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MRI EVALUATION IN SONOGRAPHICALLY INDETERMINATE ADNEXALMASSES

Radio-Diagnosis

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ABSTRACT

Adnexal mass is a lesion occurring in the adnexa of uterus: organs closely related structurally and functionally to the uterus such as ovaries, fallopian tubes and surrounding connective tissues. The imaging plays its role by differentiating the adnexal masses into benign and malignant and direct the patient to appropriate treatment algorithm. To evaluate the patients with adnexal masses, Sonography is initial imaging modality of choice owing to its widespread availability, relatively low cost and high sensitivity in detecting adnexal masses. The study aims to characterize the adnexal masses that are sonographically indeterminate, to confirm the origin of sonographically indeterminate adnexal masses and to characterize benign and malignant ovarian neoplasms.The study was conducted in PG department of Radio-diagnosis and imaging, over a period of 18 months after obtaining the ethical clearance from institutional ethics committee. This study was prospective in nature where the patients with adnexal masses were subjected to Ultrasound scan and if the mass was found to be indeterminate, MRI was done for further evaluation and finally correlated with histopathological diagnosis and follow up.Result findings reveals that origin of mass on final diagnosis among study patients; 69.8% masses were ovarian in origin; 19.8% were extra- uterine extra-ovarian and 8.1% were of uterine origin. 2.3% cases were found to have no mass on follow-up. And on final diagnosis, Endometriotic cysts were most common lesions, followed by haemorrhagic cysts and mitotic lesions. On final diagnosis, the two sonographically indeterminate lesions were found to have no adnexal masses on MRI studies. It is concluded that majority of sonographically indeterminate adnexal masses arebenign, MRI was able to determine the organ of origin with confidence, Characterizations of mass was better done by MRI and showing excellent agreement with final diagnosis, MRI was able to characterize adnexal masses into benign and malignant with high confidence and showed excellent agreement with final diagnosis.

KEYWORDS

MRI, Adnexal Masses, Sonography.

INTRODUCTION

Adnexal mass is a lesion occurring in the adnexa of uterus: organs closely related structurally and functionally to the uterus such as ovaries, fallopian tubes and surrounding connective tissues. On USG, myometrium shows three discernible layers as: a thin inner hypoechoic compact layer adjacent to myometrium, middle layer which is uniformly echogenic and outer thinner hypoechoic layer. Endometrial appearance varies with the menstrual cycle appearing as very thin echogenic line in early proliferative phase and shows progressive hypoechoic thickening in later part of proliferative phase. Secretory phase shows uniformly echogenic endometrium. Ovaries are seen lateral to uterus with central echogenic medulla withmultiplecorticalfolliclesofvaryingsizes.MRI displays 3 distinct zones as: High signal endometrium, Low signal junctional zone and outer intermediate signal myometrium. Adnexal masses whether symptomatic or asymptomatic are one of the most frequent indications of gynaecological imaging[1].The imaging plays its role by differentiating the adnexal masses into benign and malignant and direct the patientto appropriate treatment algorithm[1].To evaluate the patients with adnexal masses, Sonography is initial imaging modality of choice owing to its widespread availability, relatively low cost and high sensitivity in detecting adnexal masses[2,3]. Majority of patients need Ultrasonography only for characterisation of the adnexal lesion as the lesion may have typical benign features or overt malignant characteristics[4]. However when no typical signs of benignity or malignancy are present, second line imaging technique is used to characterise the mass[5,6]. Use of ultrasound is limited by decreased specificity for benignity and results in 20% cases labelled as Indeterminate[7,8] On ultrasonography mass is labelled indeterminate when a) complex lesion after thorough interrogation cannot be confidently placed into benign or malignant b) the site of origin cannot be elucidated. MRI offers several advantages over Sonography in assessment of origin of a mass lesion, characterisation of adnexal masses[9] and classifying masses into benign and malignant. MRI has become an important modality in evaluating the patients with adnexal masses owing to its multi-planar capabilities and excellent soft tissue resolution.[10]

AIM OF THE STUDY

1. The aim of the study was to characterise the adnexal masses that are sonographically indeterminate.
2. To confirm the origin of sonographically indeterminate adnexalmasses.
3. To characterise benign and malignant ovarianneoplasms.

