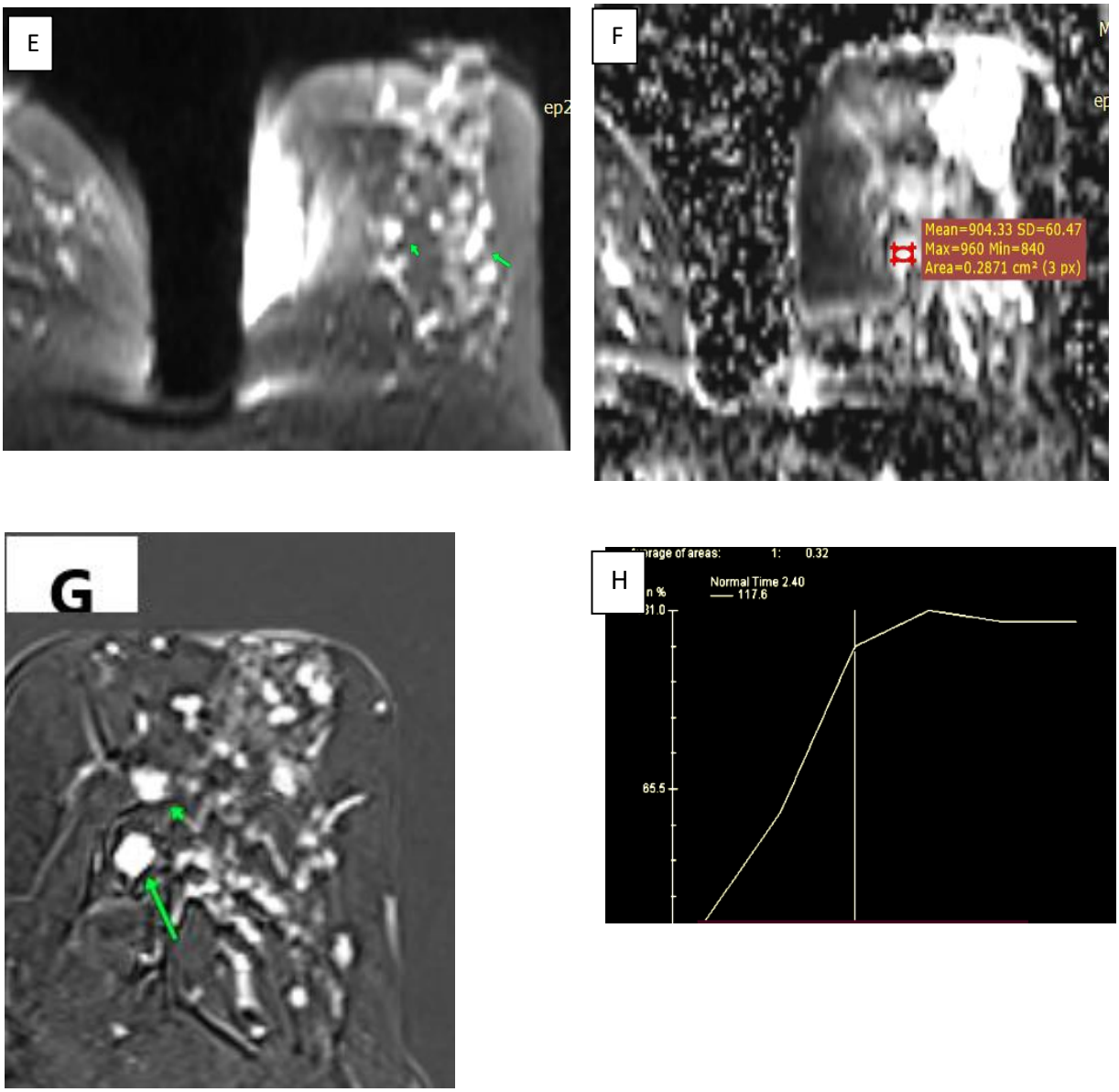


Case 1.

