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Technical Accuracy and Efficiency of Magnetic Resonance Imaging in Evaluation of Uterine Masses in Comparison with Ultrasound Using Histopathology as a Gold Standard

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ABSTRACT

Introduction: uterine masses represent a very common problem amongst the females. Uterine leiomyoma, adenomyosis, carcinoma of the cervix and the uterus and the endometrial pathology, which include the carcinoma and polyp are the most common of them. The Ultrasound (USG) and Magnetic Resonance Imaging (MRI) appear as significant modalities for the diagnosis of the pathologies of the uterine. Definitive characterization of the location, endometrial distortion and number of masses are important to decide on the treatment.

Aim of the study: To compare the accuracy; sensitivity and specificity of the magnetic resonance imaging and ultrasound in differentiation and characterization of the uterine masses.

Patients and Methods: An ethically approved prospective study was done upon 40 patients with suspected uterine masses at Institute of X-ray and Oncology Teaching Hospital/ Medical City- Baghdad. All included patients underwent Ultrasound (USG) and magnetic resonance imaging (MRI) and were accordingly treated surgically. Histopathology report was traced postoperatively. Data was collected and subjected to various statistical tests including Cohen's kappa.

Results: Among 40 female patients, majority were diagnosed as leiomyoma 23 (57.5%), cervical cancer 1 (2.5%), adenomyosis 12 (30%), endometrial polyp 2 (5%) and endometrial carcinoma 2 (5%). Totally 3 (7.5%) patients have been found malignant while 37 (92.5%) have been found benign. For detection of myometrial mass (leiomyoma), the sensitivity between the ultrasound and MRI is 100%, accuracy was (ultrasound: 85% and MRI: 98%). In the classification of myometrial mass (leiomyoma) location, sensitivity between the ultrasound and MRI has been 26% and 96% respectively and specificity was (ultrasound: 0 and MRI: 83%). All intramural and subserosal lesions are seen in MRI. For picking up degeneration within the leiomyoma MRI are more useful. There have been considerable differences in the diagnosis of the adenomyosis by the MRI in comparison with ultrasound with sensitivity was (MRI: 58% and ultrasound: 92%), and specificity for both was 100%, whereas accuracy was 87% for ultrasound and 98% for MRI. In the detection of the endometrial carcinoma, the MRI has achieved 100% sensitivity and 97% specificity whereas ultrasound had zero sensitivity and specificity was 97%. Among two cases of endometrial polyp, one patient is diagnosed correctly by ultrasound & MRI, the sensitivity for both was 50% and accuracy was (ultrasound: 95% and MRI: 98%). MRI and ultrasound was correctly diagnosis of one patient with cervical cancer with sensitivity and accuracy 100%.

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Conclusion: Ultrasound is a good screening modality, but MRI is definitely better for proper characterization and localization of uterine masses enabling clinicians to select the most appropriate management in everyday clinical practice.

Keywords: Uterine masses, USG, MRI, Leiomyoma, Adenomyosis, Endometrial carcinoma, Histopathology.

INTRODUCTION

Ultrasound has been defined as one of the commonly utilized modalities to evaluate the female pelvic pathology cases. The ultrasound benefits are prompt availability, decreased costs as well as the simplicity of the examination and safety. However, the disadvantages of that modality include the limited view field, pelvis obscuration by the bowel gases and the fact that it depends upon the radiologist skill expertise [1, 2]. Some problems with ultrasound imaging are that the diagnostic images sometimes cannot be obtained because of the size of the patient, or because the ultrasound beam cannot traverse the areas of air-filled or bone in such cases, the cross-sectional imaging with CT or MRI can be used instead [3]. MRI has been considered as one of the valuable modalities in the diagnosis of the uterine pathologies with a general rate of accuracy that ranges between 91% and 93% in particular, in the case of using the contrast methods [4]. The MRI with the multi planar and high resolution imaging is capable of the characterization of several lesions and becomes the chosen modality for the assessment of uterine pathology cases [5]. Typically, the MRI has been taken under consideration as the following step to evaluate a lesion following the ultrasound. The sole MRI disadvantage is represented in the fact that it's not being available readily and costly in comparison with the ultrasound. Moreover, it isn't desirable for the claustrophobic patients as well as the patients that have specific metallic implants [6]. Typically, it is an important difference between the ultrasound and the MRI taking under consideration the investigation costs [7]. Amongst reproductive age group between 15 -20% of adult females have been considered to be having uterus lesions [8]. In the present study, the through evaluations of the uterine mass lesion cases based on the location, number, size, as well as other measurement types, the degenerative changes in lesions, the lesion extent has been carried out with the use of the ultrasound and associated to the MRI. The final diagnoses by the imaging have been compared to the histopathology findings. The fundamental objective of this study has been comparing the ultrasound with the MRI in detecting the uterine masses and comparing the ultrasound with the MRI in the uterine lesion characterization and differentiation.

