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Can Quantitative and Qualitative DWI Differentiate between Benign and Malignant Ovarian Masses?

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Abstract

Background: Pre-operative diagnosis of ovarian represents diagnostic challenge as it affects the lines of treatment and patient's prognosis. Previous studies studied the role of the Diffusion Weighted Imaging (DWI) in discrimination between benign and malignant ovarian masses with controversial results.

Aim of Study: The aim of this study was to evaluate the role of qualitative and quantitative Diffusion Weighted Imaging (DWI) in the discrimination between benign and malignant ovarian tumors.

Material and Methods: The study included 82 patients. All patients underwent MRI with a 1.5T unit. Conventional MRI both pre and post contrast. Before administration of the contrast, the DWI sequence, single shot echo planar sequence in the axial plane was done for all patients. Analysis of the MRI findings, the signal intensity on DWI and the ADC value for solid and cystic components was done for all lesions.

Results: For conventional MRI, the overall sensitivity, specificity, PPV, NPV and accuracy of MRI was 85.71%, 85.71%, 87.80%, 83.33% and 85.71% respectively. Hyperintense signal on DWI of the solid component was observed in 17/18 (94.4%) of malignant tumors. The restricted diffusion in the solid components had a sensitivity of 94.44%, specificity 85.71%, PPV 94.44% and NPV of 85.71% with overall accuracy of 92.% in prediction of malignancy. Using 1.2 X 10^{-3} mm^2/sec) as a cut off value between benign an malignant lesion had sensitivity 88.89%, specificity 85.71% and accuracy 88% in differentiation between benign and malignant masses.

Conclusion: Diffusion weighted imaging especially the qualitative component have high diagnostic accuracy in differentiation between benign and malignant ovarian masses and should be integrated into the pelvic MRI.

Key Words: *Malignant ovarian masses – Diffusion Weighted Imaging (DWI).*

Introduction

OVARIAN malignancy is the fourth commonest malignancy in Egypt, representing 4.5% of all female malignancies **[1]**. Malignant ovarian tumors usually present at advanced stage because early and potentially curable tumors usually asymptomatic **[2]**. To improve the 5 years survival rate of patients with malignant ovarian tumors, a diagnostic tool capable of early differentiation between benign and malignant tumors is mandatory **[3]**. Also, the pre-operative differentiation between benign and malignant masses is important in choosing treatment strategy **[4,5]**.

Transvaginal ultrasound used to be the first line modality in diagnosis of ovarian masses but it has high sensitivity and low specificity **[6-8]**. Conventional magnetic resonance imaging with and without contrast, with its high soft tissue contrast and spatial resolution had better accuracy than ultrasound in differential diagnosis of ovarian masses **[9,10]**. The presence of criteria such as papillary projections, thick septae, nodularity and presence of solid components suggest malignancy. However, still many cases can not be diagnosed reliably **[11,12]**.

In the past two decades, several studies have hypothesized that adding new MRI functional techniques such as dynamic contrast enhanced MR imaging and Diffusion Weight Imaging (DWI) would increase the accuracy of discriminating benign from malignant ovarian tumors **[13-17]**.

Diffusion weighted imaging is a functional MRI technique depends on measuring movement of the random microscopic water molecules (Brownian motion) **[18,19]**. Pathological processes that affect both intracellular and extracellular water mico-diffusivity and will be reflected on DWI **[15]**. Diseases altering cell membranes, tissue cellularity, viscosity of intracellular or extracellular water and extracellular spaces tortousity will cause changes in DWI **[20,21]**. High signal on DWI reflects re-

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stricted diffusion [22]. The quantitative counterpart of the DWI is the Apparent Diffusion Coefficient (ADC) which can be either expressed as a value or a map (ADC map). Restrictive diffusion will be expressed as low signal on ADC map and low ADC value [23,24]. Theoretically, malignant tissue have more cells, distorted extracellular space and larger nuclei resulting in restricted diffusion and low ADC value [25]. Regarding ovarian masses, there is controversy in the literature about the role of DWI and ADC value in differentiation between benign and malignant masses. Some studies found the techniques useful [16,17] and other studies reported no value of DWI in discrimination between benign and malignant ovarian tumors [13,15].

The aim of this study was to evaluate the role of qualitative and quantitative diffusion weighted imaging in the discrimination between benign and malignant ovarian tumors.

Patients and Methods

Patients: The university ethics committee reviewed our protocol and approved the study. All patients signed an informed consent. From September 2016 to May 2018, 82 female patients were prospectively enrolled in the study, the mean age of all patients was 51.52±11.31 (mean ± SD; range, 18 to 71) years. Patients were referred from the Obstetrics and Gynecology Department to Radiology Department with suspected ovarian masses by transvaginal ultrasound.

The inclusion criteria was:

1- Patients with ovarian mass (either cystic, solid or complex) by transvaginal ultrasound.

2- Patients with complete conventional MRI imaging and DWI.

3- Avaiable pathological diagnosis after surgical excision.

The exclusion criteria:

Excluded from the study patients with inflammatory masses, teratoma and endometriomas which can be diagnosed confidently by transvaginal ultrasound and conventional MRI.

MR imaging:

All patients underwent MRI with a 1.5T unit (Manufacturer: GE Medical Systems, Milwaukee, USA). The Non-contrast sequences was:

A- Axial T1 weighted TR/TE 500-600/20ms, matrix 480 X 640, FOV 32-42cm, thickness/spacing 5mm/1mm, Acquisition time 100sec.

B- Axial T2 weighted imaging parameters: TR/TE 7000-8000/80-90ms, matrix, 256 X 256, FOV 34-42cm, thickness/spacing, 5mm/2mm, Acquisition time 100sec.

C- Sagittal T2 WI: TR/TE 4500/80-90ms, matrix, 256 X 256, FOV 26-34cm, thickness/spacing, 5mm/1.5mm, Acquisition time 160sec.

D- Coronal T2 WI: TR/TE 5000/80-90ms, matrix, 256 X 256, FOV 38-42cm, thickness/spacing, 5mm/1.5mm, Acquisition time 90sec.

