Role of USG & MRI in Female Pelvic Masses with Histological Correlation in Post-Operative Patients

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ABSTRACT

BACKGROUND

Adnexal masses are considered one of the most common disorders in gynaecology practice. One of the primary goals of imaging in the evaluation of adnexal masses is differentiating between malignant and benign lesions in order to direct patients to the appropriate treatment algorithm. We wanted to study the spectrum of varied nature of adnexal mass lesions, assess the relative role of USG and MRI in their detection, and compare them with the gold standard test, i.e., histopathological examination wherever possible.

METHODS

This prospective study was conducted among 74 patients who were clinically suspected to have adnexal lesions. USG and MRI using standard protocols were performed in all these patients with adnexal lesions and various features of adnexal lesions were identified.

RESULTS

Most commonly affected age group was 30 - 60 yrs. The major presenting complaints were lower abdominal pain and lump in the lower abdomen. In our study, the most common origin of adnexal lesions was from the either / both ovaries.

CONCLUSIONS

Sensitivity of MRI and USG for diagnosing malignancy of adnexal lesions is similar. However, due to better specificity and lower false positivity rate, higher sensitivity in detecting invasion of adjacent organs and organs of origin of lesions, MRI may be considered complimentary for optimal patient management and can be used in the assessment of problematic cases.

KEY WORDS

MRI, USG Pelvic Mass, Benign, Malignant

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DOI: 10.14260/jemds/2020/754

How to Cite This Article:

Usmani Y, Bhartiya P, Shukla MK, et al. Role of USG & MRI in female pelvic masses with histological correlation in post-operative patients. J Evolution Med Dent Sci 2020;9(46):3439-3443, DOI: 10.14260/jemds/2020/754

Submission 27-07-2020,

Peer Review 24-09-2020,

Acceptance 30-09-2020,

Published 16-11-2020.

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BACKGROUND

Pelvic mass is a common presentation of gynaecological pathologies. Ultrasound remains the first line imaging modality for the female pelvis. MRI should be considered for the evaluation of adnexal pathology when sonographic characteristics are not definitive to determine the origin of the mass and to determine the likelihood of malignancy.¹ This study was conducted with a view to find out the relative role of MRI & USG in adnexal masses and its correlation with gold standard test, i.e., histopathological examination in operated patients.² The cut off value of CA-125 level for classifying benign and malignant lesions was taken as 35 IU / ML. The cut off value of size of lesions for classifying benign and malignant lesions was taken as 7 cm.³

METHODS

Our main source of data for the study was clinically suspected patients from the Department of Obstetrics & Gynaecology LLRM Medical College, Meerut coming to the Department of Radiodiagnosis, LLRM Medical College, Meerut, for imaging study for the period of Jan 2018 to Nov 2018.

All patients with clinically suspected adnexal masses when referred to the Department of Radio Diagnosis for the same examined with trans abdominal USG / trans vaginal sonography and a 1.5 Tesla MRI using abdominal surface coils. Contrast will be given as and when necessary. The patient will be followed up to correlate the findings with clinical outcome or operative findings.^{4,5}

The study was conducted on 74 patients focussing mainly on clinically suspected to have adnexal lesions & sonographically indeterminate adnexal masses.⁶

The subjects of this study were patients who are clinically suspected to have adnexal lesions and underwent USG and MRI. The study will be performed on all patients after written informed consent.⁷

The MR images were evaluated without knowledge of the surgical or pathologic findings. The MR imaging features were then correlated with the USG findings and pathologic findings wherever possible.⁸ The imaging features documentation included the number of adnexal masses per patient, origin of lesion (ovarian, tubal, tuboovarian or extraovarian), lesion shape, lesion size, and content of lesion (solid only, complex solid-cystic, and cystic only).^{9,10} If a wall and internal septae could be identified, its thickness, character, and enhancement will be noted. The septal characteristics including the number, thickness, character (smooth or irregular), and enhancement of the septa were recorded. Any vegetation appearing on the wall or the septum of the lesion were measured and noted. Tissues with low signal intensity on T2-weighted MR images (i.e., $\leq$ signal intensity of skeletal muscle) were also noted.^{11,12} Such low-signal-intensity tissue is indicative of fibrous tissue. Patients who were not operated or lost to follow-up, the imaging features were described. USG is done before or after the examination of MRI and postoperative histopathological findings were noted wherever possible. The cut off value of CA-125 level for classifying benign and malignant lesions was taken as 35 IU / ML. The cut off value of size of lesions for

classifying benign and malignant lesions was taken as 7 cm.^{13,14}

Equipment

- Magnetom symphony a tin system (Phillips) with magnetic field strength of 1.5 Tesla.
- Gadolinium based contrast material if needed.
- Philips ClearVue550 ultrasound machine.