PATIENTS AND METHODS

A prospective study has been performed on 40 female patients that have been referred to the Oncology Teaching Hospital and Institute of X-ray/ Medical Baghdad City, with the suspected uterine pathology cases. This study has been performed following the getting of the approval from the institutions and following the procurement of the agreement from patients. This study has been carried out between Sept. 2020 and Jan. 2021. Every patient has been subjected to the ultrasound examination. These patients that had suspicious or positive findings in ultrasound have been subjected to the MRI screening. Ultrasound imaging was performed using Mindray DC-50 machine. Ultrasound has been performed with the use of a probe (3.5-5MHz). The parameters below have been noticed in the ultrasound examinations, which include the uterus contour and size, the endometrial thickness, the lesions in the myometrium and the

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endometrial cavity. The MRI has been carried out with the use of the 1.5 Tesla Siemens Magnetome Avanto. The sequences below have been performed in the MRI have been listed in (Table 1). Besides ultrasound results, the thickness of the junctional zone has been measured with the use of the MRI. Extent of mass was noted in case of cervical cancer and myometrial invasion level has been noted in the cases of endometrial carcinoma. The uterine masses have been generally classified to many categories, which are adenomyosis, leiomyoma, endometrial pathologies that include the endometrial carcinoma, polyp and cervical malignancies. Comparison has been conducted between the MRI and the ultrasound for detecting each mass with the findings of the histopathology. The statistical parameters, which include the specificity, sensitivity, positive, accuracy and negative predictive values have been estimated for the three modalities in every one of the uterine masses. Cohen's Kappa is used to compare the correlation between the modalities (Table 2).

Inclusion Criteria: All patients referred from attached hospitals and suspected to have uterine mass lesions willing to undergo ultrasound were included in the study. All patients having uterine masses on ultrasound and willing to undergo MRI and surgery were included in the study.

Exclusion Criteria: Patients who didn't undergo both ultrasound and MRI, patient with MR incompatible devices or implants, patients with Claustrophobia and patients who refuse to participate in the study.

Table 1: The MRI sequences used for female pelvic examination were:

Sequences	Plane	Repetition Time (TR)	Echo time (TE)	FOV	No. of slices	Slice thickness	Matrix size
T1 weighted	Axial	550	20	260	22	5	256X256
T1 weighted	Sagittal	584	21	270	22	5	256X256
T2 weighted	Axial	1400	89	308	22	5	256X256
T2 weighted	Sagittal	1400	93	300	22	5	256X256
T2 weighted	Coronal	1400	95	250	22	5	256X256
T2 weighted (STIR)	Axial	1400	91	308	22	5	256X256
T1 post contrast	Axial	550	20	260	22	5	256X256
T1 post contrast	Sagittal	584	21	270	22	5	256X256

Table 2: Strength of correlation as per Kappa values

Kappa Value	Correlation
<0	No agreement
0.0-0.20	Slight agreement
0.21-0.40	Fair agreement
0.41-0.60	Moderate agreement
0.61-0.80	Substantial agreement
0.8-1.00	Perfect agreement

RESULTS

40 female patients have been included in the study age group ranging between 30 and 79 years. Among 40 study participants, most of which have been in age group 40-49 years -18 patients (45%) and followed by 50-59 years -10 patients (25%), 30-39 years

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-7 patients (17.5), 60-69 years -4 patients (10) and one patient over 70 year (Figure 1). the majority have been in the premenopausal periods 27 (67%) and the rest have been in postmenopausal periods 13 (33%).

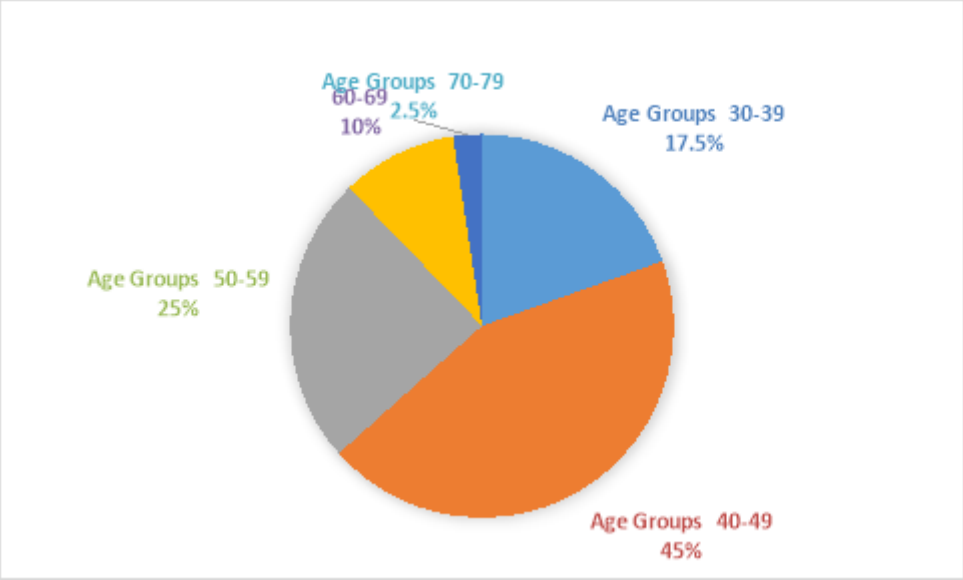

Figure 1: Distribution of patients in relation to their age groups.