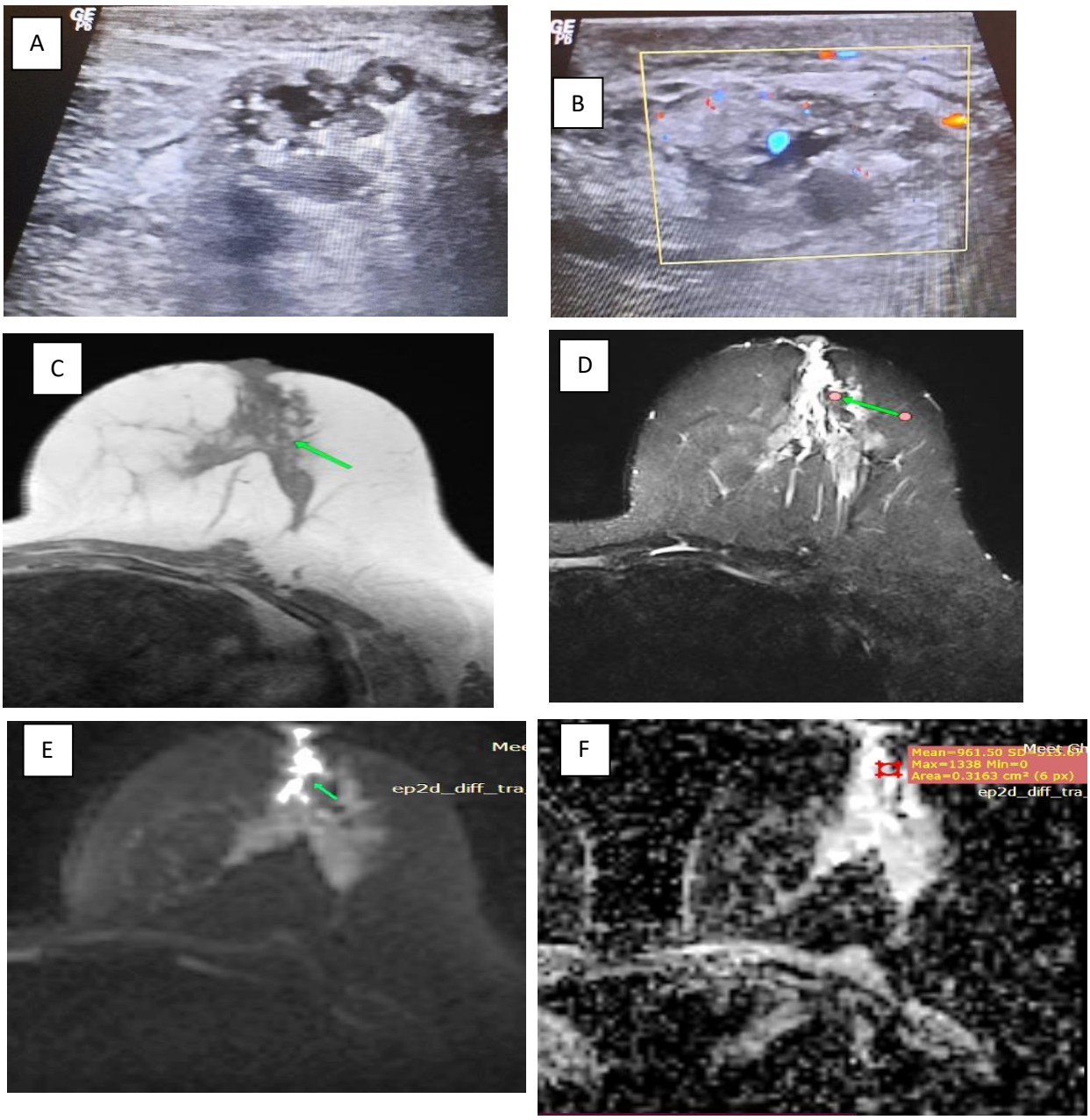
Figure (1): (A) U/S of the left breast reveals intra ductal irregular, infiltrating, hypoechoic soft tissue lesion extending along the dilated duct. (B) Doppler US shows internal vascularity by BIRADS 4c. (C) Axial T2 MRI shows iso intense signal of speculated irregular mass. (D) The detected lesion is bright on STIR. (E & F) DWI and corresponding ADC map show restricted diffusion with ADC Value ($0.810x10^{-3}$ mm^2 /S). (G& H) Axial post contrast subtracted T1WI reveals enhanced duct with ring enhancement of the mass and Type III dynamic curve (BIRADS 5) . Histopathological result was ***invasive ductal carcinoma*** which is concordant with US & MRI BIRADS.

