ORIGINAL RESEARCH

To evaluate the role of diffusion-weighted imaging and MRI in identifying uterine and adnexal lesions and distinguishing between benign and malignant lesions

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ABSTRACT

Background: Uterine and adnexal pathologies refer to various conditions and diseases that can affect the uterus and adnexal structures in the female reproductive system. The present study was conducted to evaluate the role of diffusion-weighted imaging and MRI in identifying uterine and adnexal lesions and distinguishing between benign and malignant lesions. **Materials & Methods:** 85 patients with uterine and adnexal lesions underwent Siemens Avanto Magnetic Resonance Imaging (1.5 Tesla). **Results:** The age group 20-30 years had 34 patients, 30-40 years had 40 and 40-50 years had 11 patients. The difference was non- significant (P> 0.05).Diffusion restriction was absent in 35 benign uterine and cervical lesions and present in 9 malignant lesions. Diffusion restriction was absent in 21 and present in 14 benign adnexal lesions and present in 6 malignant lesions. The difference was significant (P< 0.05). The sensitivity, specificity, positive predictive, negative predictive value and accuracy of MRI in detecting and differentiating benign and malignant uterine and adnexal lesions was 96%, 100%, 100%, 97.5% and 98% respectively. **Conclusion:** MRI is anexcellent tool for identifying and describing lesions in the uterus and adnexa. Because many benign adnexal lesions had low ADC values, DWI has a limited role in the case of adnexal lesions.

Key words: adnexal, Uterine, MRI

INTRODUCTION

Uterine and adnexal pathologies referto various conditions and diseases that can affect the uterus and adnexal structures in the female reproductive system. The term "adnexa" refers to the accessory structures of the uterus, including the ovaries and fallopian tubes.[1]

Malignant ones carry a considerable risk of death, even if the majority are benign. Therefore, early action depends critically on an accurate diagnosis, which can be achieved with high accuracy using magnetic resonance imaging (MRI).[2,3]While ultrasonography (USG) is the gold standard for diagnosing pelvic pathologies in women, magnetic resonance imaging (MRI) is a more effective method for assessing pelvic lesions in women due to its superior tissue resolution, multiplanar imaging capability, and excellent tissue differentiation ability, all of which can aid in reaching a conclusive diagnosis.[4]One type of functional imaging sequence is diffusion weighted imaging (DWI). It operates on the premise that water molecules move randomly across tissues. Water diffusion varies among tissues, which makes exogenous contrast injection unnecessary and produces acceptable image contrast.[5] The obtained DWI image is analyzed numerically using Apparent Diffusion Coefficient (ADC) maps and qualitatively using b-values, which are distinct intensities of the diffusion-sensitizing gradient.[6]The combination of MRI with DW Imaging has proven to be a promising method for identifying and characterizing a wide range of uterine and adnexal lesions, as well as for determining the anatomical extent of these lesions and comprehending their pathophysiology through ADC values, which aid in distinguishing benign from malignant lesions.[7]The present study was conducted to evaluatethe role of diffusion-weighted imaging and MRI inidentifying uterine and adnexal lesions and distinguishing between benign and malignant lesions.

MATERIALS & METHODS

The present study consisted of 85 patients with uterine and adnexal lesions. All gave their written consent to participate in the study.

Data such as name, age,etc. was recorded. All underwent Siemens Avanto Magnetic Resonance Imaging(1.5 Tesla). Sequence used was T1 Weighted Imaging (T1WI) - axial, coronal planes, T2 Weighted Imaging (T2WI) - axial, coronal and sagittal planes, Diffusion weighted sequence (DWI) in axial plane, Short TI Inversion Recovery (STIR) in axial, coronal, sagittal planes, T1-Fat supressed (FS) in axial plane, Gradient Echo (GRE) in sagittal or axial plane. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Age group (years)	Number	P value
20-30	34	0.87
30-40	40	
40-50	11	

Table I shows that the age group 20-30 years had 34 patients, 30-40 years had 40 and 40-50 years had 11 patients. The difference was non- significant (P> 0.05).

Table II Benign and malignant adnexal lesion

Lesions	Benign (70)	Malignant (15)	P value
Cystic	58	8	0.01
Solid	7	2	0.05
Solid-cystic	5	5	1

Table II, graph I show that benign lesions were 70 and malignant lesions were 15. Under benign, 58 were cystic, 7 were solid and 5 were solid-cystic. Under malignant, 8 were cystic, 2 were solid and 5 were solid-cystic. The difference was significant (P< 0.05).