Among 40 patients, 6 (15%) of them suffered with pain, 21 (52.5%) suffered with abnormal bleeding, 9 (22.5%) were suffering from pain with bleeding, 1(2.5%) suffered with pain with vaginal discharge and 3 (7.5%) were suffering with dysmenorrhea. But the common presentations were pain and bleeding (Figure 2).

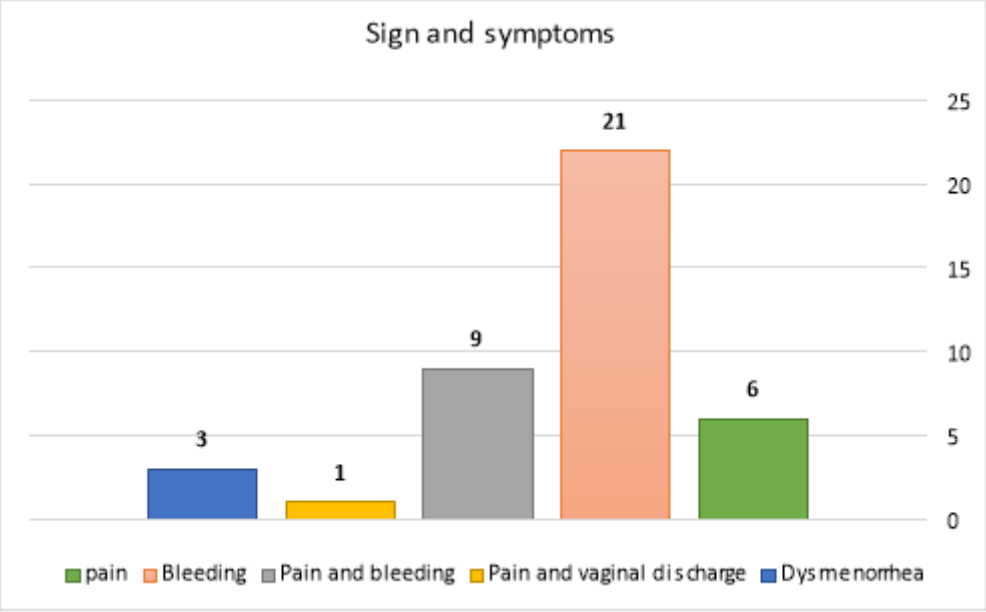

Figure 2: Distribution of patients in relation to their signs and symptoms.

Among 40 patients, majority were diagnosed with leiomyoma 23 (57.5%), 1 (2.5%) were diagnosed with cervical cancer, 12 (30%) had adenomyosis, 2 (5%) had endometrial polyp and 2 (5%) had endometrial carcinoma. Totally 37 (92.5%) of the patients have been found benign, while 3 (7.5%) patients have been found malignant.

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The accuracy, specificity and sensitivity have been computed for every one of the modalities in every one of the subgroups and compared.

Table 3: Detection of uterine leiomyoma by ultrasound and MRI

		HPE				Total	
		Present		Absent			
		No.	%	No.	%	No.	%
Ultrasound	Present	23	100%	6	35.3%	29	**72.5%**
	Absent	0	0	11	64.7%	11	**27.5%**
Total		**23**	**100%**	**17**	**100%**	**40**	**100%**
MRI	Present	23	100%	1	5.9%	24	**60%**
	Absent	0	0	16	94.1%	16	**40%**
Total		**23**	**100%**	**17**	**100%**	**40**	**100%**

First in detecting the myometrial mass (uterine leiomyoma), as per the data depicted above, ultrasound detects 29 leiomyoma cases; true positives detected by ultrasound came out to be 23 while true negative came out to be 11. 6 cases were false positive suggested as leiomyoma on ultrasound but the same was not proved on HPE, i.e. 5 cases of focal adenomyoma and one case of endometrial carcinoma were interpreted falsely as leiomyoma on ultrasound. No cases were missed on ultrasound (false negatives). MRI detected 24 leiomyoma cases; true positive were detected by MRI and came out to be 23 while true negative came out to be 16. One case was false positive on MRI; one case of focal adenomyoma was interpreted falsely as leiomyoma on MRI. No cases were missed on MRI (false negative) (Table 3) and (Figure 3).

