# A STUDY OF DIAGNOSTIC VALUE OF MRI IN ENDOMETRIAL PATHOLOGIES AND ITS COMPARISON WITH ULTRASOUND USING HISTOPATHOLOGY AS GOLD STANDARD

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**Abstract:**
Endometrium has a wide range of appearance as well as overlapping imaging features, adding to challenges faced while diagnosing endometrial lesions. Although USG is the first modality to detect the endometrial lesions, MRI provides more details about the lesion. Hence, we aimed to assess and compare USG and MRI in characterising endometrial pathologies and to compare their sensitivity, specificity, positive predictive values and negative predictive values for diagnosis using histopathology (HPE) as a gold standard.

**Aim**: Our study aimed to evaluate the diagnostic value of MRI in endometrial pathologies in comparison to ultrasound. Materials and Methods: Hospital based Prospective Cross sectional study was done enrolling 40 patients who visited the gynaecology OPD and had endometrial lesions on USG. **Results**: Overall 20% of the lesions were malignant. The overall accuracy of MRI, and USG were 95%, and 85% respectively. There was a significant difference in accuracy between MRI and USG in diagnosing endometrial pathology. **Conclusion:** Our study suggests that all women with endometrial pathology identified on USG or in whom there is a strong clinical suspicion of disease should undergo MR pelvic imaging for better characterization of the pathology.

Keywords: Endometrial pathology, MRI, USG

## Introduction:

Endometrial pathologies are common cause of morbidity in the population worldwide, mostly in the postmenopausal females. Large screening studies have shown that majority of these lesions are benign even though the malignant ones are significant cause of mortality. As such, it becomes important to ascertain an accurate diagnosis in these cases with imaging so that appropriate and timely interventions can be made.[1] For many decades, USG has remained the main imaging modality in female pelvic pathologies

MRI has high contrast resolution and multi planar imaging capability which gives us the edge in the imaging by being able to differentiate between the types of tissue, their malignant potential and other characteristics based on their signal intensity, diffusion restriction , contrast uptake and come to a diagnostic conclusion prior to surgery. Also MRI is the choice of investigation after USG in specific groups of the population such as pregnant women and young children who cannot undergo a CT scan due to risk of ionising radiation.[2,3]

MRI appears to be an important modality in diagnosing endometrial pathologies with an overall precision rate of 91-93% particularly when contrast techniques are used.[4] MRI with its high

resolution and multi planar imaging has the capability to characterize multiple lesions, extent of lesion and is becoming the modality of choice to assess the endometrial pathologies.[5] Several studies have shown that conventional MRI, diffusion weighted imaging and contrast enhanced MR images are superior to TVS in patients with endometrial cancer[6,7]

MRI had an edge over USG in detecting endometrial/myometrial invasion in case of endometrial carcinoma.

Our study aimed to assess and compare USG and MRI in characterising endometrial pathologies and to compare their sensitivity, specificity, positive predictive values and negative predictive values for diagnosis using histopathology (HPE) as a gold standard.

## MATERIALS AND METHODS

STUDY TYPE: Qualitative study

STUDY DESIGN: Hospital based Prospective Cross sectional study

STUDY UNIVERSE: All patients attending gynaecology OPD in SMS medical college and attached hospitals with clinically suspected endometrial lesions

SAMPLING TECHNIQUE: Every eligible case was included in our study

STUDY POPULATION: The study included all patients with clinically suspected uterine lesions who visited Department of Radiodiagnosis, SMS Medical College and attached hospital, Jaipur and had uterine pathology on USG.

STUDY AREA: Department of Radiodiagnosis, SMS Hospital, Jaipur, Rajasthan.

STUDY DURATION: Data collection for study was started after approval from the institutional research and review board from April 2020 to September 2022.

SAMPLE SIZE: Sample size was calculated 40 cases who met the inclusion criteria

INCLUSION CRITERIA:

- All patients referred to the Department of Radiodiagnosis with clinically suspected endometrial pathology in USG and willing for MRI.

EXCLUSION CRITERIA:

- All patients who had contraindications to MRI including those with cardiac pacemakers, metallic fixations and claustrophobic patients.
- Unmarried women.
- Pregnant patients.

STUDY TOOL: Pre-tested, pre-designed proforma was used to collect data.

