Original Article

DIAGNOSTIC ACCURACY OF MRI IN SONOGRAPHICALLY INDETERMINATE ADNEXAL MASSES

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ABSTRACT

OBJECTIVES: To determine the accuracy of MRI in characterization of sonographically indeterminate adnexal masses while histopathology is taken as gold standard.

Study design: Cross sectional (validation) study

Duration of study: from July 2013 to December 2013

Setting: Radiology Department of Allied Hospital Faisalabad.

Patient & methods: After obtaining approval from institutional ethical committee, a total of 61 patients were enrolled in this study. All the patients are examined with MR imaging performed on a 1.5-T Philips MR imaging unit in the radiology department Allied Hospital Faisalabad. The mean interval between sonography and MRI was 7 days. The final diagnosis for each of the 61 masses was established by histopathology.

RESULTS: All women having a mean age of 45 years (range, 16–86 years) who were having sonographically indeterminate adnexal masses were included in the study. The mean interval between sonography and MRI was 7 days. There were 72.1% benign and 27.9% malignant cases on MRI while on histopathology 77% masses were benign and 23% malignant. The sensitivity and specificity of MRI in determining adnexal masses in our study is 100% & 93.6%

Conclusion: Magnetic resonance imaging (MRI) has high contrast resolution, it provides good tissue characterization, and also capable of multiplanar imaging capabilities; it is a useful tool for diagnosis of female pelvic pathology. Magnetic resonance imaging is helpful in characterization of adnexal masses were ultrasound cannot evaluate it properly.

Key words: adnexal masses, Magnetic resonance imaging, ultrasonography

INTRODUCTION:

Adnexal masses pose a challenge for diagnosis, in part because benign adnexal masses greatly outnumber malignant ones. Ovarian cancer was know for having mortality rate, death rate has decreased over time by 0.7% annually[1] due radiological investigations. Most critical step after identification of an adnexal mass is the degree of suspicion for malignancy. Approximately 5%–10% of U.S. women with suspected adnexal mass undergo surgery, but in only 0.38%–18% of these patients mass was diagnosed to be malignant[2]. The number of suspected benign masses is far greater than that of malignant masses this discrepancy even becomes greater if screening is done with cancer antigen (CA-125) or if US is used to define the population. Incorrect diagnosis of ovarian malignancy may be seen with certain sonographic features of adnexal masses. Determination of an indeterminate mass whatever size is really important to decide whether the next step should be surgery or pelvic MRI, which might cause

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characterization of the mass, mostly as a benign lesion[3]. For ovarian cancer, screening is currently not routinely advised, but in high-risk groups i.e. females with a family history of cancer, screening is recommended. Even in these high risk groups a large number of benign masses are found on surgery[4].

It is especially important to characterize ovarian masses preoperatively. For proper planning of adequate procedures it helps the surgeon to anticipate ovarian carcinoma before operation[5]. Recently, laparoscopy is used to manage benign adnexal masses which is having minimal surgical morbidity as compared with laparotomy which is extensive surgery[6]. That's why, it is important to be familiar with the clinical and imaging features of various ovarian tumors in determining the likelihood whether tumor is benign or malignant. For malignant adnexal lesions the sensitivity and specificity of MRI were 98% and 93%, respectively, MRI also has an accuracy of 95%, with a PPV of 0.92 and NPV of 0.98.[7]

MATERIAL & METHODS:

The study was conducted in Radiology Department of Allied Hospital Faisalabad. Duration of study was six months from July 2012 to December 2012.Permission was sought from hospital ethical committee. Patients are collected from OPD of Radiology and gynaecology department of Allied Hospital Faisalabad. Written Informed consent was taken from patient after objective & procedure of the study are explained. Target group was female patients having sonographically indeterminate adnexal masses. However patients with diagnosed case of malignancy were excluded from the study. Patients were advised to fast for 3-6hrs, not to urinate for 1-2hrs before the examination to allow a moderately filled bladder. All the patients were examined with MR imaging performed on a 1.5-T Philips MR imaging unit. A sense abdomen coil was used in all patients. 5mmthick slice were taken of the following sequences: Axial T1-weighted (W), Axial, Sagittal, coronal T2W sequences in every patient while Axial T2W fat suppressed images without contrast and axial, coronal and sagittal T1W contrast-enhanced images were obtained after IV injection of gadolinium 0.1 mmol/kg body weight as per requirement of the patient.