Figure 3: A 45 years women, a) ultrasound image show submucosal leiomyoma. b) Sagittal T2 weighted image show submucosal leiomyoma projecting completely into uterine cavity (white arrow).

Table 4: Performance of ultrasound versus MRI in diagnosis of uterine leiomyoma

	Sensitivity	Specificity	PPV	NPV	Accuracy	Kappa value	P.value
U/S	100%	65%	79%	100%	85%	0.67	.000

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MRI	100%	94%	96%	100%	98%	0.94	.000

This indicates that ultrasound has remarkably high sensitivity (100%), low specificity (65%) and fairly good accuracy (85%). Ultrasound has substantial agreement with HPE (kappa 0.67), p=0.000 highly significant (p<0.01). MRI has high sensitivity (100%), excellent specificity (95%) and accuracy 98%. MRI has perfect agreement with HPE (kappa 0.94), p=0.000 highly significant (p<0.01) (Table 4).
For ultrasound detection of leiomyoma location, accurate location (true positives) detected by ultrasound came out to be 6 while (true negative) came out to be zero. 6 cases was (false positive) on ultrasound but same was not proved on HPE, 17 cases were false location (false negatives) on ultrasound. MRI detection of leiomyoma location, true positive (accurate location) were detected by MRI came out to be 22 while true negative came out to be 5. One case of leiomyoma location was false positive on MRI. One case was falsely location on MRI (false negative) (Figure 4). Ultrasound has remarkably poor sensitivity (26%), no specificity (0) and low accuracy (20%). Ultrasound has fair agreement with HPE (kappa 0.35). MRI has high sensitivity (96%), specificity (83%) and excellent accuracy (93%). MRI has substantial agreement with HPE (kappa 0.78).

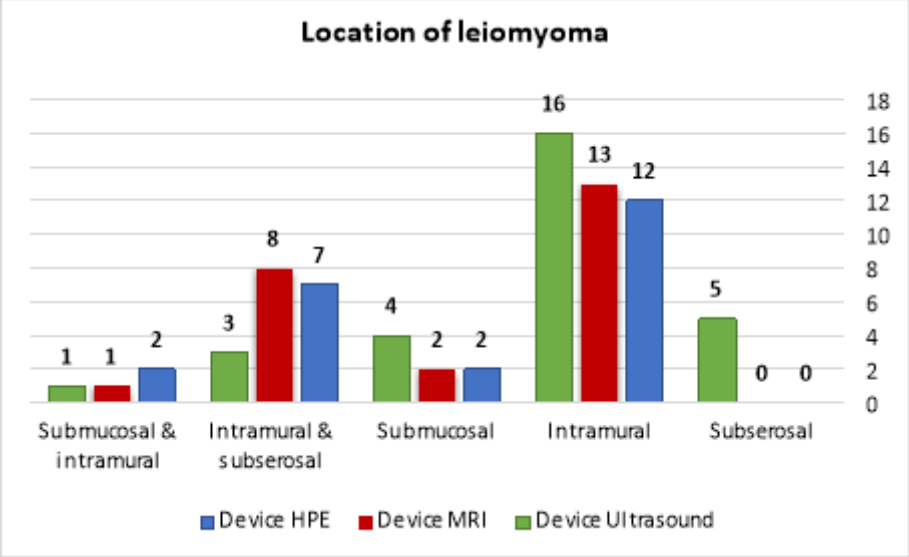

Figure 4: Distribution of leiomyoma location according to ultrasound and MRI.

Table 5: Detection of uterine adenomyosis by ultrasound and MRI

		HPE				Total	
		Present		Absent			
		No.	%	No.	%	No.	%
Ultrasound	**Present**	7	58.3%	0	0	7	**17.5%**
	Absent	5	41.7%	28	100%	33	82.5%
Total		**12**	**100%**	**28**	**100%**	**40**	**100%**
MRI	**Present**	11	91.7%	0	0	11	**27.5%**
	Absent	1	8.3%	28	100%	29	**72.5%**
Total		**12**	**100%**	**28**	**100%**	**40**	**100%**

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As per the data of adenomyosis depicted above, true positives detected by ultrasound came out to be 7 while true negative came out to be 28. No cases were false positive on ultrasound. 5 cases were misdiagnosis on ultrasound (false negatives); 5 cases of focal adenomyoma were interpreted falsely as leiomyoma on ultrasound. On MRI, true positive were detected by MRI came out to be 11 while true negative came out to be 28. No cases were false positive on MRI. One case was missed on MRI (false negative); one case of focal adenomyoma was interpreted falsely as leiomyoma on MRI, (Table 5) and (Figure 5).