EQUIPMENT: Philips Affinity 70G Ultrasound machine

3.0T GE Signa Architect 64 channel MRI machine

**Results and discussion:**

In our study, most of the patients presenting were under 55- 65 year of age and postmenopausal. Majority of the patients presented with pain with bleeding PV (30%) followed by discharge, loss of appetite / weight (22.5%) and bleeding PV alone (12.5%).

- In our study, sensitivity, specificity , PPV , NPV and accuracy of USG for detecting was endometrial polyp was 100%, 75%, 63.16%, 100% and 82.00% respectively while MRI had 100% sensitivity, specificity , PPV, NPV and accuracy . 5 cases of endometrial polyp diagnosed on USG came out to be submucosal fibroid and another 2 cases as vascular RPOC on histopathological study. So we conclude that MRI can better differentiate between submucosal polyp and fibroid and also provide the pedicle length.
- In our study, sensitivity, specificity , PPV , NPV and accuracy of USG for detecting was endometrial carcinoma was 60%, 93.337%, 75%, 87.5% and 85% respectively while MRI had sensitivity, specificity , PPV , NPV and accuracy of 100%, 96.67%, 91%, 100% and 97.5% respectively.
- In detecting endometrial carcinoma in present study, MRI is 100% sensitive but specificity is 97% because 1 case was misdiagnosed as stage 1A came out to be normal by histopathological study.USG had very low sensitivity because it was unable to detect the myometrial invasion in almost all cases. USG detected 6 out of 10 cases of endometrial carcinoma but myometrial invasion and extension of lesion could not be correctly identified and USG failed to pick up stage 1A in two cases which was diagnosed as endometrial hyperplasia. Another case of stage III endometrial carcinoma was picked up by USG but the lesion extension and myometrium invasion was not correctly identified whereas MRI readily identified myometrial invasion.
- USG falsely detected one case as endometrial carcinoma stage IB which was diagnosed as endometrial hyperplasia on MRI.
- In our study, one case of endometrial carcinoma was misdiagnosed as endometrial hyperplasia on USG which was picked by MRI as stage 1B endometrial carcinoma. Therefore, MRI is required for better staging of endometrial carcinoma. It also provides better information about myometrial invasion & extension of lesion.

Table 1: Comparison of USG and MRI for diagnosing benign and malignant endometrial lesions

| | | MRI | | Total |
|---|---|---|---|---|
| | | Benign | Malignant | |
| USG | Benign | 28 | 4 | 32 |

| | | | | |
|---|---|---|---|---|
| | Malignant | 1 | 7 | 8 |
| Total | | 29 | 11 | 40 |

Chi sq =18.0564 p value< 0.000021.

The result is significant at $p < 0.05$.

Table 2 &3: Detection of Endometrial Carcinoma by USG among total cases

| | | HPE | | Total |
|---|---|---|---|---|
| | | PRESENT | ABSENT | |
| USG | PRESENT | 6 | 2 | 8 |
| | ABSENT | 4 | 28 | 32 |
| Total | | 10 | 30 | 40 |

| Statistic | Value | 95% CI |
|---|---|---|
| Sensitivity | 60.00% | 26.24% to 87.84% |
| Specificity | 93.33% | 77.93% to 99.18% |
| Positive Predictive Value | 75.00% | 41.76% to 92.62% |
| Negative Predictive Value | 87.50% | 76.51% to 93.77% |
| Accuracy | 85% | 70.16% to 94.29% |