Post contrast axial and sagittal T1 weighted imaged: The post contrast was done after intravenous injection of Gadopentate dimeglumine in a dose of 0.1mmol/Kg. The sequences was axial 2D SPGR with the following parameters: TR/TE 4.8/2.4ms, matrix 256 X 256, FOV 34-42cm, thickness/spacing 5mm/1.5mm, Acquisition time 45sec. Post contrast sagittal T1 FSE with the following parameters: TR/TE 700/10ms, matrix 356 X 256, FOV 26-34cm, thickness/spacing 5mm/1.5mm, Acquisition time 120sec.

Diffusion weighted imaging (DWI): Before administration of the contrast, the DWI sequence, single shot echo planar sequence in the axial plane: TR/TE 7,000-10,000/80-100; slice thickness/ intersection gap, 5/1mm; FOV, 32 to 42cm; matrix, 128 X 128; b-value of 0 , 500, 1,000s/mm^2 was also applied in three orthogonal (Z, Y, and X) directions.

MRI analysis:

The non contrast and post contrast conventional MRI data and DWI data were transferred to workstation 4.2 (GE Healthcare, Milwaukee, USA).

At first, the unenhanced and contrast enhanced images were reviewed. The morphological features each lesion were recorded including the size, signal intensity, enhancing and non enhancing solid components, cystic components (hypointense signal on T1 and T2 weighted images), the presence of vegetations, thick septae and the presence of associated findings as ascites and regional lymphadenopathy.

The signal intensity on T2 were classified in comparison with the outer layer of the myometrium, The T2 signal is classified as 'Intermediate' when it is equal to the outer myometrium and classified as 'high' if it is higher the outer myometrium.

For classifying a lesion as malignant we used the criteria used by Valentini et al., [26] : Solid mass

with heterogeneous enhancement Fig. (1), cystic mass with vegetations and internal structures, thickness of the wall or septae >4mm Fig. (2), the presence of tiny amorphic calcification, the presence of necrosis, lobulations, papillary projections or tumor vessels. Also the presence of regional lymph nodes with short axis > 1 cm, and the presence of peritoneal deposits was considered as signs of malignany.

Interpretation of DWI images:

Qualitative interpretation: The signal intensity of the cystic and solid componentson DWI was classified as high, intermediate or low compared to that of regional fluid. The areas of restricted diffusion had high signal intensity on DWI and corresponding low signal on ADC map.

Quantitative interpretation: The solid component of the lesion was identified on T2 or post contrast T1 WI, the region of interest (ROI) was placed in the solid component, size ranged from 10-100mm depending on the size of the lesion. Three to five measures of ADC value was taken according to the size of the lesion and the mean was considered the final result Figs. (3-6).

Statistical analysis:

The standard reference was post-operative pathological results. The calculations using the statistical package SPSS version 13 (SPSS, Chicago, IL, USA). Chi-square was used for comparisons between groups for qualitative variables. Mann-whitney test used for quantitative variables which are not normally distributed. p-values ≤ 0.05 were considered as statistically significant.

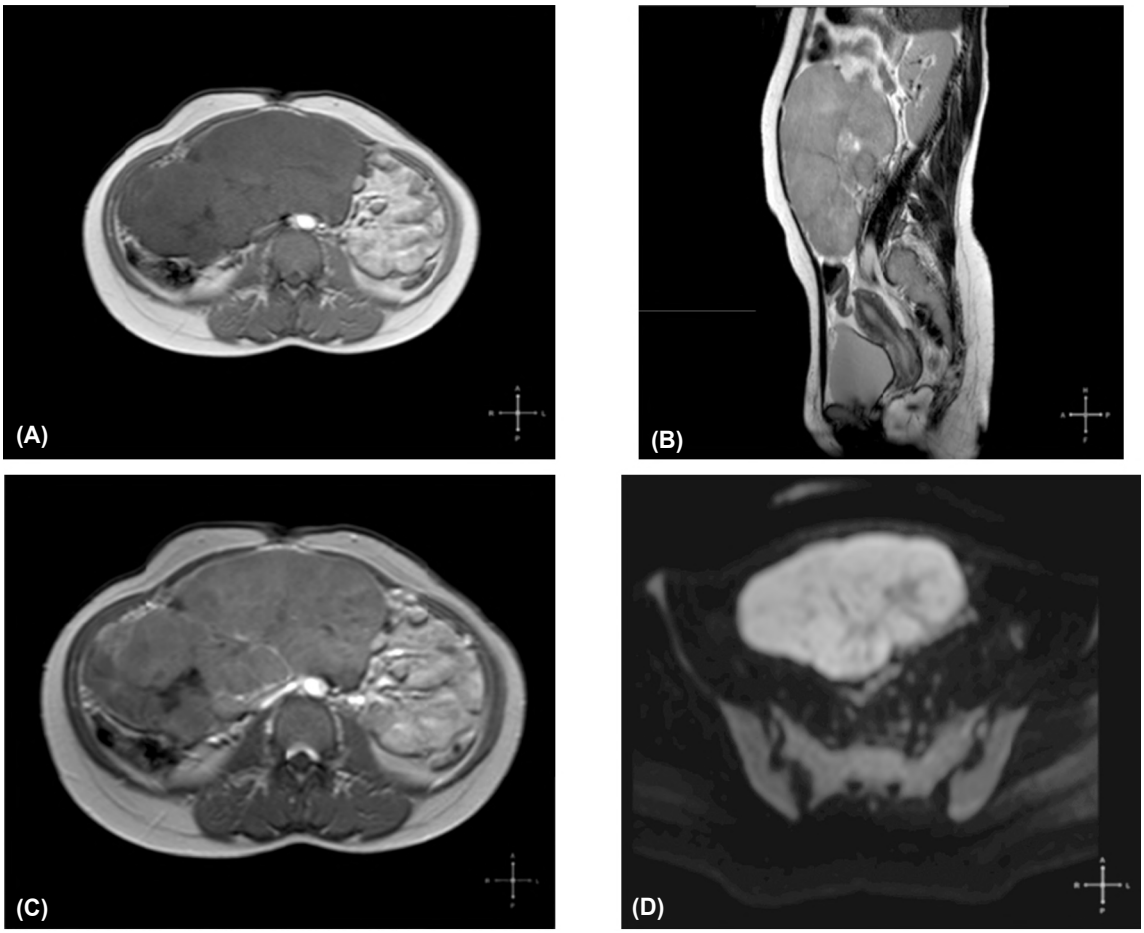

Fig. (1): Female patient aged 23 years, with large solid pelvi-abdominal mass on ultrasound. (A) Sagittal T2 WI, (B) Axial T1 WI, (C) Axial T1 post-contrast (D) DWI (b-value > 1 000sec/mm^2). The lesion shows hyperintense signal on T2, hypointense signal on T1WI, shows moderate enhancement in the post contrast study and shows restricted diffusion on DWI suggesting malignancy. The ADC value was 0.87 X 10^{-3} mm^2/s. Final diagnosis: Granulose cell tumor.