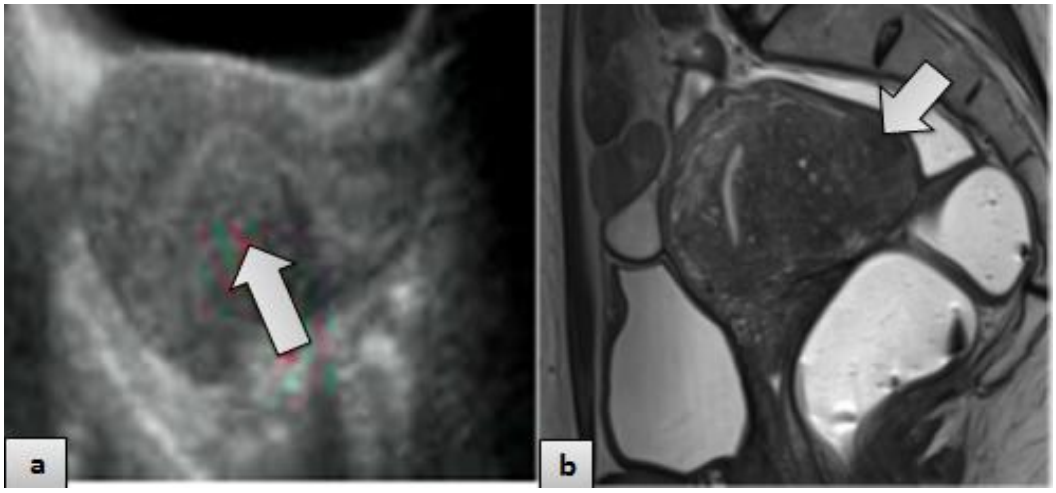

Figure 5: a 44 year women, a) Ultrasound image, show ill define mass suggests leiomyoma, b) Sagittal T2 weighted image (adenomyoma); circumscribed intramyometrial hypointense mass minimal mass effect with high signal foci (white arrow).

Table 6: Performance of ultrasound and MRI study in diagnosis of adenomyosis

	Sensitivity	Specificity	PPV	NPV	Accuracy	Kappa value	P.value
U/S	58%	100%	100%	88%	87%	0.66	.000
MRI	92%	100%	100%	97%	98%	0.94	.000

This indicates that ultrasound has remarkably low sensitivity (58%), high specificity (100%) and accuracy (87%). Ultrasound has substantial agreement with HPE (kappa 0.66), p=0.000 highly significant (p<0.01). MRI has high sensitivity (92%), high specificity (100%) and excellent accuracy (98%). MRI has perfect agreement with HPE (kappa 0.94), p=0.000 highly significant (p<0.01) (Table 6).

Table 7: Detection of endometrial carcinoma by ultrasound and MRI

		HPE				Total	
		Present		Absent			
		No.	%	No.	%	No.	%
Ultrasound	**Present**	0	0	1	3%	1	**2%**
	Absent	2	100%	37	97%	39	**98%**
Total		**2**	**100%**	**38**	**100%**	**40**	**100%**

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MRI	**Present**	2	100%	1	3%	3	**8%**
	Absent	0	0	37	97%	37	**93%**
Total		**2**	**100%**	**38**	**100%**	**40**	**100%**

As per the data of endometrial carcinoma depicted above, true positives detected by ultrasound came out to be zero while true negative came out to be 37. One case was false positive, i.e. suggested as endometrial carcinoma on ultrasound but the same was not proved on HPE. Two cases were missed on ultrasound (false negatives); on ultrasound these two cases of endometrial carcinoma were interpreted falsely as leiomyoma and endometrial polyp. On MRI, true positive were detected by MRI came out to be two while true negative came out to be 37. One case was false positive, i.e. suggested as endometrial carcinoma on MRI but the same was not proved on HPE. No cases were missed on MRI (false negative) are shown in (Table 7).

Table 8: Performance of ultrasound and MRI study in diagnosis of endometrial carcinoma

	Sensitivity	**Specificity**	**PPV**	**NPV**	**Accuracy**	**Kappa value**
U/S	0	97%	0	94%	92%	0.15
MRI	100%	97%	67%	100%	98%	0.78

This indicates that ultrasound has remarkably no sensitivity (0), high specificity (97%) and accuracy (92%). Ultrasound has slight agreement with HPE (kappa 0.15). MRI has high sensitivity (100%), high specificity (97%) and excellent accuracy (98%). MRI has substantial agreement with HPE (kappa 0.78) (Table 8).

DISCUSSION

Most of the cases in our study have been in the group of the reproductive ages. This is because of benign uterine masses are more frequently seen in that age group [9]. Ultrasound and MRI have been carried out on 40 female patients that have been referred to as Institute of x-ray and Oncology Teaching Hospital/ Medical City-Baghdad with clinically suspected masses of the uterine. Patients have been evaluated for the uterine masses where the MRI and ultrasound have been performed and correlated. Patients were in an age group that ranges between 30 and 79 years. 7 patients from 30 to 39 years, 18 from 40 to 49 years, 10 from 50 to 59 years and 4 in 60 to 69 years and one patient over 70 years, with the average age of 47.8 years.