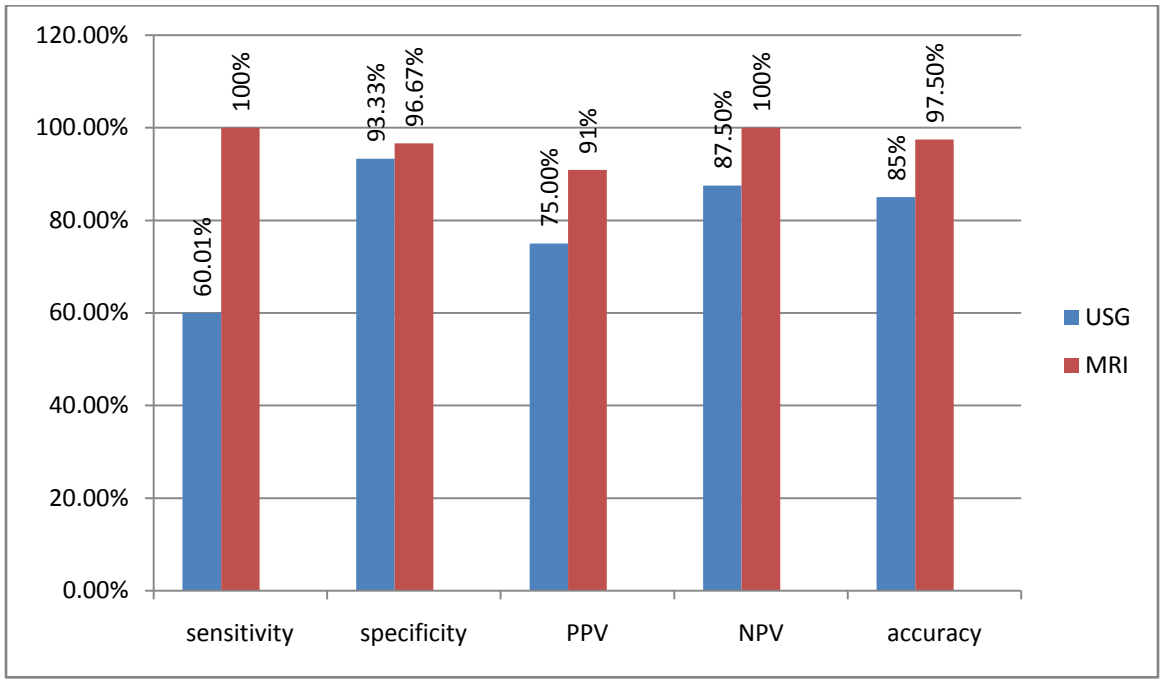
Table 4 & 5: Detection of Endometrial Carcinoma by MRI among total cases

| | | HPE | | Total |
|---|---|---|---|---|
| | | PRESENT | ABSENT | |
| MRI | PRESENT | 10 | 1 | 11 |
| | ABSENT | 0 | 29 | 29 |
| Total | | 10 | 30 | 40 |

| Statistic | Value | 95% CI |
|---|---|---|
| Sensitivity | 100% | 69.15% to 100% |
| Specificity | 96.67% | 82.78% to 99.92% |
| Positive Predictive Value | 90.91% | 59.28% to 98.57% |

| | | |
|---|---|---|
| Negative Predictive Value | 100% | |
| Accuracy | 97.5% | 86.84% to 99.94% |

Figure 1: Comparison of USG and MRI for diagnosing Endometrial Carcinoma




**Conclusion:** This study concludes that pelvic MR Imaging compared to USG is significantly better in characterizing the endometrial lesions. Although USG can act as a great screening tool in evaluation and further management as it is cost effective and less time consuming but it lacks sensitivity and specificity in definitive differentiation of lesions and in evaluating number of lesions in benign and malignant pathologies. MRI is more precise in staging the malignant lesions and provides exact extent of myometrial /endometrial invasion where USG lacks it drastically.Therefore MRI should be the ideal preoperative imaging modality for diagnosing and distinguishing the various endometrial pathologies.

**Conflict of the study**

There was no conflict of interest in study.

LIMITATIONS OF THE STUDY

1. This was a smaller and single centre study, larger and multi-centre studies are required for better correlation of our findings.

2. Lack of MRI study in patients with metallic implants and cardiac pacemakers.

Case illustration:

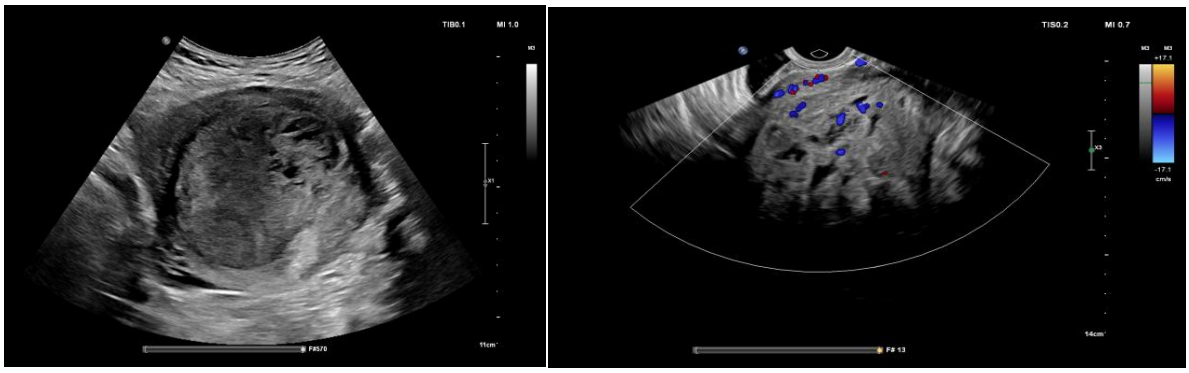
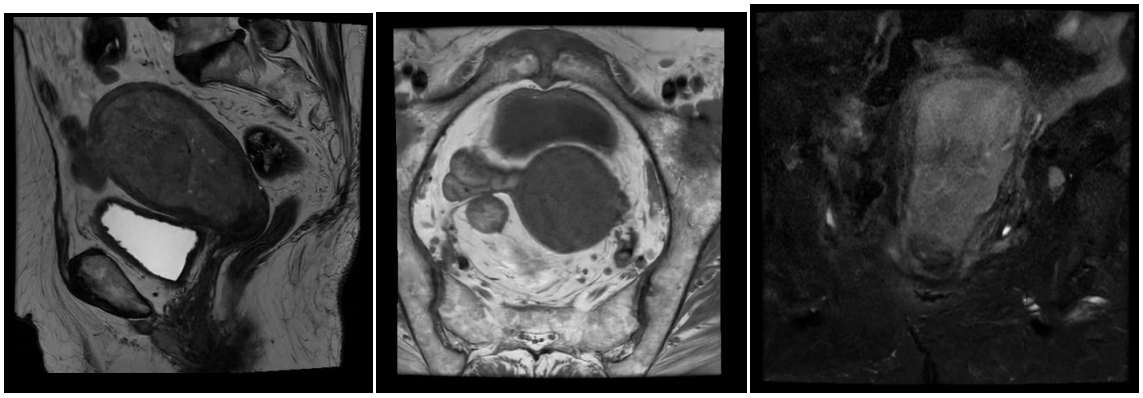


Figure 2A,B: USG images showing a heterogeneously hyperechoic mass in the endometrium with internal cystic areas and internal vascularity. Myometrial invasion was not seen.



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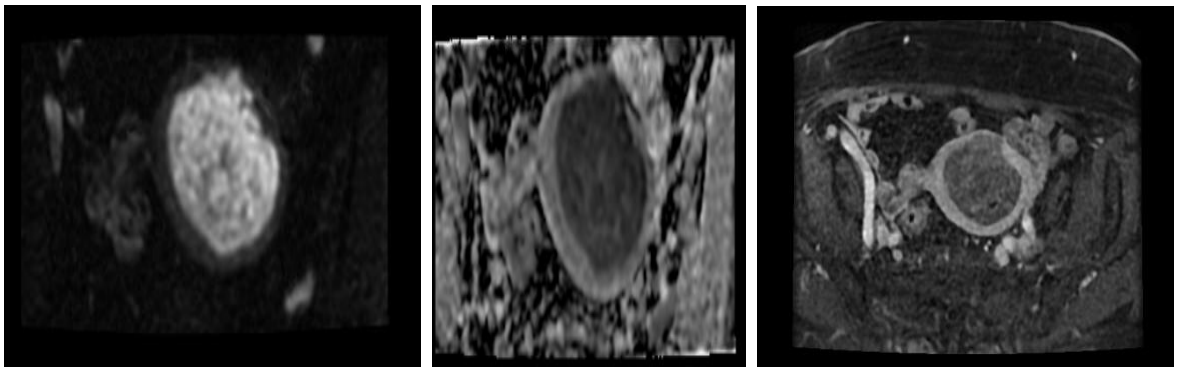

F G H

Figure 3 C-H : Sagittal T2, axial T1, Coronal T2 images showing a large relatively well defined T1/T2 heterogeneously hyperintense lesion with tiny internal cystic areas with patchy areas of diffusion restriction (F,G) showing heterogeneous enhancement less than myometrium with peri as well as intralesional vascularity predominantly along anterior wall, is seen within and distending the endo cavity causing thinning of myometrium. It is showing focal myometrial invasion extending upto serosa and discontinuity of T2 hypointense rim suggesting extrauterine extension along anterior wall of corpus of uterus. Lesion is abutting ileal loops without any frank invasion suggesting endometrial carcinoma FIGO stage III which was confirmed by histopathology as endometrial adenocarcinoma.

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