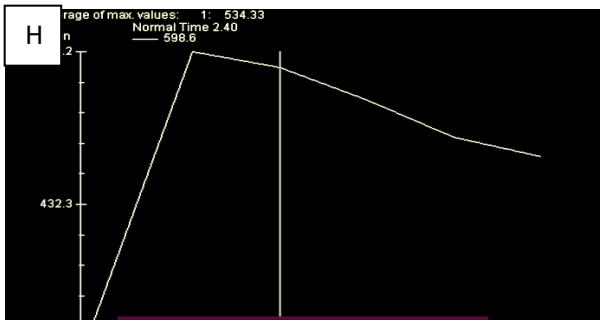




Case 2

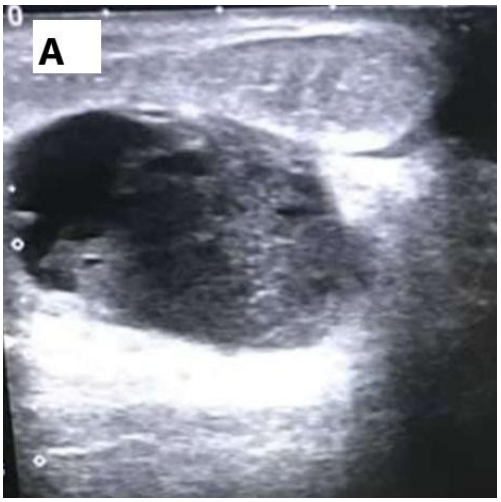
Figure (2): (A) U/S shows irregular intra ductal iso to hyperechoic soft tissue lesion. (B) Doppler US shows internal vascularity (BIRADS 4a) (C) Axial T2WI shows retro areolar irregular nodule of low signal intensity (D) Bright signal on STIR.. (E& F) DWI and corresponding ADC map of nodule show restricted diffusion with ADC value ($0.904x10^{-3}$ mm^2 /S). (G& H) Axial post contrast subtracted T1WI revealed: irregular homogenous enhanced nodule, with Type II dynamic curve (BIRADS 4). Histopathological result was ***intra ductal Papilloma with atypia, which is*** concordant with US & MRI BIRADS.

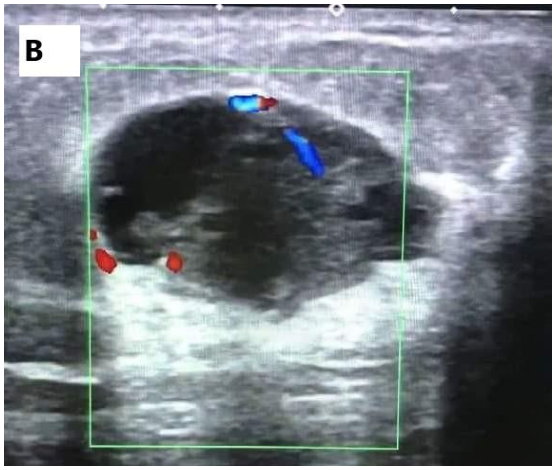

A
B
C
D
E
ep2d_diff_tra
F
Mean=961.50
Max=1338 Min=0
Area=0.3163 cm² (6 px)
ep2d_diff_tra