27 patients (67%) have been in premenopausal age groups, 13 patients (33%) have been in postmenopausal age group. Out of 40 female patients in this study, 6 of them (15%) have made pain complaints, 21 (52.5%) patients had abnormal bleeding, 9 (22.5%) were suffering from pain with bleeding, 1 patient (2.5%) had pain and vaginal discharge, and 3 (7.5%) were suffering with dysmenorrhea. But the common sign and symptoms were pain and bleeding. All of the study patients have been sub grouped to 5 categories based upon underlying histopathology examination (HPE): endometrial carcinoma (2) patients, uterine leiomyoma (23) patients, cervical cancer (1) patient, uterine adenomyosis (12) patients; and endometrial polyp (2) patients. Sensitivity, specificity and accuracy have been estimated for every one of the modalities in every one of the subgroups and then compared.

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Among the total 40 patients, 23 of them had uterine leiomyoma, ultrasound detected 29 leiomyoma cases. The ultrasound sensitivity in the detection of the leiomyoma has been 100%, specificity has been 65% and accuracy is 85%. Reducing the specificity of ultrasound is because of 6 cases, 5 of them were suggested as leiomyoma on ultrasound but the same was not proved on HPE, i.e. 5 cases were focal adenomyoma and one case was endometrial carcinoma were interpreted falsely as leiomyoma on ultrasound. In ultrasound many focal adenomyoma are reported as leiomyoma reducing the specificity. In MRI detects 24 uterine leiomyoma patients, the sensitivity is 100%, specificity has been 94% and accuracy is 98%. The specificity is 94%; this has been a result of the fact that in the MRI one case has been reported as having the leiomyoma and it had turned out to be focal adenomyoma. Among 23 cases of leiomyoma show 6 of them had degeneration on MRI. In our study we found most common uterine masses are leiomyoma were (23) patients. This results is agrees with study done by Jagannathan & Subramanian, [10] who found in study of them, uterine leiomyoma are most common uterine masses were (24) patients.

Similar to our study, a study done by Jagannathan & Subramanian, [10] stating uterine masses detection on ultrasound and MRI, it was found ultrasound sensitivity for detection of leiomyoma is 100%, whereas MRI sensitivity is 100%, accuracy is 98%. In comparison to our study both ultrasound and MRI had 100% sensitivity. MRI is more accurate than ultrasound in detection of uterine leiomyoma with accuracy 98%.

Some studies have also shown a result similar to our study. The study done by Dueholm et al, [11] that the presence of uterine leiomyoma was detected with the same high level of accuracy by both modalities (ultrasound: sensitivity, 99%; specificity, 91%, and MRI: sensitivity, 99%; specificity, 86%), but specificity of these study differ from specificity in our study (ultrasound: 65% and MRI: 94%), this is because 6 cases had misdiagnosed on ultrasound in our study. Ultrasound is as efficient as magnetic resonance imaging in evaluating uterine leiomyoma presence.

Some studies showed a result which was contrary to the present study [5] stated that the MRI sensitivity has been two fold greater than the ultrasound for detecting the uterine leiomyoma (ultrasound: 40%; MRI: 80%;) utilizing pathological samples as a gold standard. However, when the uterine leiomyoma has been identified, MRI and ultrasound positive predictive values (PPV) have been similar. These observations suggested that the MRI be considered an optimal modality for detecting the uterine leiomyoma in the clinical researches, in particular, taking under consideration its superior capability for the detection of the smaller lesions. In our study, the sensitivity was (ultrasound: 100% and MRI: 100%). However, (PPV) for MRI and ultrasound were different (ultrasound: 79% and MRI: 96%), low PPV for ultrasound, this is because 6 cases were misdiagnosed on ultrasound. In our study, MRI and ultrasound had similar sensitivity in detection of leiomyoma.

It is best to locate the lesion site and the amount of the lesions with an MRI. It has given the surgeon a visual image. In our results, positive intramural leiomyoma were 12 cases. On MRI, 13 intramural leiomyoma were detected, 12 of which were correctly diagnosed and one case was misdiagnosed on MRI. On ultrasound, 16 intramural leiomyoma have been detected, 5 of which have been diagnosed correctly, and 11 cases have been misdiagnosed. Among 2 positive cases of submucosal leiomyoma, ultrasound detected 4 cases. Only 2 cases were found to be correctly diagnosed whereas MRI had correctly diagnosed 2 cases. Among 7 positive intramural and sub serosal leiomyoma, MRI detected 8 cases. 7 of them were

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diagnosed correctly and one case was misdiagnosed on MRI. Ultrasound detects only 3 cases. Only one case was correctly identified using ultrasound, 2 cases were misdiagnosed, while the remaining 4 cases were not detected on ultrasound. Among 2 positive cases, MRI and ultrasound detected one case of submucosal and intramural had been correctly diagnosed. Ultrasound detected 5 sub serosal cases, but was not proven on HPE. On MRI, 4 of them were intramural and one of which was both intramural and sub serosal on MRI. The sensitivity was (MRI: 96% and ultrasound: 26%), specificity was (ultrasound: 0 and MRI: 83%). When it comes to detecting the sites of a leiomyoma, MRI is more accurate than ultrasound with an accuracy of 93%. This result of our study agrees with the results of study done by Shankar et al [12] stating that to characterize, localize and detect the number of uterine masses, MRI has been found to be more accurate in comparison to ultrasound.