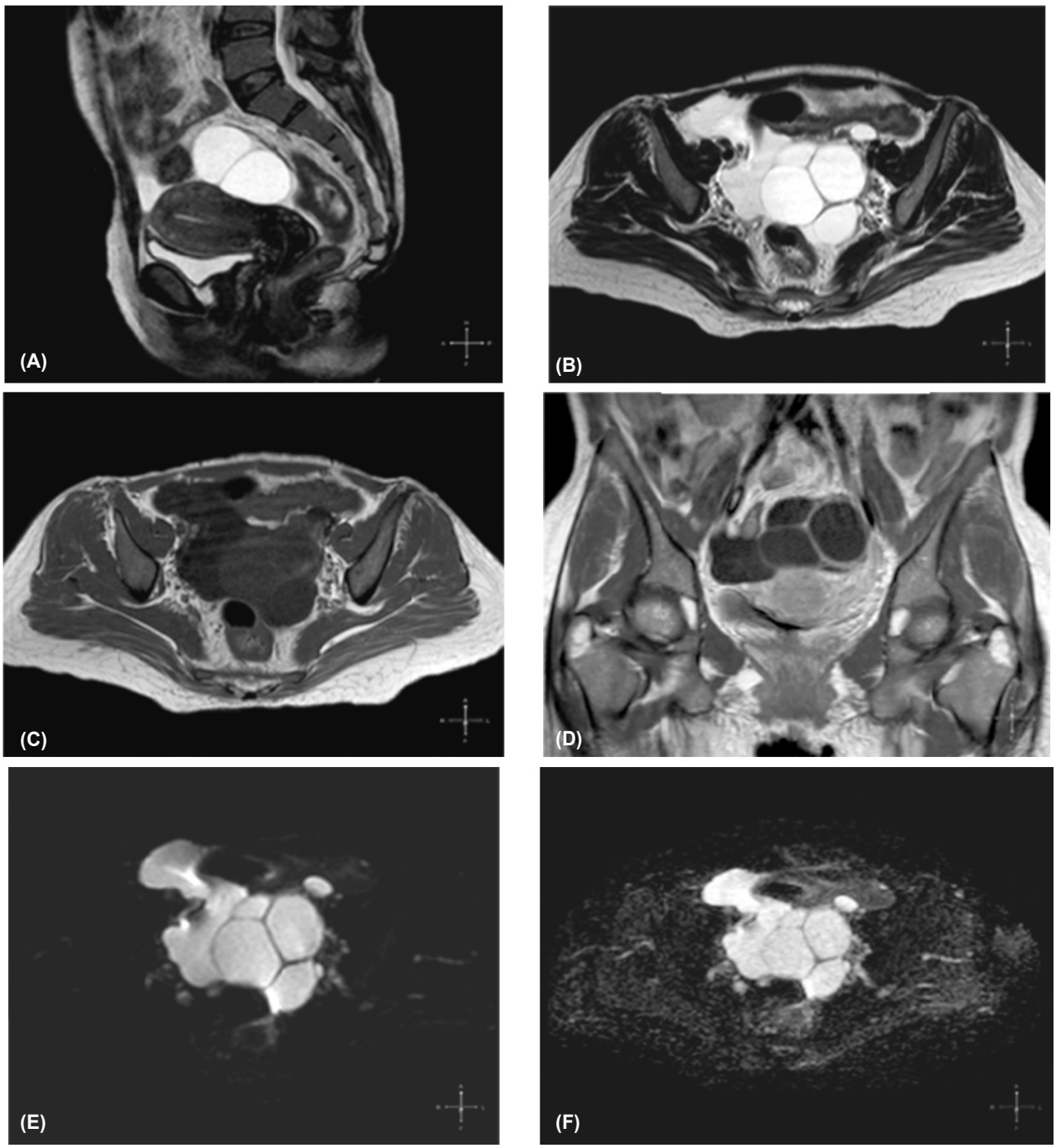

Fig. (2): Female patient aged 42 years, with large multilocular cystic lesion on ultrasound. (A) Sagittal T2 WI, (B) Axial T2 WI, (C) Axial T1 WI, (D) Axial T1 post-contrast (E) DWI (b-value= 1 000sec/mm ^{2}), (F) ADC map. A large multilocular left adnexal cystic lesion with low signal in T1, high signal in T2 (fluid signal). It shows thin septations (<3mm) which shows enhancement on the post-contrast images. Note the presence of free ascites in the axial T2 images. The lesion shows high signal on DWI and high signal of ADC map. The ADC value was 2.07 X 10 $^{-3}$ mm ^{2}/s. Final diagnosis: Serous cystadenoma.

Results

The study included 82 patients. The final diagnosis based on surgical pathological types of all patients is listed in (Table 1). The mean age of all patients was 51.52 ± 11.31 (mean ± SD; range, 18 to 71) years. Forty-eight women (58.5.3%) were premenopausal and 34 patients (41.5%) were postmenopausal. Thirty six (43.9%) of the 82 ovarian masses were benign, and 41 (50%) were malignant and 5 cases (6.1 %) were borderline.

Conventional MRI imaging:

Table (2): Show the conventional MRI characteristics among different groups. On T2 weighted images, high signal intensity in the solid component

was observed more frequently in malignant (83.3%) than benign lesions (28.4%), with statistically significant difference (p<0.001). The enhancement of the solid component was observed in 88.8% of malignant lesions and in only 14.2% of the benign lesions (p<0.01). The presence of thick septae was much more common in malignant lesions (82.9%) than in benign lesions (only 6.1%) with statistically significant difference p<0.001. Also the presence of vegetations, ascites and regional lymphadenopathy was more frequent in malignant than benign lesions with significant difference (p-value <0.01, <0.001 and <0.01 respectively).