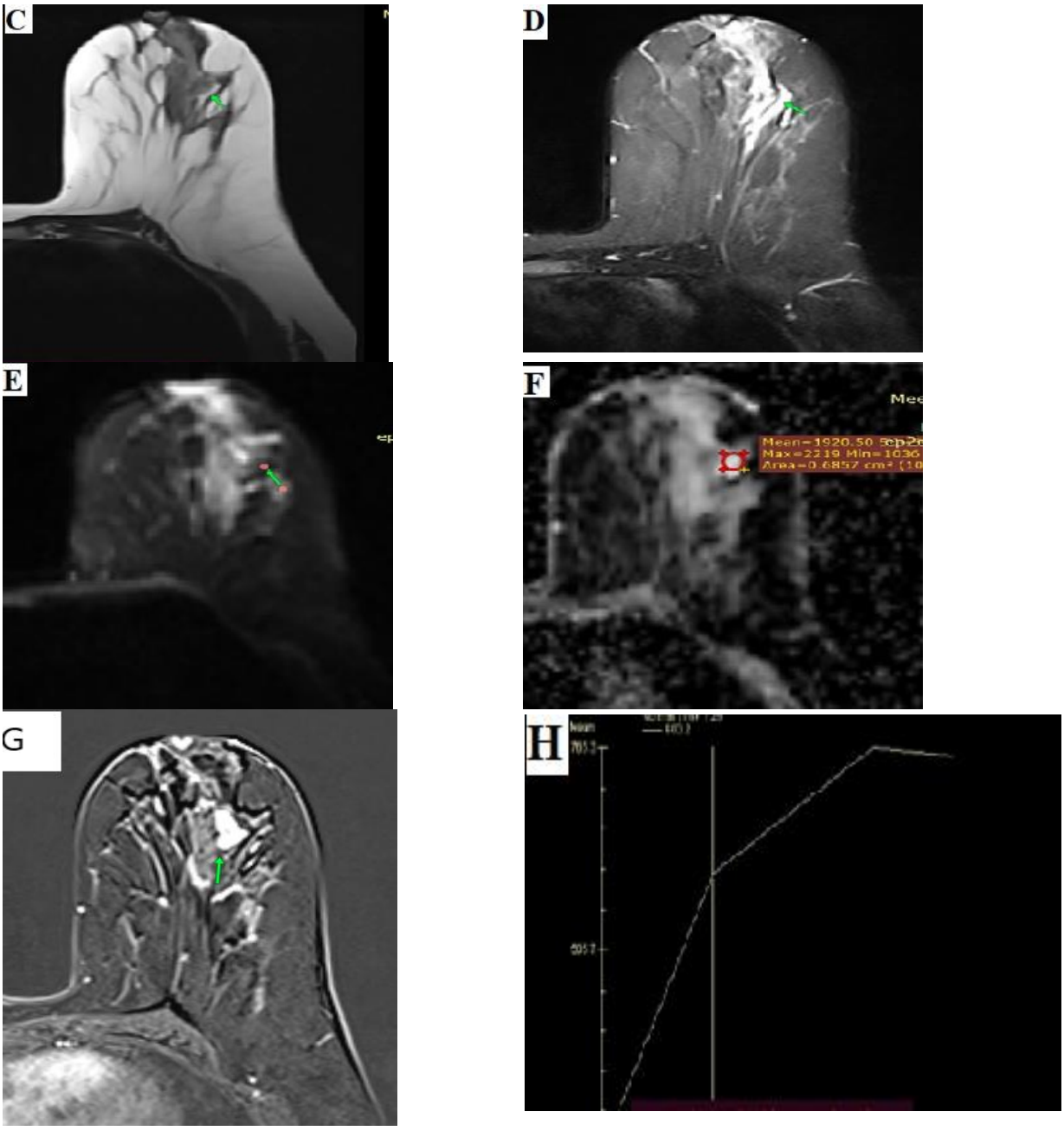


Case 3

Figure (3): (A) U/S shows retro areolar irregular intra ductal iso-echoic soft tissue lesion with internal micro calcifications. (B) Doppler US shows internal vascularity (BIRADS 4c). (C) Axial T2 WI shows left retro areolar low signal branching duct. (D) Axial Fat suppressed series reveals bright signal. (E &F) DWI and corresponding ADC map show restricted diffusion with ADC Value ($0.961x10^{-3}$ mm^2 /S) (G & H) Axial post contrast subtracted T1WI reveals ductal enhancement with periductal enhanced nodule and Type III dynamic curve (BI-RADS 5). Histopathological result was ***high grade DCIS*** which is concordant with MRI BIRADS.