The results of our study also agreement with study done by Jagannathan & Subramanian, [10] stating uterine masses detection on ultrasound and MRI, it was found MRI more accurate than ultrasound for detection of uterine leiomyoma location.

Among the total of 40 cases, 12 of them had positive cases of adenomyosis. 11 cases of adenomyosis were correctly diagnosed with MRI in our study, whereas one case was misdiagnosed as uterine leiomyoma on MRI. The MRI had 92% sensitivity, 100% specificity and accuracy was 98%. On ultrasound, out of 12 cases, the correct adenomyosis diagnosis was observed in only 7 patients, while an incorrect diagnosis was recorded in 5 patients were misdiagnosed as leiomyoma, which reduces ultrasound sensitivity and explains why an important difference is made when diagnosing adenomyosis by ultrasound and MRI. In this study, ultrasound sensitivity was 58% for adenomyosis diagnosis; specificity was 100% and accuracy was 87%.

Similar to our study, a study done by Jagannathan & Subramanian, [10] stating uterine masses detection on ultrasound and MRI, it was found, for detection of adenomyosis the sensitivity of MRI is 92% due to the fact that one of the cases that has been considered as the uterine leiomyoma by the MRI turned out focal adenomyoma with junctional zone of normal thickness.

Study done by Shankar et al, [12] stating role of MRI in evaluating the pathologies of the uterine and its correlations with the ultrasound, it was found, MRI had sensitivity of 100% for diagnosis of adenomyosis. There have been considerable differences in diagnosing the adenomyosis with the ultrasound and MRI. The low sensitivity in adenomyosis diagnosis in the ultrasound has been fundamentally a result of the misdiagnosis as the uterine leiomyoma in the ultrasound. This study correlates with our results; MRI is more sensitive than ultrasound for diagnoses of the adenomyosis with an accuracy of 98% and sensitivity of 92%.

Study done by Jagannathan & Subramanian, [10] found 12 patients with the adenomyosis. 5 of them had bleeding, 10 of them complained from pains, 5 had both, and 4 had vaginal discharges. Dysmenorrhea has been present in 10 patients. 1 of the patients had infertility. All of the patients have been in a 31-39 years age group. In comparison to our study it was found that 12 patients that had the adenomyosis. 3 of them had pains with bleeding, 6 of them had bleeding and dysmenorrhea was present in 3 of them. 6 patients have been in 40-49 years age group, 5 patients in age group of 50-59 years and one patient of 65 years of age.

Moghadam et al, [13] indicates MRI and pathology are similar for 12 of the 31 patients with adenomyosis, and that MRI has a high specificity (91%) and low sensitivity (38%) for adenomyosis diagnosis, with PPV and NPV adenomyosis MRI values respectively of 52% and 85%, with 80% accuracy, MRI has high specificity

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and a low sensitivity for diagnosing adenomyosis. This study above does not agree with our results. MRI has high sensitivity and high specificity for detection of adenomyosis. The sensitivity was 92%, accuracy 98%, the specificity of the MRI was 100%, PPV was 100% and NPV was 97%.

Our results are different from the results in a study done by Bazot et al, [14] underwent ultrasound and MRI. The histological prevalence of adenomyosis was 33.0%. Specificity, sensitivity, and negative and positive ultrasound predictive values have been 65%, 32.50% 97.50% and 95%. In the MRI, the existence of a myometrial spot of high signal intensity has been equally specific, however, with a lower sensitivity compared to the maximum thickness of JZ >12.0mm. Sensitivity, specificity, and negative and positive predictive values of the MRI have been 77.50%, 92.50%, 89.20% and 83.80% respectively.

Study done by Stamatopoulos et al, [15] a study with enlarged uterus combined with the gynecologic signs and/or with asymptomatic pelvic masses. In adenomyosis diagnoses, the MRI has shown 46.10% sensitivity, 99.10% specificity, 88.50% NPV and 92.30% PPV. The MRI PPV in diagnoses of the uterus adenomyosis is high too. The MRI appears a beneficial approach in the daily clinical practices in diagnostic approaches of those widespread conditions. Compared with this, the MRI had sensitivity 92%, accuracy 98%, the specificity was 100%, PPV was 100% and NPV was 97%.

