



ROLE OF ULTRASONOGRAPHY AND MAGNETIC RESONANCE IMAGING IN EVALUATION OF FEMALE ADNEXAL MASSES WITH HISTOPATHOLOGICAL CORRELATION

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ABSTRACT

Ultrasound is the imaging modality of choice for the female pelvis. It is widely available, has broad acceptance by patients and is relatively inexpensive. However, there are some shortcomings with this modality, such as the limited field of view, obscuration of pelvic organs by the presence of bowel gas, experience of the operator. MRI, on the other hand, provides excellent contrast resolution, resulting in accurate tissue characterization and improved anatomic delineation. There is a significant difference, in the inherent costs of MRI and ultrasound. In this article we have characterized adnexal lesion on both USG and MRI and looked for sensitivity and specificity of USG for picking up malignant lesion accurately. The comparative study was carried out with 50 patients. According to this study, Ultrasound remains the first line of imaging for the female pelvis with high diagnostic accuracy rates for adnexal abnormalities with 100% sensitivity and 90.3% accuracy. In 40% patients where USG were inconclusive MRI was diagnostic, In 2% cases both MRI and USG didn't solve the diagnostic dilemma.

KEYWORDS :

INTRODUCTION

Ultrasound is the imaging modality of choice for the female pelvis. It is widely available, has broad acceptance by patients as a "familiar test," and is relatively inexpensive. High-resolution imaging of transvaginal ultrasound provides high diagnostic accuracy for pelvic pathology. However, there are some shortcomings with this modality, such as the limited field of view, obscuration of pelvic organs by the presence of bowel gas, inherent limitations dependent on patient size, and its dependence on the skill and experience of the operator.¹ MRI, on the other hand, provides excellent contrast resolution, resulting in accurate tissue characterization and improved anatomic delineation.² There is a significant difference, however, in the inherent costs of MRI and ultrasound. In this article we will characterize adnexal lesion on both USG AND MRI and will look for sensitivity and specificity of USG for picking up malignant lesion accurately.

AIM AND OBJECTIVES

1. Sensitivity and specificity of USG for diagnosing malignant adnexal lesions.
2. Characterization of uterine and adnexal masses as benign or malignant on USG and MRI.
3. To determine the origin, tissue content and characterization of sonographically indeterminate uterine and adnexal masses.

MATERIAL AND METHOD

The comparative study was carried out in Government Medical College, Nagpur over duration of 2 years. 50 patients were included in the study.

Inclusion criteria:

- Patients with clinical suspected cases of pelvic adnexal lesion masses.
- Patients with incidental detection of adnexal masses on USG.
- Patients of all age groups will be included in the study.

Exclusion criteria:

- Patients who have underwent treatment for adnexal mass
- Patients with metallic implants, cardiac pacemakers, cochlear implants.
- Patients who are claustrophobic.
- Patients who are unwilling for imaging.

Trans-abdominal and selected trans-vaginal examinations were performed to evaluate the masses. TAS was done with full bladder

and curvilinear probe of medium (5MHz) frequency was used. The full urinary bladder was required to provide an acoustic window and to displace the bowel loops. Trans-vaginal probe insonate at higher frequency i.e. 7-9MHz was used with consequent improved spatial resolution over the lower frequency TAS probes. MRI Imaging was done with 1.5 tesla Philips Achieva machine using abdominal surface coils. The following sequences were selected as required. T1WI, T2WI AND T1 SPIR (in axial plane), T2WI (in coronal plane), T2WI, T2W SPAIR, T1W SPIR (in sagittal plane).³ Gadolinium was used in all cases as intravenous contrast material in a dose of 0.1 mmol/kg body weight. Post contrast study includes T1W FAT SUPPRESSED Sequence (in axial and sagittal planes). Additional MRI imaging included selective application of fat saturation imaging. It was done to differentiate fat, blood and proteinaceous fluid in hyperintense lesions in T1W images.

Patient was imaged by USG first than MRI (performed within a short interval of 1-2 days to avoid any change in the mass that might occur as a result of cyclical bleeding) to look for the various features; which form the mainstay of the differential diagnosis of the pelvic masses.

