MR Evaluation of Uterine Mass Lesions in Correlation with Transabdominal and Transvaginal Ultrasound

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Abstract: *Introduction: This study involves detailed evaluation of uterine mass lesions like number, location, size, other measurements, degenerative changes within the lesions, extent of the lesion using Transabdominal ultrasound, Transvaginal ultrasound & MRI. Final diagnosis by imaging was compared with histopathological reports. Aim: To evaluate the MRI characteristics of uterine mass lesions. To compare the sensitivity of MRI, Transabdominal ultrasound, Transvaginal ultrasound in characterising the uterine mass lesions. To assess the accuracy in staging the malignant mass lesions. Materials and Methods: A prospective study of 52 patients with suspected uterine masses referred from Department of Obstetrics and Gynecology, Rangaraya Medical College, Ggh, Kakinada, to the Department of Radiodiagnosis from November 2019 to October 2020. Inclusion Criteria: 1.All patients referred from Department of Obstetrics and Gynecology, Rangaraya Medical College, Ggh, Kakinada, suspected to have uterine mass lesions willing to undergo all three tests and willing for surgery were included in the study. Exclusion Criteria: 1. Patients who did not undergo all three tests. 2. Not operated or non availability of the histopathological examination report. 3. Patient with MR incompatible devices or implants 4.Patients of Claustrophobia Results: In classifying myometrial mass lesions, the diagonal agreement between USG and MRI is 54 %, between transvaginal USG and MRI is 67 %. Localizing the site of lesion and number of lesions is best with MRI. Conclusion: High spatial resolution MR imaging with CP spine Array coil is accurate for characterisation, localisation and evaluation of the number of lesions in benign uterine mass lesions and for staging of malignant mass lesions.*

Keywords: MRI-Magnetic Resonance imaging, TVUSG- Transvaginal ultrasound SI-Signal intensity Wt- Weighted Ca- Carcinoma EM-Endometrium Fatsat-Fat saturation

1. Introduction

Mass lesions in the uterus are a commonly encountered problem all over the world. 15 to 20% of women in the reproductive age group have mass lesions in the uterus.

Over the years many imaging modalities like Tran abdominal ultrasound, Transvaginal ultrasound, Color Doppler, Hysterosonosalpingography, Computerised Tomography, Magnetic Resonance Imaging have been tried to characterise the mass lesions. Even today Tran abdominal ultrasound is the screening imaging modality of choice.

Definite characterization of the lesion is important to decide on the treatment modality.

This study involves detailed evaluation of uterine mass lesions like number, location, size, other measurements, degenerative changes within the lesions, extent of the lesion using Tran abdominal ultrasound, Transvaginal ultrasound & MRI. Final diagnosis by imaging was compared with histopathological reports.

Mass lesions seen commonly in uterus can be divided into

1) Lesions involving myometrium
   Leiomyoma, Adenomyosis, Leiomyosarcoma, Rarely Lipoleiomyoma, Malignant lymphoma, Arteriovenous malformations.

2) Lesions involving endometrium
   Endometrial polyp, Endometrial hyperplasia, Endometrial carcinoma, Endometrial cyst, Hematometrocolpos, Rarely Endometrial stromal sarcoma.

3) Lesions involving cervix
   Nabothian cyst, Cervical poly, Carcinoma cervix.

Aim

1) To evaluate the MRI characteristics of uterine mass lesions.
2) To compare the sensitivity of MRI, Tran abdominal ultrasound, Transvaginal ultrasound in characterising the uterine mass lesions.
3) To assess the accuracy in staging the malignant mass lesions.

2. Materials and Methods

A prospective study of 52 patients with suspected uterine masses referred from Department of Obstetrics and Gynaecology**, Rangaraya Medical College, GGH**, **Kakinada**, to the Department of Radio diagnosis from November 2019 to October 2020.

Inclusion Criteria

All patients referred from Department of Obstetrics and Gynecology**, Rangaraya Medical College, GGH, Kakinada**, suspected to have uterine mass lesions willing to undergo all three tests and willing for surgery were included in the study.