In our study, Among 40 cases, 2 of them had endometrial polyp. Both MRI and ultrasound had sensitivity (50%), specificity was (MRI: 100%, ultrasound: 97%), accuracy was (MRI: 98%, ultrasound: 95%). only one case out of two cases of endometrial polyp in our sample is diagnosed on ultrasound and MRI.

Study done by La Torre et al, [16] sonographic evaluation of endometrial polyps, analysis of endometrial polyps, sensitivity, specificity, PPV, NPV were 91%, 90%, 86%, 90% respectively. In comparison with our findings, ultrasound sensitivity 50%, specificity was 97%, PPV 50%, NPV 97%.

In detecting endometrial carcinoma in our study, among 40 cases, 2 of them had positive endometrial carcinoma. MRI detected 3 patients with endometrial carcinoma. MRI had 100% sensitivity, with 97% specificity. The specificity reduction results from one case that has been considered as endometrial carcinoma, but has not been proven on the HPE. Ultrasound detected only one case as endometrial carcinoma, but was not proven on HPE. Two cases of positive endometrial carcinoma were not correctly diagnosed on ultrasound, one case considers as leiomyoma and another case consider endometrial polyp while these two cases turned out to be endometrial carcinoma on HPE. Ultrasound was (0) sensitive but specificity was 97%.

Similar to our study, a study done by Jagannathan & Subramanian, [10] stating uterine masses detection on ultrasound and MRI; it was found MRI sensitivity for detection of endometrial carcinoma is 100%; this is because all cases correctly diagnosed on MRI. But ultrasound sensitivity of this study was 100%, this does not agree with our results because ultrasound in our study misdiagnosed all cases of endometrial carcinoma with sensitivity (0).

Yamashita et al, [17] have researched the myometrial invasion evaluations by endometrial carcinoma. Comparisons have been performed among the accuracies of the ultrasound, unenhanced T2W and contrast enhanced T1 weighted imaging and it was discovered that the contrast enhanced T1W MRI has been considerably better. In comparison with results in our study, 2 patients with endometrial carcinoma were diagnosed correctly on MRI, but those who had myometrial invasion in the T2 weighted image and well defined on contrast enhanced T1 is considerably superior to

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T2 weighted image. MRI sensitivity was 100% and accuracy 98%; whereas ultrasound findings of two patients were misdiagnosed (ultrasound sensitivity was zero). In our study, MRI is better and more accurate than ultrasound in evaluation of endometrial carcinoma. MRI specificity was 97%. This is because one patient was diagnosed as an endometrial carcinoma was actually an endometrial polyp according to the HPE. This results from the fact that there have not been any myometrial invasions noted in that patient. Also, there have not been any myometrial invasions observed in the T2 weighted image nor the contrast imaging.

In detecting the cervical cancer in this study, among 40 cases, only one patient had cervical cancer. Ultrasound and MRI were correctly diagnosed this patient with 100% sensitivity and specificity. MRI detects large cervical mass is seen measuring about 9 cm. It appreciates hypoin-isointense on T2 weighted images with heterogonous enhancements post contrast. The mass is seen no evidence of parametrial invasion with not invading the low signal cervical stroma. It is seen extending to the uterus corpus with evidence of inner myometrial invasion and protruding through the upper part of the vagina. MRI has high accuracy in detection of cervical cancer.

Shweel et al, [18] study for the evaluation of the diagnostic accuracy of cervical cancer and its similarities with the histopathology in order to infer that cervical cancer stage by MRI is symmetrical to histopathology stage. The study of them is agreement with result of our study.

Similar to our study result, a study done by Testa et al, [19] ultrasound and MRI detected the depth of stromal invasion to be greater than two thirds with a sensitivity of 100%. Ultrasound and MRI had similar sensitivity and specificity with regard to the parameters investigated.

CONCLUSION

For the characterization, localization and evaluation of the number of the benign as well as the malignant mass lesions in the female pelvic pathologies, the MRI has been found more accurate and often as a gold standard compared with the ultrasound. In the leiomyoma cases in assisting their location and number, the MRI appeared better than the ultrasound. In the adenomyosis cases, the MRI appeared to have higher accuracy for diagnoses, where the ultrasound has been considered indeterminate in the visualization of junctional zone. In the endometrial polyp cases, MRI is more efficient than ultrasound. In the endometrial carcinomas, the MRI may be utilized as one of the best screening tools as the ultrasound has been discovered to have lower sensitivity and lower specificity, the MRI has been discovered as crucial in the determination of the myometrial invasion. The extents of the cervical cancer as well as its invasions on the neighboring organs have been discovered to be better in the MRI in comparison with the ultrasound. Ultimately, it has been concluded that the ultrasound does not have the same levels of the sensitivity and the specificity compared with the MRI however, it can be considered as a very good tool of screening in evaluations and further management due to the fact that inexpensive and consumes less time. The MRI is accordingly a more accurate preoperative modality of the imaging for the diagnosis and differentiation of distinct features of a variety of the uterine masses.

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