MATERIALAND METHODS

The study was conducted in PG department of Radio-diagnosis and imaging, Government Medical College Srinagar over a period of 18 months after obtaining the ethical clearance from institutional ethics committee. This study was prospective in nature where the patients with adnexal masses were subjected to Ultrasound scan and if the mass was found to be indeterminate, MRI was done for further evaluation and finally correlated with histopathological diagnosis and follow up. The recorded data was compiled and entered in a spread sheet(MicrosoftExcel)andthenexportedtodataeditorofSPSSVersion 20.0 (SPSS Inc., Chicago, Illinois, USA). Statistical software SPSS (version 20.0) and Microsoft Excel were used to carry out the statistical analysis of data. Continuous variables were expressed as Mean±SD and categorical variables were summarized as percentages. Graphically the data was presented by bar and pie diagrams. The MRI determination of the origin of mass and its tissue content were compared with the final diagnosis, and agreement between MRI and the final diagnosis was established using the Kappa statistic and 95% confidence interval [$\kappa = 1.0$, perfect agreement; $\kappa \geq 0.8$ but < 1.0, excellent agreement; $\kappa \geq 0.6$ but < 0.8; good agreement; $\kappa \geq 0.4$ but < 0.6, fair agreement; $\kappa > 0$ but < 0.4, poor agreement; and $\kappa = 0$, agreement by chance alone]. Diagnostic accuracy (sensitivity, specificity, positive predicted value, negative predicted value and accuracy) of MRI was obtained for determination of benignity and malignancy of a mass, taking final diagnosis as goldstandard.

Inclusion Criteria:

1. Patients with documented sonographically indeterminate adnexal masses were included.

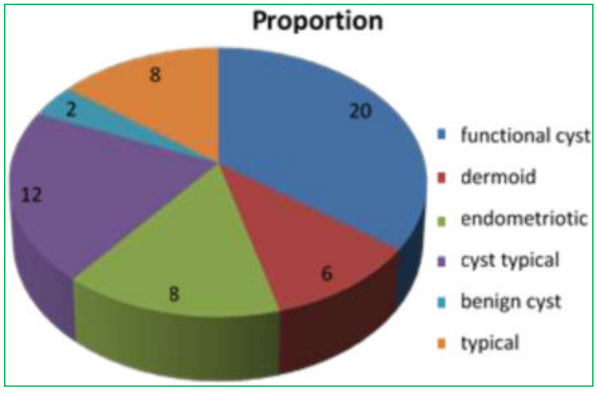
Exclusion Criteria:

1. Patients not giving consent to thestudy
2. Claustrophobicpatients
3. Patient with psychiatric illness.
4. Patients with implantable cardiac devices cochlear implant or any metallic device.
5. Patients lost tofollow-up.

RESULTS:

USG were performed of total 593 patients. Cysts with typical benign features were seen in 123 patients (20.7%), lesions with typical malignant features were seen in 24 patients (4.1%). Most common adnexal lesion is functional ovarian cyst 209 patients (35.2%) followed by dermoid cysts seen in 63 patients (10.63%). Endometriotic cyst is seen in 88 patients (14.83%), and Indeterminate Ultrasound features are seen in 86(14.5%). patients. These 86 patients with indeterminate lesions were finally included in the study. The age range in our study was 20-55 years with mean age of 37.5 years.

Fig.1: Proportion of adnexal masses on ultrasonography of 268 patients



Ultrasonography of 86 patients revealed indeterminate lesions and these were taken in the study. Rest of the patients were excluded from the study as their diagnosis was straight-forward on ultrasonography. Majority of the patients were in the age group of 20-29 years accounting for 51.2%, followed by 40-49 year age group with 17.4%, with 30-39 year group having 16.3% of patients and those with > 50 years of age had the lowest percentage of 15.1% of the total patients.

Table 1. Origin of organ of indeterminate mass lesions

Origin of mass	Number	Percentage
Ovarian	63	73.3
Uterine	7	8.1
Extraovrian or extrauterine	14	16.3
No mass	2	2.3

Table 1 depicts that on MRI majority of indeterminate adnexal masses were found to be ovarian in origin making 73.3% of total cases followed by extra-ovarian extra-uterine masses which constituted 16.3%. 8.1% were uterine in origin and 2 cases were found to have no mass on MRI and were wrongly interpreted as Indeterminate masses on ultrasonography.