Inclusion Criteria

- All patients with clinically suspected adnexal masses.
- Patients of 30 - 60 years age group.

Exclusion Criteria

- All Patients having cardiac pacemakers, prosthetic heart valves, cochlear implants or any metallic implants.¹⁵
- Patients having history of claustrophobia.
- All patients who do not consent to be a part of the study.

Study Design

Comparative observational study for determining the efficacy of Ultrasound and MRI for detection of adnexal masses in comparison to histopathological examination of postoperative masses.^{16,17}

Gold Standard Investigation

The gold standard test applied here is histopathological examination which is confirmed by immunohistochemistry.¹⁸

Statistical Analysis

Parameters of validity of the test such as sensitivity, specificity and diagnostic accuracy of ultrasound and MRI compared with histopathological examination.^{19,20}

RESULTS

A total of 81 adnexal lesions was detected in 74 patients on MRI. Out of 74 patients, 37 patients (39 lesions) were operated and these findings on MRI and USG were correlated with post-operative histopathological findings. Out of remaining 37 patients, 18 patients (21 lesions) were followed up with either USG or MRI for change in size / characteristics / stability of lesions with or without treatment.²¹ Remaining 19 patients were not operated and were also lost to follow up and were analysed only on basis of imaging findings. The most common symptom observed in 74 patients was pain abdomen (75 %) followed by abdominal distension (60 %) and bleeding per vaginum (56 %).^{22,23} Constipation and dysuria were also seen in few patients. The most common age group encountered was 30 - 60 yrs. and 54 % lesions (40 out of 74 patients) were seen in this age group. Out of total 12 malignant adnexal lesions, 9 were seen > 40 yrs. and 3 were < 40 yrs. Investigation of CA-125 in 35 patients with adnexal lesions, revealed that out of 6 patients with malignant lesions, 5 patients had raised (> 35 IU

/ ML) CA-125 level (80 %).^{24,25} One patient with serous cystadenocarcinoma had low level of CA-125. Out of total 39 benign lesions 35 had low level (89.7 %) and 4 had raised level (> 35 IU / ML) of CA-125 (10.2 %).²⁶ The benign adnexal lesions with raised CA-125 were 1 endometriomas and 3 cystadenomas.

Characteristics	Total	Benign Nos.	Benign %	Malignant Nos.	Malignant %
Thin and smooth without septa	30	30	100	0	00
Thin and smooth with septae	23	23	100	0	00
Thick and smooth without septa	0	0	-	0	-
Thick and smooth with septae	4	4	100	0	00
Thick and irregular with septae	9	4	44.4	5	55.5

Table 1. Wall / Septum Characteristics in Benign and Malignant Adnexal Lesions of Cystic and Predominantly Cystic Lesions on MRI

Papillary Projection / Mural Nodules	Total	Present No.	Present %	Absent No.	Absent %
Benign	55	4	7.2	51	92.8
Malignant	5	5	100	0	00

Table 2. Papillary Projection / Mural Nodules in Benign and Malignant Cystic Lesions on MRI (n = 60 Lesions)

	MRI	USG	Histopathological Diagnosis
Benign	31	30	33
Malignant	8	8	6

Table 3. Comparative Analysis of MRI and USG in Diagnosing Benign and Malignant Adnexal Lesions in 37 Operated Patients with 39 Lesions (n = 39 lesions).

	Histopathologically Positive for Malignancy	Histopathologically Negative for Malignancy	Total
MRI Positive for Malignancy	6 (TP)	2 (FP)	8
MRI Negative for Malignancy	0 (FN)	31 (TN)	31
Total	6	33	39

Table 4. Sensitivity, Specificity, and Accuracy of MRI in Diagnosing Malignant Lesions in 37 Operated Patients with 39 Adnexal Lesions (n = 39 Lesions)

Sensitivity = (TP / TP + FP) x 100 = 75 %, Specificity = (TN / TN + FP) x 100 = 93.9 %, Accuracy = (TP + TN / TP + TN + FP + FN) x 100 = 94.8 %.