Graph I Benign and malignant adnexal lesion

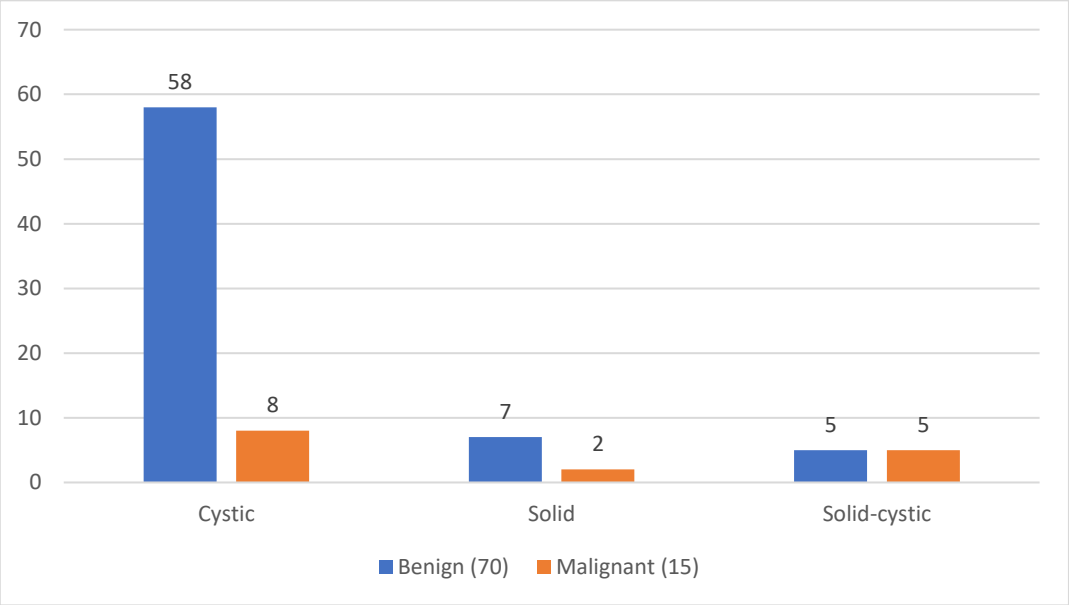

Table III Benign and malignant lesion on diffusion restriction

Lesions	Variables	Absent	Present	P value
Uterine and cervical lesions	benign	35	0	0.04
	malignant	0	9	
Adnexal lesions	benign	21	14	0.05
	malignant	0	6	

Table III shows that diffusion restriction was absent in 35 benign uterine and cervical lesions and present in 9 malignant lesions. Diffusion restriction was absent in 21and present in 14 benign adnexal lesionsand present in 6 malignant lesions.The difference was significant (P< 0.05).

Table IV Efficacy of MRI

Efficacy	Percentage
sensitivity	96%
specificity	100%
positive predictivevalue	100%
negative predictive value	97.5%
accuracy	98%

Table IV show that the sensitivity, specificity, positive predictive, negative predictive value and accuracy of MRI in detecting and differentiating benign and malignant uterine and adnexal lesions was 96%, 100%, 100%, 97.5% and 98% respectively.

DISCUSSION

For females, uterine and adnexal lesions are the main source of morbidity. Diagnosis and treatment for uterine and adnexal pathologies depend on the specific condition. Imaging studies, blood tests, and biopsies may be used for diagnosis.[8,9] Treatment options may include medications, surgery, or a combination of both, depending on the nature and severity of the condition. It's important for individuals experiencing symptoms or at risk for these pathologies to seek medical advice for proper evaluation and management.With MRI, a thorough assessment of diseases under suspicion in USG is required.[10,11] The present study was conducted to evaluate the role of diffusion-weighted imaging and MRI in identifying uterine and adnexal lesions and distinguishing between benign and malignant lesions.

We found that the age group 20-30 years had 34 patients, 30-40 years had 40 and 40-50 years had 11 patients. Nagi Reddy et al[12] found that the mean ADC value for benign uterine lesions was 1.33 + 0.18 ×10-3 mm2/s and for malignant lesions was 0.77 + 0.08 ×10-3 mm2/s with an ADC cut off value of 0.92×10-3mm2/s was suggested for differentiating benign from malignant uterine lesions. The mean ADC value for benign adnexal lesions was 1.35 +78 ×10-3 mm2 /s and for malignant lesions was 0.91 + 0.03 ×10-3 mm2 /s. Few benign lesions showed ADC values lower than malignant lesions. The mean ADC value for endometriomas was 0.69 + 0.03 ×10-3 mm2 /s and the mean ADC value for tubo-ovarian abscess was 0.46+ 0.06 x×10-3 mm2 /s. Hence statistically, ADC cut-off value of 0.96×10-3mm2 /s was not significant in differentiating benign from malignant adnexal lesions with a kappa value of 0.3 and p-value of 0.37. The sensitivity, specificity, positive predictive, negative predictive value and accuracy of MRI in detecting and differentiating benign and malignant uterine and adnexal lesions was 95%, 100%, 100%, 98.72% and 99% respectively.

We observed that benign lesions were 70 and malignant lesions were 15. Under benign, 58 were cystic, 7 were solid and 5 were solid-cystic. Under malignant, 8 were cystic, 2 were solid and 5 were solid-cystic. RC Jha et al[13] demonstrated that ADC measurements can quantitatively distinguish between normal and malignant uterine lesions. The modality of choice for the assessment of tumour size and its spread is MRI. The MRI has a high negative predictive value (NPV) of 95 percent for parametrial invasion in cervical carcinoma.

We found that diffusion restriction was absent in 35 benign uterine and cervical lesions and present in 9 malignant lesions. Diffusion restriction was absent in 21 and present in 14 benign adnexal lesions and present in 6 malignant lesions. The sensitivity, specificity, positive predictive, negative predictive value and accuracy of MRI in detecting and differentiating benign and malignant uterine and adnexal lesions was 96%, 100%, 100%, 97.5% and 98% respectively.Naganawa et al[14] observed that cervical carcinoma has been shown to demonstrate impeded diffusion relative to normal cervical stroma, and a significantly lower ADC has been reported in cervical carcinoma (1.09 ± 0.2 × 10-3 mm2 /sec) compared with the normal cervix (1.79 ± 0.24 × 10-3mm2 /sec).

The limitation of the study is the small sample size.

CONCLUSION

Authors found that MRI is anexcellent tool for identifying and describing lesions in the uterus and adnexa. Because many benign adnexal lesions had low ADC values, DWI has a limited role in the case of adnexal lesions.

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