OBSERVATION AND RESULTS

A total of 62 adnexal lesions were detected in 50 patients on MRI. Out of 50 patients, 26 patients (31 lesions) were operated and these findings on MRI and USG were correlated with operative and histopathological findings. Out of remaining 24 patients, 10 patients (11 lesions) were followed up with either USG or MRI for change in size/characteristics/stability of lesions with or without treatment. Remaining 14 patients were not operated and were also lost to follow up and were analyzed only on basis of imaging findings. MRI had detected total 62 adnexal lesions and USG detected total 60 lesions. 2 lesions were not detected on USG. One of them was hematosalpinx which was seen in patient with ovarian dermoid cyst and not detected on USG because of posterior acoustic shadow of dermoid cyst, gas shadow of bowel loops and partially distended bladder. Another lesion that was not detected on USG was small endometrioma which was seen in association with infective tubo-ovarian mass because of bowel gas shadow. In 62 lesions, 54 were benign, and 6 were malignant. In 54 benign lesions 17 lesions (31.4%) were less than 4 cm and 37 were (68.5%) more than 4 cm. In 8 malignant lesions 2 lesions (25%) were less than 4 cm and 6 were (75%) more than 4 cm. All the benign lesion showed maintained fat plane with the surroundings whereas the 3 malignant lesions showed loss of fat plane with the surrounding structures.

Characterizations of the benign and malignant lesions on MRI:

	TOTAL	BENIGN		MALIGNANT	
		NO	PERCENTAGE	NO	PERCENTAGE
SOLID	15	11	73.3	4	26.7
SOLID CYSTIC	8	05	62.5	3	37.5
CYSTIC	39	38	97.4	1	2.5

Wall / Septum Characteristics In Cystic And Predominantly Cystic Lesions

	total	Benign		Malignant	
		No	Percentage	No	Percentage
Thin and smooth, no septae	22	22	100	0	0
Thin and smooth with septae	14	14	100	0	0
Thick and smooth, no septae	0	0	-	0	-
Thick and smooth with septae	4	4	100	0	0
Thick, irregular with septae	4	3	75	1	25

Out of the 39 benign cystic lesions in two lesions papillary projection were there, and in the single malignant cystic lesion had mural nodule. 1 of the malignant lesion had associated omental caking.

Comparative analysis of MRI and USG in diagnosis of benign and malignant lesion in 26 operated patients with 31 adnexal lesions

	MRI	USG	HPE diagnosis
Benign	24	23	26
Malignant	07	08	05

Sensitivity, specificity and accuracy of USG in diagnosing malignant adnexal lesions in 26 operated patients with 31 adnexal lesions (n=31 lesions)

	Histopathologically positive for malignancy	Histopathologically negative for malignancy	Total
USG positive for malignancy	5(tp)	3(fp)	08
USG negative for malignancy	0(fn)	23(tn)	23
Total	05	26	31

Sensitivity = (TP/TP+FP) x 100 = 100%

Specificity = (TN/TN+FP) x 100 = 88.4% Accuracy = (TP+TN/TP+TN+FP+FN) x 100 = 90.3%

In 40% patients where USG were inconclusive MRI was diagnostic, In 2% cases both MRI and USG didn't solve the diagnostic dilemma, where in 58% cases both USG and MRI lead to the diagnosis.

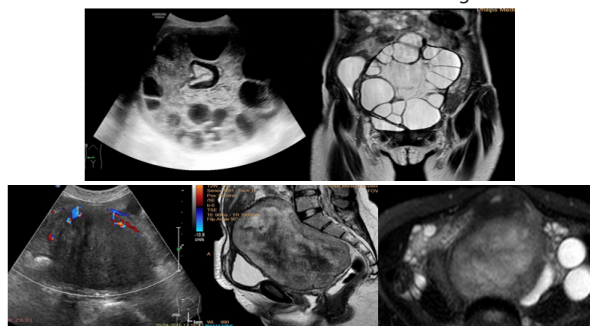


Figure 2: Broad Ligament Fibroid, here organ of origin was indeterminate on USG, which was confirmed on MRI to be extrauterine origin displacing uterus anteriorly.

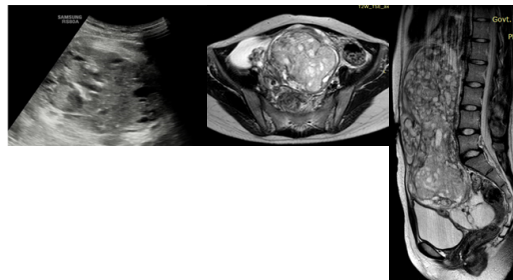


Figure 3: Immature Teratoma of right ovary.



Figure 4: Left sided hydrosalpinx as correctly diagnosed by USG.

CONCLUSION

Ultrasound remains the first line of imaging for the female pelvis with high diagnostic accuracy rates for ovarian abnormalities with 100% sensitivity and 90.3% accuracy according to this study. For lesions indeterminate on ultrasound, MRI increases the specificity of imaging evaluation, especially if a predominantly solid lesion requires more tissue-specific characterization for diagnosis. Large ovarian and adnexal masses, whether cystic or solid should be additionally imaged by MRI, especially to see adjacent tissue invasion which can't be predicted on USG accurately. Also, MRI should be considered for the evaluation of uterine and adnexal pathology when sonographic characteristics are not definitive to determine the origin of the mass and to determine the likelihood of malignancy.

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