Case 4

Figure (4): (A) U/S shows retro areolar ductal dilatation with irregular hypoechoic intraductal soft tissue lesion (B) Doppler US reveals internal vascularity (BIRADS 4a). (C) Axial T2 WI shows Left retro areolar dilated duct with low signal intraductal soft tissue lesion. (D) Axial Fat suppressed series reveals Bright signal. (E &F) DWI and corresponding ADC map show facilitated diffusion with ADC Value ($1.9x10^{-3}$ mm^2 /S). (G&H) Axial post contrast subtracted T1WI reveals retro areolar ductal dilatation with homogenous oblong shaped enhanced nodule and Type I dynamic curve**.** MRI BI-RADS 2. Histopathological revealed ***intra ductal papilloma*** which was concordant with MRI BIRADs.

Table (1): MRI features of intra-ductal lesions.

Variables	Type of lesions		Test of significance	P value
	Benign n= 19	Malignant n= 11		
Size (cm^2)				
Mean± SD Median (range)	0.72±0.50 0.65 (0.20-2)	4.92±4.99 2 (0.30-15)	MW=-2.916	0.004**
Margin				
ill-defined	1 (5.3%)	8 (72.7)	χ^2 =17.030	0 .001**
Well defined	12 (63.2%)	1 (9.1%)		
Irregular	3 (15.8%)	2 (18.2%)		
No overlaying mass	3 (15.8%)	0 (0.0%)		
Shape				
Elongated	0 (0.0%)	3 (27.3%)	χ^2 =17.697	0.007 **
Oval	4 (21.1%)	0 (0.0%)		
Speculated	0 (0.0%)	4 (36.4%)		
lobulated	2 (10.5%)	1 (9.1%)		
Rounded	6 (31.6%)	1 (9.1%)		
Irregular	4 (21.1%)	2 (18.2%)		
No overlaying mass	3 (15.8%)	0 (0.0%)		
Pattern of enhancement in post contrast series				
Dilated ducts with progressive ductal wall enhancement	3 (15.8%)	0 (0.0%)	χ^2 = 18.773	0.002**
Homogenous nodule	12 (63.15%)	2 (18.2%)		
Homogenous mass	4 (21%)	0 (0.0%)		
Heterogenous mass	0 (0.0%)	2 (18.2%)		
Non mass ductal	1 (5.3%)	6 (54.5%)		
Non mass regional	0 (0.0)	1 (9.1%)		
Dynamic Enhanced Curve				
Type I curve	8(42.1%)	0 (0.0%)	χ^2 =17.368	<0.001**
Type II curve	11 (57.9%)	4(36.4%)		
Type III Curve	0 (0.0%)	7 (63.6%)		
DWI				
Restricted	5 (26.3%)	9 (81.8%)	FET	0.007**
Facilitated	14 (73.7%)	2 (18.2%)		

t=student t- test, χ^2=Chi-Square test, FET= Fischer exact test, NS= statistically non-significant (p>0.05), *= statistically significant (p<0.05), **= statistically highly significant (p<0.001), Parameters described as mean ± SD, Median (range), number and percentage

Table (2): Association between Pattern of enhancement in post contrast series, and specific pathology.

Variables (Pattern of enhancement of intra ductal breast lesions)	Specific pathology						χ^2 (P- value)
	Inflammatory	Intraductal hyperplasia	Intraductal papilloma	Atypical hyperplasia	DCIS	IDC	
Dilated ducts with progressive ductal wall enhancement	3 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	χ^2 =68
Homogenous nodule	0 (0.0%)	9 (100.0%)	4 (57.1%)	1 (50.0%)	1 (14.3%)	0 (0.0%)	(<0.001**)
Homogenous mass	0 (0.0%)	0 (0.0%)	3 (42.9%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Heterogenous mass	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (28.6%)	0 (0.0%)	
Non mass ductal	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	3 (42.9%)	2 (100.0%)	
Non mass regional	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (14.3%)	0 (0.0%)	

χ^2= Chi-Square test, **= statistically highly significant (p<0.001), Parameters described as number and percentage

Table (3): Association between Diffusion weighted image, Dynamic Enhanced Curve, ACR BI-RADS MRI lexicon and specific pathology.