The patients with suspicious of malignancy were operated by senior gynaecologist and those with benign disease, true cut biopsy/ FNAC was taken and histopathology was done from histopathology lab PMC/Allied Hospital Faisalabad and were reported by senior histopathologist.

RESULTS:

Statistical data obtained were i.e. on MRI 77% masses were benign and 23% were malignant (table1) however on histopathology 75% were benign and 24% were malignant (table2), so sensitivity of MRI for malignant masses was 100% and specificity 93.3%.(table3)

Table: 1MRI report

	Frequency	Percentage
Benign	44	72.1
Malignant	17	27.9
Total	61	100

Table: 2- Histopathology report

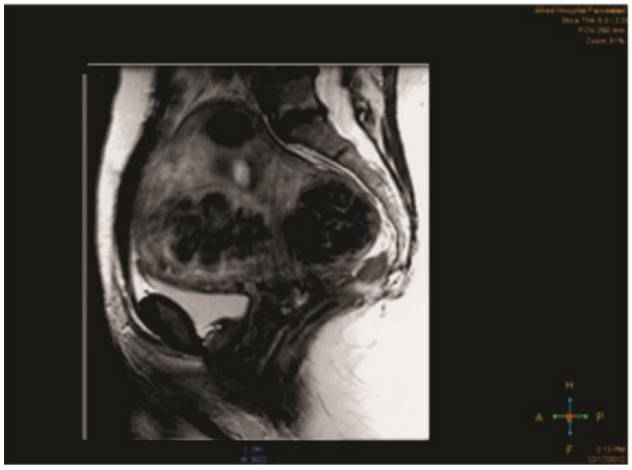
	Frequency	Percentage
Benign	47	77.0
Malignant	14	23.0
Total	61	100.0

Table: 3 Histopatholoy

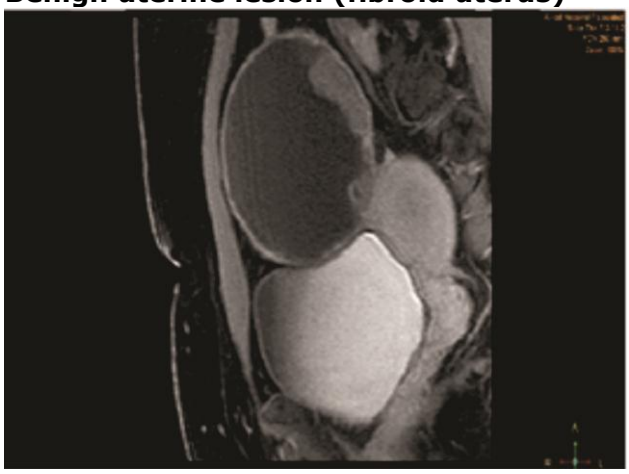
	+ve	-ve	total
MRI +ve	14	3	17
-ve	0	44	44
Tota;	14	47	61

Value	95% confidence interval
Sensitivity	100% (78.47, 100)
Specificity	93.62%(82.84, 97.81)
PPV	82.35% (58.97, 93.81)
NPV	100%(91.97, 100)

Diagnostic Accuracy
95.08%(86.51, 98.31)

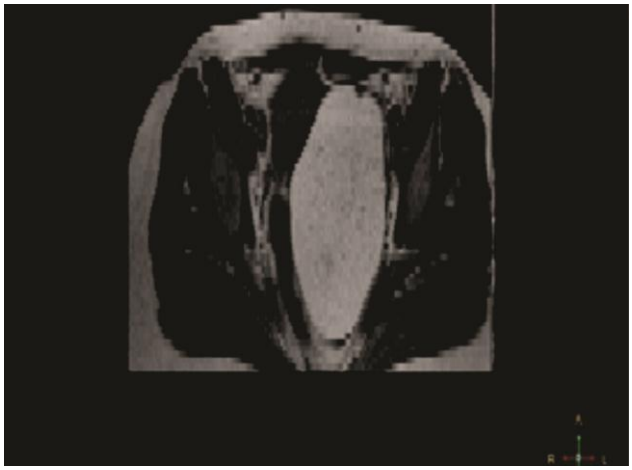


Case1
Benign uterine lesion (fibroid uterus)