For the solid component, the presence of enhancement of solid component had higher accuracy 88% than the presence of high T2 signal intensity (77.27%). On the other hand, for the cystic components, the presence of thick septations had higher accuracy in the prediction of malignancy than the presence of vegetations [88.24% vs. 75% respectively, (Table 3)].

Table (1): Pathological diagnosis of the 82 masses encountered in the study.

Group	Pathological type	No.	%
Benign (36 patients)	Mucinous cystadenoma	8	22.2
	Serous cystadenoma	10	27.7
	Fibroma/fibro-thecoma	3	8.3
	Simple cyst	8	22.2
	Haemorrhagic cyst	7	19.45
Borderline (5 patients)	Mucinous cystadenoma	3	60
	Serous cystadenoma	2	40
Malignant (41 patients)	Undifferentiated adenocarcinoma	3	7.3
	Mucinous adenocarcinoma	12	29.2
	Serous adenocarcinoma	10	24.3
	Granulosa cell tumor	7	17.1
	Clear cell adenocarcinoma	3	7.3
	Metastatic	6	14.6

Table (2): Conventional MRI characteristics of the studied patients.

	Benign	Border line	Malignant	p-value
Signal intensity:				
• High T2	2/7 (28.4%)		15/18 (83.3%)	<0.001
Texture:				
• Solid	3 (8.3%)		6 (14.6%)	0.07
• Cystic	29 (80.5%)	5 (100%)	23 (56.1%)	
• Mixed	4 (11.1%)		12 (29.2%)	
Enhancement:				
• Enhanced solid component	1/7 (14.2%)	NA	16/18 (88.8%)	<0.01
Septations:				
• No	21/33 (63.9%)		1/35 (2.9%)	<0.001
• Hick	2/33 (6.1%)	3/5 (60%)	29/35 (82.9%)	
• Thin	10/33 (30.3%)	2/5 (40%)	5/35 (14.9%)	
Vegentations:				
• Yes	4/33 (12.1%)	4/5 (80%)	22/35 (62.9%)	<0.01
• No	29/33 (87.9%)	1/5 (20%)	13/35 (37.1%)	
Ascites:				
• Yes	3/36 (8.3%)	2/5 (40%)	25/41 (61%)	<0.001
• No	33/36 (91.7%)	3/5 (60%)	16/41 (39%)	
Regional lymphadnopathy:				
• Yes	1/36 (2.8%)	0/5	7/41 (17.1%)	<0.01
• No	35/36 (97.2%)	5/5 (100%)	34/41 (82.9%)	

Table (3): Accuracy of different conventional MRI signs in differentiation between benign and malignant ovarian masses.

MRI sign	Sensitivity	Specificity	PPV	NPV	Accuracy
High T2 signal	83.33%	50%	88.24%	40.00	77.27%
Enhanced solid component	88.89%	85.71%	94.12%	75.00%	88.00%
Thick septations	82.86%	93.94%	93.55%	83.78%	88.24%
Vegetations	62.86%	87.88%	84.62%	69.05%	75.00%
Ascites	60.98%	91.67%	89.29%	67.35%	75.23%

In general, of the 41 cases with malignant masses conventional MRI parameters correctly diagnosed 36 cases, and of the 36 benign masses, conventional MRI correctly diagnosed 30 cases. The overall sensitivity, specificity, PPV, NPV and accuracy of MRI was 85.71%, 85.71%, 87.80%, 83.33% and 85.71% respectively.

Qualitative DWI:

Hyperintense signal on DWI of the solid component was observed in 17/18 (94.4%) of malignant tumors (Table 4), and in only 1/7 (14.2%) of the benign lesions (p<0.0001). The restricted diffusion in the solid components had a sensitivity of 94.44%, specificity 85.71%, PPV 94.44% and NPV of 85.71% with overall accuracy of 92.% in prediction of malignancy (Table 5), Figs. (5,6).

On the other hand, the restricted diffusion in the cystic lesions was observed in 65.7% of malignant lesions and 33,3% of benign lesions (p-value <0.05). The restricted diffusion in the cystic lesions had a sensitivity of 65.71%, specificity 78.79%, PPV 76.67% and NPV of 68.42% with overall accuracy of 72.06% Figs. (2,3).