Table 2: Showing MRI findings of study patients

MRI Findings	NO.	%age
Endometriotic cyst	12	14.0
Hemorhagic cyst	10	11.6
Dermoid	9	10.5
S.Cystadenoma	7	8.1
Fibroma	6	7.0
Hydrosalpinx	6	7.0
M cystadenoma	5	5.8
Subserosal fibroid	4	4.7
Intramural fibroid	3	3.5
Broad ligament fibroid	2	2.3
Hematosalpinx	2	2.3
Hydatid cyst	2	2.3
P Inclusion cyst	2	2.3
Tubo ovarian abscess	2	2.3
Malignant	12	14.0
No mass seen	2	2.3
Total	86	100

The findings further reveals that origin of mass on final diagnosis among study patients; 69.8% masses were ovarian in origin; 19.8% were extra- uterine extra-ovarian and 8.1% were of uterine origin. 2.3% cases were found to have no mass on follow-up. And on final diagnosis, Endometriotic cysts were most common lesions, followed by haemorrhagic cysts and mitotic lesions. On final diagnosis, the two sonographically indeterminate lesions were found to have no adnexal masses on MRI studies.

Table 3: Comparison Of Mri With Final Diagnosis On The Basis Of Origin Of Mass

Origin of mass on MRI	Origin of mass on final diagnosis				Tota-l
	Ovarian	Uterine	Extraovarian or extrauterine	No mass	
Ovarian	60	0	3	0	63
Uterine	0	7	0	0	7
Extraovarian or extrauterine	0	0	14	0	14
No mass	0	0	0	2	2
Total	60	7	17	2	86

Regarding the agreement of MRI with final diagnosis, excellent agreement was noted in view of origin of the lesion and characterization of lesion with both the variables having kappa value of >0.8.

Table 4: Diagnostic Accuracy Of MRI For Determination Of Benignity Versus Malignancy

Parameter	Value	95% CI
Sensitivity	100	72.3-100
Specificity	97.3	90.7-99.3
Positive predicted value	83.3	55.2-95.3
Negative predicted value	100	94.9-100
Accuracy	97.6	91.7-99.3

DISCUSSION:

In this studythe patients with indeterminate sonographic masses and subjected them to MRI. Our aim was not to compare the two imaging modalities but to find out what extra information could be acquired from MRI. There is a common perception that any mass >5cm is suspicious for malignancy on sonography and that the MRI is unnecessary. However, study by Dunton et al[11] found that unnecessary surgeries were performed in 50-67% patients having inconclusive findings on initial sonography. In our study we found that only 11.6% of the patients were having malignancy on final diagnosis. Thus patient needs to be reassured that the mass lesion found on initial sonography can be a benign mass and is not necessarily a malignant one.

Initially, 593 patients were referred to our department with mean age of 37.5 years. The most common adnexal lesion seen on USG was simple cyst (35.2%) and indeterminate adnexal lesions were seen in 14.5% patients. Our study is supported by Hassan S et al[12],where they found functional cysts as the most common adnexal lesions with dermoid being second common frequent lesion and the frequency of complicated/indeterminate cysts was 9%.

In the study it is concluded that concluded in our study that the indeterminate adnexal masses when subjected to MRI, about 89.74% were benign and only 10.25%, were indeterminate which is comparable to the study conducted by Shardha et al[39].

Among the benign lesions, Endometriotic cysts were the commonest lesions in our study accounting for 12.8% of all the lesions on final diagnosis followed by haemorrhagic cysts in 11.6% and dermoid cysts in 10.5% of all the cases. Study conducted by Salam M et al[13] is in accordance to our study where they reported the incidence of Endometriotic cysts as the commonest lesions among the indeterminate adnexal masses followed by mature cysticteratoma.

In our study, MRI wrongly predicted the organ of origin in only three cases as two extra-ovarian lesions; two peritoneal inclusion cysts and one broad ligament fibroid were labelled as ovarian in origin. Similar

findings were seen in a study conducted by Shiva Shankar et al[14] where they found that MRI had wrongly predicting organ of origin in two patients in a study group of 82 patients where in a broad ligament fibroid was mistakenly labelled as ovarian mass and a peritoneal inclusion cyst was wrongly labelled as ovarian in origin.

CONCLUSION

The study was done to assess the role of MRI in further characterizing the sonographically indeterminate adnexal masses. Based on date collected and observations made, following conclusions were made majority of sonographically indeterminate adnexal masses arebenign, MRI was able to determine the organ of origin with confidence, Characterizations of mass was better done by MRI and showing excellent agreement with final diagnosis, MRI was able to characterize adnexal masses into benign and malignant with high confidence and showed excellent agreement with final diagnosis.

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