	Histopathologically positive for Malignancy	Histopathologically Negative for Malignancy	Total
USG Positive for Malignancy	6 (TP)	2 (FP)	8
USG Negative for Malignancy	0 (FN)	30 (TN)	30
Total	6	32	38

Table 5. Sensitivity, Specificity and Accuracy of USG in Diagnosing Malignant Adnexal Lesions in 37 Operated Patients with 38 Adnexal Lesions (n = 38 Lesions)

Sensitivity = (TP / TP + FP) x 100 = 75 %, Specificity = (TN / TN + FP) x 100 = 93.7 %, Accuracy = (TP + TN / TP + TN + FP + FN) x 100 = 94.7 %.

DISCUSSION

On MRI of 74 patients with adnexal lesions, 81 lesions were detected out of which 78 were detected on USG and 81 were detected on MRI.²⁹ On imaging studies, 69 lesions were benign and 12 malignant. Out of these 69 benign lesions, 23 (33.3 %) lesions were < 7 cm and 46 (66.6 %) were > 7 cm. Out of 12

malignant lesions 4 (33.3 %) lesions were < 7 cm and 8 (66.6 %) were > 7 cm.³⁰

Based on type of content 15 lesions had solid content, out of which 13 (86.6 %) were benign and 2 (13.3 %) were malignant. 14 lesions had complex solid cystic content, out of which 5 (35.7 %) were benign and 9 (64.2 %) were malignant.³¹⁻³⁶ 52 lesions were cystic, out of which 51 (98.0 %) were benign and 1 (1.9 %) were malignant. In benign lesions, fat plane was maintained in all (100 %) cases whereas, in malignant, 2 (16.6 %) lesions had loss of fat plane while it was maintained in 10 (83.3 %) cases.

The lesions were cystadenoma / cystadenofibroma (23.4 %), endometriomas (14.8 %) and subserosal / broad ligament leiomyomas / intramural leiomyomas with large exophytic component (12.3 %), haemorrhagic cysts (9.8 %), dermoid cysts (6.1 %) infective tuboovarian masses (8.6 %), simple cyst (4.8 %), Krukenberg tumour (4.9 %), and cystadenocarcinoma (6.1 %), carcinoma cervix with large exophytic component (2.4 %). 37 - 40.

In comparison with the gold standard test, i.e., histopathological examination of specimen obtained from laparotomy / laparoscopy of adnexal masses, the sensitivity, specificity and accuracy of MRI in diagnosing malignancy in 37 operated patients with 39 adnexal lesions were 75 %, 93.9 % and 94.8 % respectively (Table 4). In the present study, the sensitivity, specificity and accuracy of USG in diagnosing malignancy in 37 operated patients with 38 adnexal lesions were 75 %, 93.7 % respectively. Conclusively the sensitivity of MRI and USG for diagnosing malignancy of adnexal lesions is similar (75 %) (Table 5).⁴¹

CONCLUSIONS

MRI may be considered as complimentary for optimal patient management since it has better specificity and lower false positivity rate, higher sensitivity in detecting invasion of adjacent organs and organs of origin of lesions.

Cases with pelvic masses can be resolved promptly by the referring physician and the radiologist through prompt collaboration. As the diagnosis should be assessed in the shortest time with the greatest care and accuracy, it is necessary to choose the appropriate available examinations, thus reducing the time needed to establish a diagnosis and decreasing the number of examinations required. Ultrasound remains the main diagnostic imaging modality prior to treatment. Improved detection and characterization of pelvic mass contribute to better diagnostic accuracy and consequently reduction of false-positive findings and invasive procedures, which leads to a significant reduction of morbidity and mortality from pelvic masses.⁴²

MRI should be considered for evaluation of adnexal pathology when sonographic characteristics are not definitive in determining the origin of mass as well as to determine the likelihood of malignancy. Histopathological examination of specimen obtained from laparotomy / laparoscopy of adnexal mass is the gold standard for confirming the diagnosis. However, no single diagnostic aid in itself is sufficient in determining the pathological adnexal masses. Hence, a multifaceted diagnostic approach should be used for a definitive diagnosis and management of adnexal mass.

Data sharing statement provided by the authors is available with the full text of this article at jemds.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jemds.com.

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