	Specified pathology						χ^2 (P- value)
	Inflammatory	Intra ductal Hyperplasia	Intra ductal papilloma	Atypical Ductal Hyperplasia	DCIS	IDC	
DEC							
Type 1	3(100%)	2(22.2%)	3(42.9%)	0(0.0%)	0(0.0%)	0(0.0%)	
Type 2	0(0.0%)	7(77.8%)	4(57.1%)	1(50%)	3(42.9%)	0(0.0%)	χ^2 =32.2 <.001**
Type 3	0(0.0%)	0(0.0%)	0(0.0%)	1(50%)	4(57.1%)	2(100%)	
DWI							
Facilitated	3(%100)	7(77.8%)	4(57.1%)	1(50%)	1(14.3%)	0(0.0%)	
Restricted	0(0.0%)	2(22.2%)	3(42.9)	1(50%)	6(85.7%)	2(100%)	11.4 <0.04 *
BI-RADS MRI							
BI-RADS I	3(%100)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	χ^2 =64.6 (<0.001**)
BI-RADS II	0(0.0%)	2(22.2%)	3(42.9%)	0(0.0%)	0(0.0%)	0(0.0%)	
BI-RADS III	0(0.0%)	6(66.7%)	3(42.9%)	0(0.0%)	0(0.0%)	0(0.0%)	
BI-RADS IV	0(0.0%)	1(11.1%)	1(14.3%)	2(100%)	3(42.9%)	0(0.0%)	
BI-RADS V	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	4(57.1)	2(100%)	

χ^2= Chi-Square test, **= statistically highly significant (p<0.001), Parameters described as number and percentage

DISCUSSION

This study included 30 patients with indeterminate intraductal breast lesion by US examination including BIRADs from 3 to 5 all these cases underwent conventional and dynamic MRI examination and findings were correlated to histopathological data.

During our study; we assessed the validity of US in the diagnosis of intraductal breast lesions and found that its sensitivity was 72.7%, specificity (47.4 %), PPV (44.4%), NPV (81.8%), and accuracy (56.7%),This was in concordance with Zaky et al. who found that the ability of ultrasonography to accurately diagnose pathologic nipple discharge was 54.2% with a 31.2% PPV and an 86.7% NPV [9]. Also, Wang et al. study revealed a sensitivity at 75%and a specificity at 66.7% in diagnosing intraductal breast lesion with ultrasonography [10].

In the present study, we found an obvious variation between malignant and benign ~~Intra~~intraductal breast lesions regarding MRI morphological criteria (shape and margin) and more significant with the margin of lesion ($p<0.001$). Similar to our study Zhu et al., Singh et al., and Hesham et al ., reported that speculated margin of the lesion in MRI has a high predictive value for malignancy [11,12.13].

In the present study, we found that there was a highly remarkable variation between malignant and benign intraductal breast lesions regarding their internal pattern of enhancement.

Our results were comparable to Ahluwalia et al. who found that Strong indicators of malignancy are heterogeneous increase on DCE-MRI and type III curve [14].

In our study we found that type II plateau curve was seen in 11 (57.6%) of benign lesions and 4 (36.4%) of malignant lesions. We found that There was high statistically significant difference between malignant and benign Intra ductal breast lesions regarding time signal intensity curve ($p<0.001$). other studies by Dawoud et al., and Ebrahim et al. agreed with us as they reported that type III curves are more likely to be associated with malignant lesions, persistent curves with benign lesions and plateau curves may be associated with malignant or benign lesions [15,16**].**

Yılmaz et al., reported that most of Intraductal papilloma displayed oval well-circumscribed smooth marginated nodules within dilated ducts in DCE MRI [17]. Daniel et al. reported 7 of 11 enhanced IDP (63.6%) showed a plateau curve [18]. In agreement with them, in our study 57.1% of IDP showed homogenous enhanced nodules and type II platue curve also 42.9% showing benign type 1 Curve.