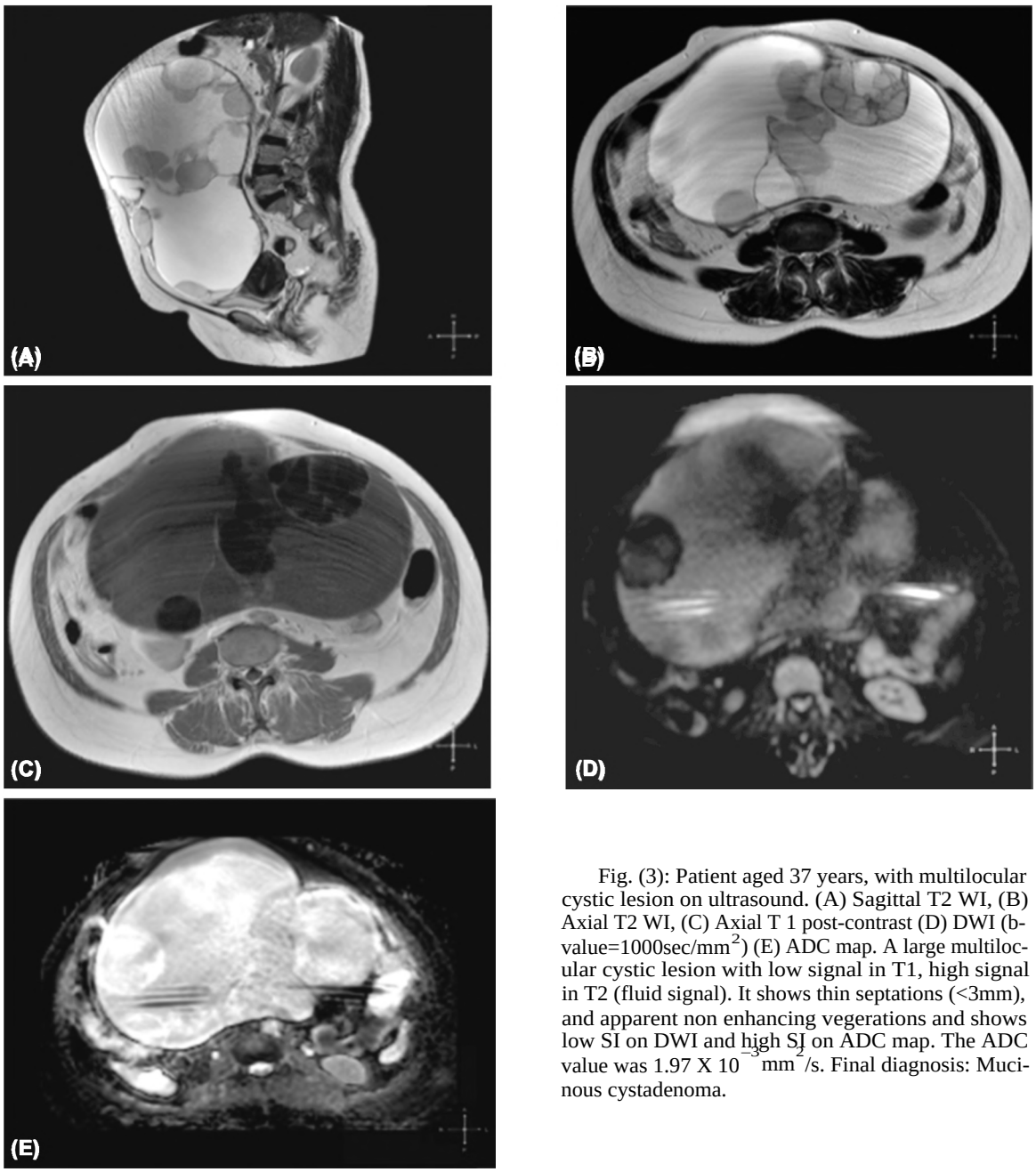

Fig. (3): Patient aged 37 years, with multilocular cystic lesion on ultrasound. (A) Sagittal T2 WI, (B) Axial T2 WI, (C) Axial T 1 post-contrast (D) DWI (b-value=1000sec/mm^2) (E) ADC map. A large multilocular cystic lesion with low signal in T1, high signal in T2 (fluid signal). It shows thin septations (<3mm), and apparent non enhancing vegerations and shows low SI on DWI and high SI on ADC map. The ADC value was 1.97 X 10^{-3} mm^2/s. Final diagnosis: Mucinous cystadenoma.

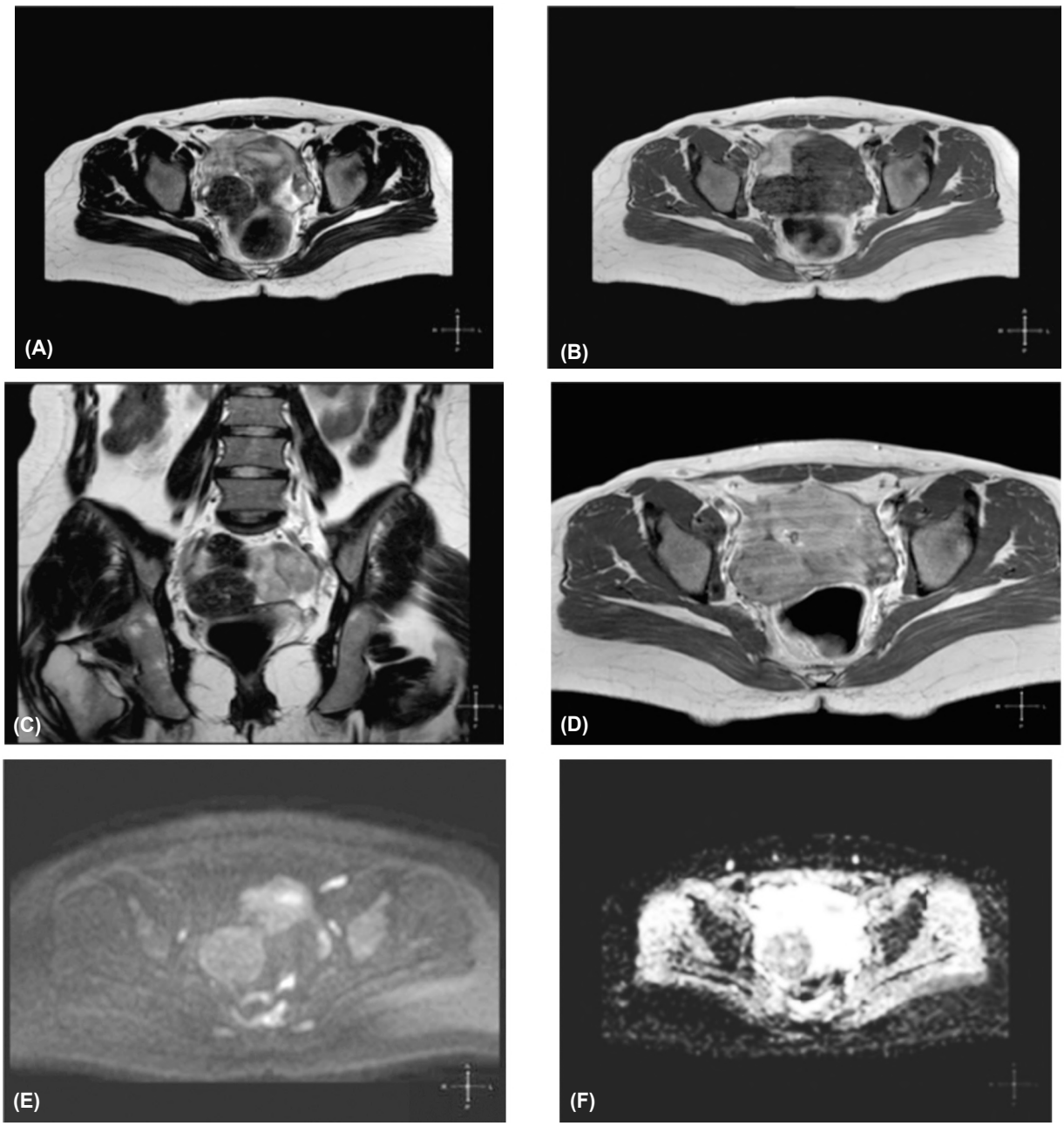

Fig. (4): Patient aged 35 years. (A) Axial T2WI, (B) Axial T1 WI, (C) Axial T1 post-contrast (D) Coronal T2WI. (E) DWI (b-value=1000sec/mm^2), (F) ADC map. a rounded right adnexal solid mass lesion related to the uterus, yet there is a line of cleavage between them. It elicits low signal intensity on T1 WI, and very low signal on T2WI. Marked enhancement of the tumor is observed on the post-contrast images. The lesion appear hypointense in DWI and hyperintense on ADC map, yet. The ADC value was 0.99 X 10^{-3} mm^2/s. Final diagnosis: Ovarian fibrothecaoma.