Case2

Malignant ovarian lesion(complex ovarian mass)



Case3
Benign ovarian lesion (dermoid)

DISCUSSION:

As Ovarian cancer is the leading cause of death from gynecological cancers, old age women with advanced ovarian cancer have the best survival with proper therapeutic options.[8] If it is diagnosed at early stage, survival rate is almost 90% .

Sassone et al.[9] proposed a scoring system using endovaginal US for characterization of ovarian lesions and found a sensitivity of 100% and a specificity of 83% in distinguishing ovarian lesions whether they are benign or malignant. The sensitivity of morphologic analysis with US in determining malignancy in ovarian tumors has been shown to be 85%–97%, while its specificity ranges from 56% to 95%.[10]

Our study shows that MRI is investigation of choice for indeterminate adnexal masses, so to prevent unnecessary surgeries. According to my study, 72.1% adnexal masses were benign on MRI and 27.9% were malignant while on histopathology 77% masses were benign and 23% malignant. The sensitivity and specificity of MRI in determining adnexal masses in our study was 100% & 93.6% respectively which are consistent with the study of Adusumilli S. Et al.[11] Who found that when used for further evaluation of an indeterminate adnexal mass diagnosed on ultrasound in a prospective series, MRI pelvis showed sensitivity and specificity of 100% and 94%, respectively, in diagnosis of malignancy.

The results of our study are also comparable to that of Kinkel et al.[12] who found that no doubt MRI can be helpful in cancer detection, the main contribution of MRI in characterization of adnexal masses is its specificity.

Women with suspected adnexal masses, for identifying malignant lesions both Doppler ultrasound and MRI were highly sensitive (ultrasound 100%, MRI 96.6%), but significantly greater specificity of MRI was found (ultrasound 39.5%, MRI 83.7%). Therefore, women who have a low risk of

malignancy on clinical findings but on ultrasound indeterminate lesions was found are the ones most likely to benefit from MRI[13].
For the successful management of suspected adnexal masses pre-treatment evaluation is necessary because if the nature of the lesion can be predicted, the nature and timing of surgery can be optimized accordingly.
According to Hricak et al.[14]overall accuracy for differentiating benign from malignant adnexal tumors MRI pelvis has been shown to have overall accuracy of 91–93%.
Outwater and Dunton revealed that unnecessary surgery was performed in 50–67% of benign cases because sonography findings were suspicious for malignancy and revealed that because of suspicious sonography findings in 50–67% of benign cases surgery was performed where it was not necessary[15].
The advantage of MRI is to reveal normal ovaries separately and also to determine the characteristic morphologic features of a mass, for example the pathognomonic tortuous folded appearance of a hydrosalpinx[16].

CONCLUSION:

Results of our study show that the MRI pelvis is the choice of investigation in determining indeterminate adnexal masses on USG. The sensitivity and specificity of MRI in our patients is comparable to the results found in different studies conducted before. MRI is a good option to prevent unnecessary surgeries and to decrease the burden on hospital and doctors as well.

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Submitted for publication: 07-03-2016

Accepted for publication: 20-02-2017

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2	Dr.Anjum Mehdi	Proof reading
3	Dr.Murtaza Ali	Manuscript writing

SUCCESS IS THE RESULT OF FORESIGHT AND RESOLUTION, FORESIGHT DEPENDS UPON DEEP THINKING AND PLANNING AND THE MOST IMPORTANT FACTOR OF PLANNING IS TO KEEP YOUR SECRETS TO YOURSELF.

ONE WHO SAYS UNPLEASANT THINGS ABOUT OTHERS, WILL HIMSELF QUICKLY BECOME A TARGET OF THEIR SCANDAL.

Hazrat Ali (Karmulha Wajhay)