Liberman et al., reported that the differential diagnosis of ductal enhancement was DCIS & ADH [19] also, Heller et al. found that the most common imaging findings of ADH in DCE MRI were non mass enhancement [20]. In consistence with them, 50% of atypical ductal hyperplasia (ADH) in our study displayed ill-defined homogenous nodule, 50% displayed ductal enhancement, 50% showed a type II curve and 50% showed type III washout curve. However, we reported only two cases of ADH which needs more studies to confirm these ratios.

Tajima et al. reported that the most common pattern of enhancement in DCIS is a non-mass enhancement (segmental, ductal, focal, and diffuse enhancement). In 60–81 percent of patients, high-grade DCIS frequently appears as patches of non-mass enhancement with an irregular internal pattern and segmental distribution [21]. In our study; 57.2% of DCIS displayed non mass enhancement in DCE MRI, while 28.6% showed heterogenous mass enhancement and 14.3 % appeared as a homogenous nodule. And regarding the dynamic curve; 43% showed type II curve and 57% showed type III washout curve.

Regarding our study we detected that all invasive ductal carcinoma (IDC) showed non mass enhancement (%100) and all showing a type III wash-out curve, Yoon et al., in his study found that non mass enhancement lesions with clumped or clustered ring enhancement were more frequent in the invasive ductal carcinoma than in DCIS [22]. Hegazy et al., found that invasive duct carcinoma mostly shows type III dynamic curve [24].

In our study, there was statistically significant difference between malignant and benign intraductal breast lesions regarding diffusivity ($p<0.05$), we found that 73.7% of benign breast lesions showed facilitated diffusion while 81.8%

of malignant breast lesions showed restricted diffusion .

In the same line with us Mousa et al., reported that 89.47 % of the benign breast lesions showed facilitated diffusion, while 90% of malignant lesions showed restricted diffusion [26].

Regarding the ADC value, we detected that the mean ADC value of benign ductal breast lesion was ($1.34x10^{-3}$ mm^2/s ±0.33 SD), while the mean ADC value of malignant ductal breast lesions ($0.69x10^{-3}$ mm^2/s ±0.24 SD). There was a significant difference between benign and malignant ductal breast lesions regarding ADC value ($p<0.05$) using a cut off ADC value at $1x10^{-3}mm^2/s$.

Similar to us Ebrahim et al., study found that the mean ADC value of benign breast lesions was (1.23×10^{-3} mm^2/s ± 0.26 SD), while the mean ADC value of malignant Breast lesions was (0.74×10^{-3} mm^2/s ± 0.23 SD), their recommended ADC cut off value was (1.063×10^{-3} mm^2/s) and this cut off value had (96.9%) sensitivity and (66.7%) specificity [16].

Also Yang et al., study found a sharp difference between malignant and benign breast masses in terms of ADC ($p<0.05$), using a cut off ADC value at ($1.061 \times 10^{-3}mm^2/s$)[27].

We estimated the validity of MRI in the diagnosis of intra-ductal lesion during our work, where the sensitivity was 100%, specificity (89.5%), PPV (84.6%), NPV (100%), and accuracy (93.33%). Statistical comparison between benign and malignant lesions regarding US and MRI diagnostic criteria was done. There was no remarkable variation ($p>0.05$) between benign and malignant lesions regarding US diagnostic criteria. While there was a highly marked variance ($p<0.001$) between benign and malignant lesions regarding MRI diagnostic criteria.

Similar to us El moneam et al., detected that the sensitivity, specificity, PPV, NPP and accuracy of DCE MRI in detecting breast lesions were 100%, 92.3%, 94.9%, 100% and 96.8%, respectively [28]. Also, similar to our study Zaky et al. detected MRI sensitivity of 100% and specificity of 83.3%. PPV was 63.6%, NPV was 100%, and accuracy was 87.1% [9].

Our study had some limitations; small sample size (30 patients) including different pathological categories which may lead to statistical bias also absence of inter-observer variability analysis. More researches with larger number of cases and adding inter-observer analysis is recommended.

CONCLUSIONS

The present findings revealed that dynamic contrast enhanced MRI and DWI-MRI have a significant accuracy in predicting high risk intra ductal breast lesions, and it can decrease over treatment and misdiagnosis.

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