Quantitative DWI:

The mean ADC value in the solid component of the malignant ovarian lesions (0.97 ±0.13) was significantly lower than that of benign masses (1.52±0.65), with statistically significant difference (p=<0.001). Using 1.2 X 10^{-3} mm^2/sec) as a cut off value between benign an malignant lesion had sensitivity 88.89%, specificity 85.71% and accuracy 88% in differentiation between benign and malignant masses.

The mean ADC value in the cystic component of the malignant ovarian lesions (1.59 ±0.99 X 10^{-3} mm^2/sec) was significantly lower than that of benign masses (2.25 ±0.52 X 10^{-3} mm^2/sec), with statistically significant difference (p=<0.05). Using 2 X 10^{-3} mm^2/sec) as a cut off value between benign an malignant lesion had sensitivity 77.14%, specificity 91.18% and accuracy 84.06% in differentiation between benign and malignant lesions (Tables 4,5).

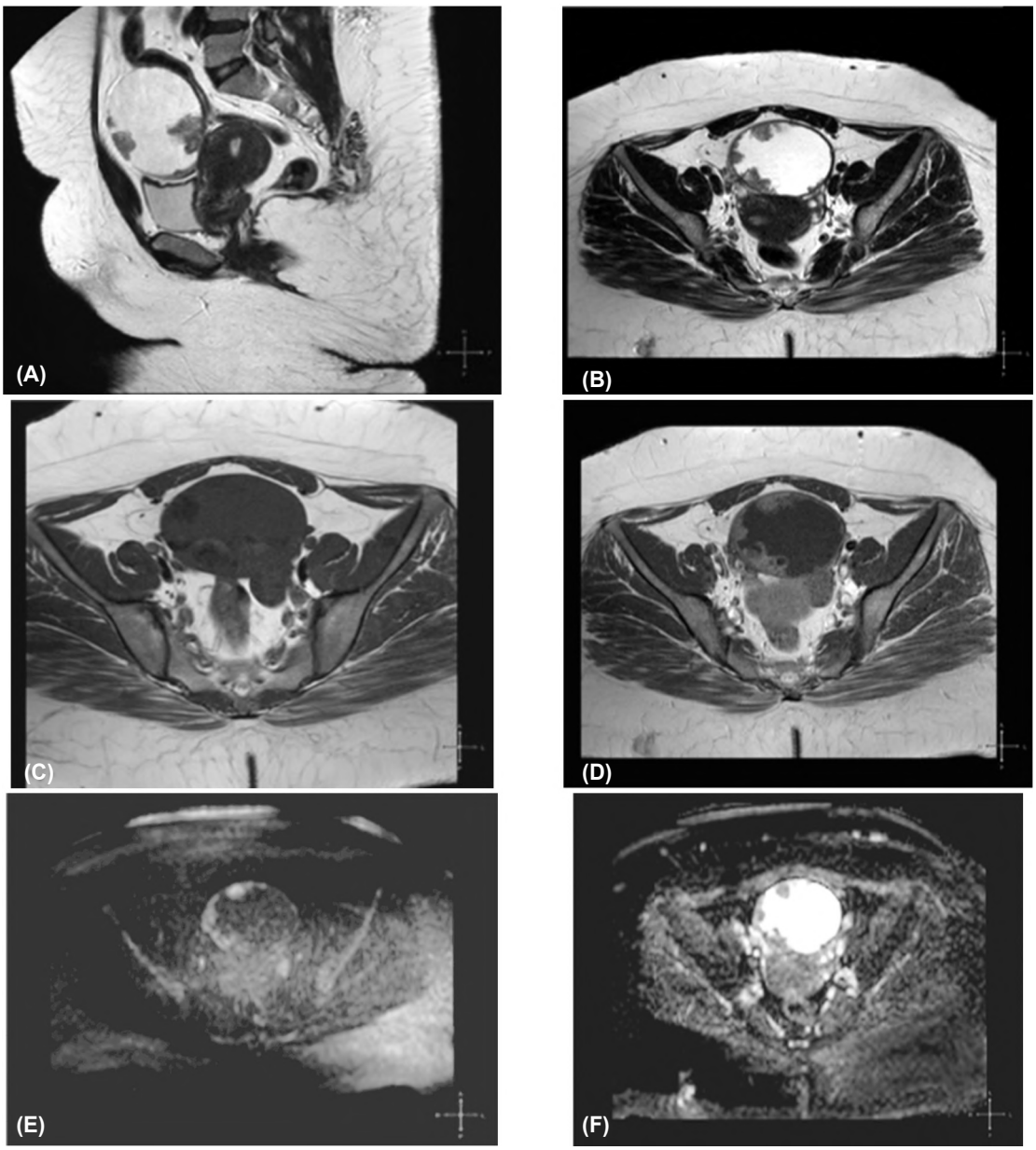

Fig. (5): Patient aged 57 years. (A) Sagittal T2 WI, (B) Axial T2 WI, (C) Axial T1WI, (D) Axial T1 post-contrast (E) DWI (b-value=1000sec/mm^2), (F) ADC map. A complex cystic adnexal mass is seen just anterior to the uterus with multiple papillary protections. It elicits low signal intensity on T1WI, high signal on T2WI. Enhancement of the tumor vegetations is observed. The ADC value was 1.03 X 10^{-3} mm^2/s. Final diagnosis: Borderline papillary serous cystadenoma.

Table (4): DWI and ADC in benign and malignant groups.

	Benign	Border line	Malignant	*p*-value
Restricted diffusion:				
Solid component	1/7 (14.2%)			
Cystic component	7/33 (33.3%)	3/5 (60%)	17/18 (94.4%)	<0.001
			23/35 (65.7%)	<0.05
ADC value (10^{-3} mm^2/sec):				
• *Solid component:*				
Range	1.21-2.8	–	0.72-1.23	<0.01
Mean ± SD	1.52±0.65		0.97±0.13	
<1.2	1/7		16/18	
>1.2	6/7		2/18	
• *Cystic component:*				
Range	1.91-3.4	1.81-4.8	1.31-2.4	<0.05
Mean ± SD	2.25±0.52	1.92±0.65	1.59±0.99	
<2	3/33	1/5	27/35	
>2	31/33	4/5	8/35	

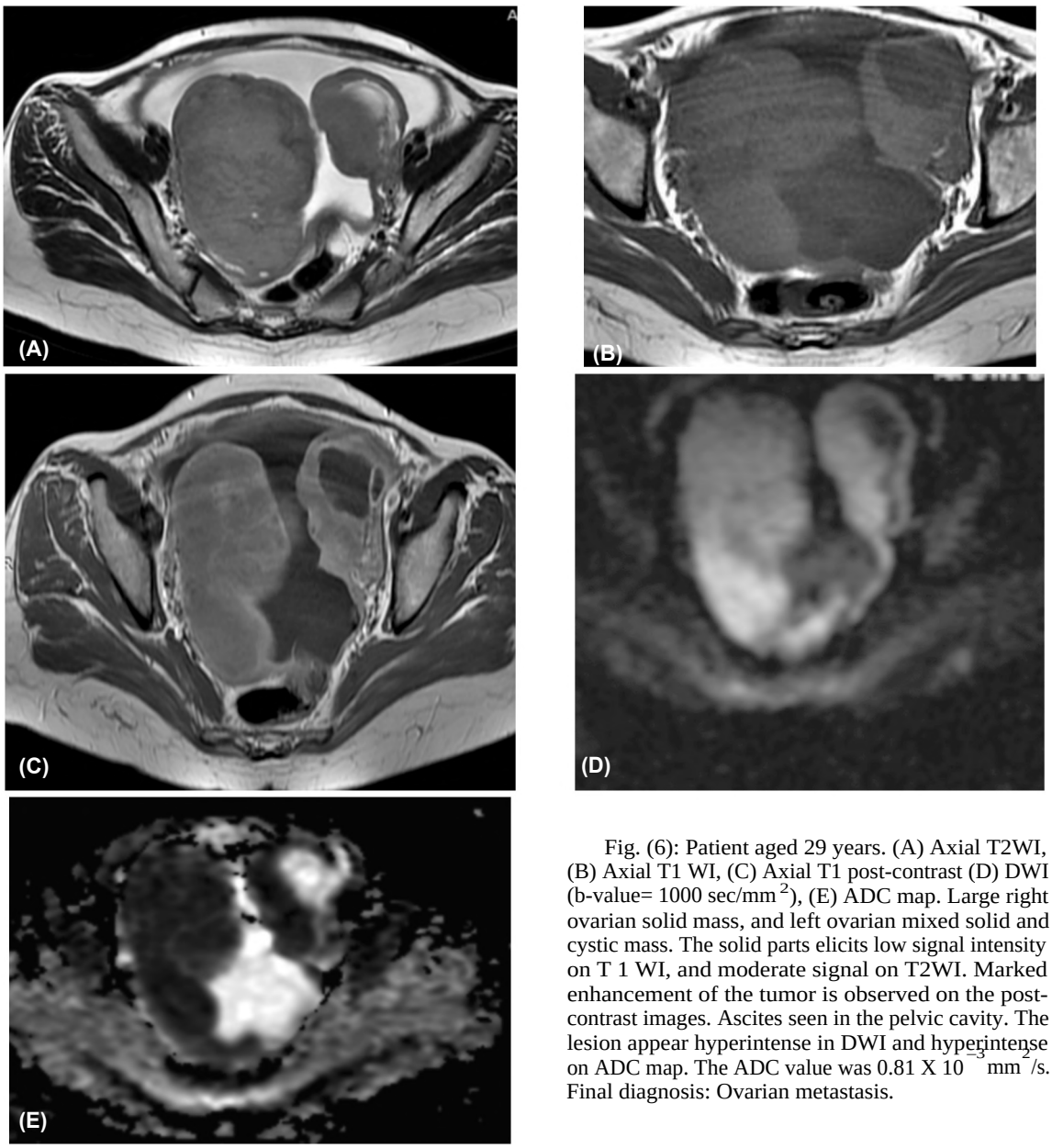

Fig. (6): Patient aged 29 years. (A) Axial T2WI, (B) Axial T1 WI, (C) Axial T1 post-contrast (D) DWI (b-value= 1000 sec/mm ^{2}), (E) ADC map. Large right ovarian solid mass, and left ovarian mixed solid and cystic mass. The solid parts elicits low signal intensity on T 1 WI, and moderate signal on T2WI. Marked enhancement of the tumor is observed on the post-contrast images. Ascites seen in the pelvic cavity. The lesion appear hyperintense in DWI and hyperintense on ADC map. The ADC value was 0.81 X 10 $^{-3}$ mm ^{2}/s. Final diagnosis: Ovarian metastasis.

Table (5): Accuracy of DWI, ADC value and combined MRI and DWI in characterization of ovarian masses.

	Sensitivity	Specificity	PPV	NPV	Accuracy
Restricted diffusion on solid component	94.44%	85.71%	94.44%	85.71%	92.00%
Restricted diffusion in cystic component	65.71%	78.79%	76.67%	68.42%	72.06%
ADC value of solid component	88.89%	85.71%	94.12%	75.00%	88.00%
ADC of cystic component	77.14	91.18%	90.00%	79.49%	84.06%
Combined DWI and conventional MRI	95.3%	87.8%	89.3%	91.2%	92.8%

Discussion

Our results demonstrate that the integration of qualitative and quantitative DWI into the routine magnetic resonance imaging can differentiate between the benign and malignant ovarian masses and improve the diagnostic accuracy of pelvic MRI.

Ovarian cancer affects women of different age groups, and it is one of the most fatal cancers unless early discovered. Unfortunately, most patients are diagnosed at advanced stage. Theoretically, the application of new techniques for reliable differentiation between the benign and malignant masses may improve the patient's survival rate and life quality.

Previous studies reported considerable overlap between the benign and malignant ovarian masses in conventional MRI parameters, including thick septae (>3mm), presence of solid components and presence of enhancement parts [13,15,27]. In the current study, the conventional MRI parameters showed statistically significant difference between the benign and malignant groups, but there was overlap in the differentiating parameters as 14.2% of benign masses had enhancing components, and 28.4% of the benign masses with solid parts had high T2 signal intensity. The overall accuracy of MRI in differentiating between benign and malignant ovarian masses was 85.71% in the current study. Hemat et al., [28] reported overall accuracy of MRI of 84% similar to current study. Based on morphological MRI criteria, Emad Eldein et al., [29] reported sensitivity of 94.3%, and accuracy of 92.3% in differentiation between benign and malignant ovarian lesions, results higher than the current study.

Diffusion Weighted Imaging (DWI) is one of the functional MRI techniques, reflecting the micro-movement of water molecules. Restricted diffusion seen in conditions leading increased number of cells and decrease or distortion in the extracellular space.

In the current study, we studied the added value of quantitative and qualitative DWI in both solid and cystic components of the ovarian masses. In the current study we used ADC cut off value ≥ 1.20 X 10^{-3} mm^2/s for differentiation between benign and malignant masses. This cut off value was suggested by several previous studies as the best cut off value [13,16,17,30,31]. In the current study the mean ADC value for benign masses was 1.52 ± 0.65 X 10^{-3} mm^2/s, and for malignant masses 0.97 ± 0.13 X 10^{-3} mm^2/s (Table 4), with a statistically significant difference ($p<0.01$). Our results are close to those of Zhuang et al., [32], who reported mean ADC value for benign masses 1.49 ± 0.39 10^{-3} mm^2/s and for malignant ovarian masses 0.95 ± 0.13 with a statistically significant difference. Also, our results are in agreement with those of Ahmad et al., [33]. The reason of lower ADC value in malignant masses is due to increase number of cells, distortion of extracellular spaces and the deceased gap between cells limiting the movements of water molecules. Kim et al., [34], in a meta-analysis review of 21 studies concluded that DWI can not differentiate between benign and malignant ovarian masses. In a recent review of literature, Yaun et al., [35] in a met-analysis of 12 studies found DWI to have both moderately high specificity (86%) and sensitivity (81%). The difference between the two reviews may be due to the difference in studies included, statistical methods used, geographical factors as the study by Kim et al., [34] included studies in China.

In the current study, the high signal intensity of solid component on DWI had sensitivity of 94.44% and accuracy 92%, and the low ADC had sensitivity 88.89% and accuracy 88% in differentiation between benign and malignant masses. Meng et al., [36] in a systemic meta-analysis of 10 studies included 1159 subjects, of which 559 patients had malignant masses and 600 had benign masses and investigated the efficiency of DWI in differentiation between benign and malignant masses with pooled sensitivity 93% and pooled specificity 89%. They concluded that DWI is an excellent diagnostic tool for discrimination between the benign and malignant masses.

There was some overlap in the ADC value in the current study between the benign and malignant groups, may be due to presence of dense collagen fibers and presence of fibroblasts in the benign masses decreasing ADC value [31]. Also, malignant masses may exhibit elevated ADC value due to presence of necrosis or cystic changes [37].

The presence of high signal intensity in DWI was the single most accurate criterion for differentiation between benign and malignant masses in the current study. Our results are similar to those of Zhang et al., [31]. The high SI in the solid component is due to hypercellularity and decreased extracellular space, and on the other hand the low SI in the benign masses is due to low cellularity and high density of fibers [16,30,37].

In the current study, DWI and ADC value of the cystic component was less valuable and less accurate in differentiation between benign and malignant masse, with considerable overlap in ADC value. These findings has been observed in previous studies [15,16].

We excluded from the study endometriomas and teratomas because they can be accurately diagnosed by conventional MRI imaging sequences. Moteki et al., [38] recommended exclusion of all tumors splaying high T1 signal intensity from DWI because ADC value may decrease with increase protein concentration.

Combined DWI and conventional MRI sequences had the highest accuracy in the current study with sensitivity 95.3% and accuracy 93.1%. Our results similar to Mansour et al., [39], who reported sensitivity of combined DWI and MRI 93.3%, but

the overall accuracy in their study was less than current study (82.3%) probably because they did not exclude teratomas and endometriomas from their study.

We admit that this study has some limitations. The sample size was relatively small. We did not attempt to differentiate between malignant and border line masses as the number of cases of border line group was small. Also the exclusion of endometriomas and teratomas.

Conclusion:

Diffusion weighted imaging especially the qualitative component have high diagnostic accuracy in differentiation between benign and malignant ovarian masses and should be integrated into the pelvic MRI whenever the question is about the nature of the ovarian lesion. Interpretation of ADC value should be taken with caution, considering the overlap between the benign and malignant masses and should be correlated with conventional MRI findings.

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هل يمكن لقياس الانتشار الكمى والكيفى التمييز بين أورام المبيض الحميدة والخبيثة

المقدمة: يمثل تشخيص المبيض قبل الجراحة تحدياً تشخيصياً لأنه يؤثر على خطوط العلاج.

المواد والأساليب: شملت الدراسة 82 مريضاً. خضع جميع المرضى التصوير بالرنين المغناطيسى مع وحدة 1.5T. كما تم إجراء الرنين المغناطيسى بطريقة الانتشار DWI.

النتائج: بالنسبة للتصوير بالرنين المغناطيسى التقليدى، كانت الحساسية الشاملة والنوعية وPPV وNPV ودقة التصوير بالرنين المغناطيسى 85.71% و85.71% و87.80% و83.33% و85.71% على التوالى. كان لطريقها الانتشار فى المكونات الصلبة حساسية 94.44%، خصوصية 85.71%، 94.44 PPV% و 85.71 NPV% مع دقة إجمالية قدرها 92.% فى التنبؤ بالأورام الخبيثة.

خاتمة: التصوير بخاصية الانتشار وخاصة المكون النوعى لديه دقة تشخيص عالية فى التمييز بين الأورام المبيضة الحميدة والخبيثة ويجب دمجها فى التصوير بالرنين المغناطيسى فى الحوض.