Exclusion Criteria

1) Patients who did not undergo all three tests.
2) Not operated or non availability of the histopathological examination report.
3) Patient with MR incompatible devices or implants
4) Patients with Claustrophobia.

This study confines to the ethics and was done with the consent and full co-operation of the patient.

All patients were subjected to Tran abdominal Ultrasound, Transvaginal Ultrasound and MRI examination.

Grey scale Tran abdominal and Transvaginal Ultrasound were performed using a **ESOATE MYLAB 7** series; equipped with 3.5 mega hertz convex probe and 5.0 mega hertz Transvaginal probe. MRI was performed using Siemens 1.5 tesla super conducting Magneto me using CP spine array coil.

MRI Pelvis

Patient was placed in supine position in MR gantry.

Technique used

A scout coronal section was obtained to plan for sagittal views. Oblique coronal and oblique axial sections were planned using sagittal slices (along the axis of uterus and perpendicular to it).

The sequences used were

T1 weighted sagittal

TR	700ms	TE	97 ms
Number of slices	22	Slice thickness	4mm
FOV	300	Matrix size	256x256

T2 weighted sagittal, coronal and axial

TR	3250ms	TE	97 ms
Number of slices	22	Slice thickness	4mm
FOV	300	Matrix size	256x256

Optional Sequences

Fat Saturation in cases of Endometriosis and Ovarian dermoid

FIG 1.SAGITTAL PLAN

FIG 2.OBLIQUE CORONAL PLAN


FIG3. OBLIQUE AXIAL PLAN

3. Method

A preliminary abdominal examination, per speculum and per vaginal examination was done. Tran abdominal Ultrasound was done in full bladder with optimal settings, then bladder emptied and Transvaginal Ultrasound done. In both the Ultrasound examinations the following uterine parameters were noted: the size of the uterus, contour.

- Regular/ lobulated, endometrium – homogenous/ inhomogeneous, echogenic/ hypo echoic comparing to

the myometrium, endometrial thickness.

- In addition to the findings noted in the Ultra sonogram, in MRI the maximal junctional zone thickness was measured.
- Intensity of the lesions in both T1 and T2 weighted images were noted. Number and location of the lesions were also noted.
- In case of endometrial lesions, level of myometrial invasion and in cases of Carcinoma Cervix, extent of the lesions was noted.
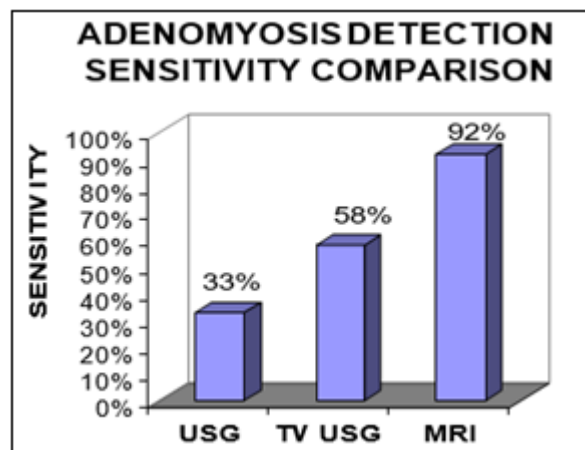
4. Results
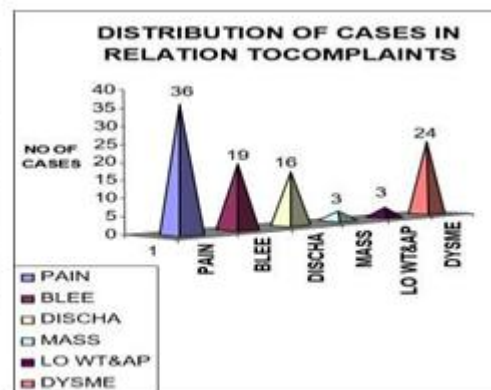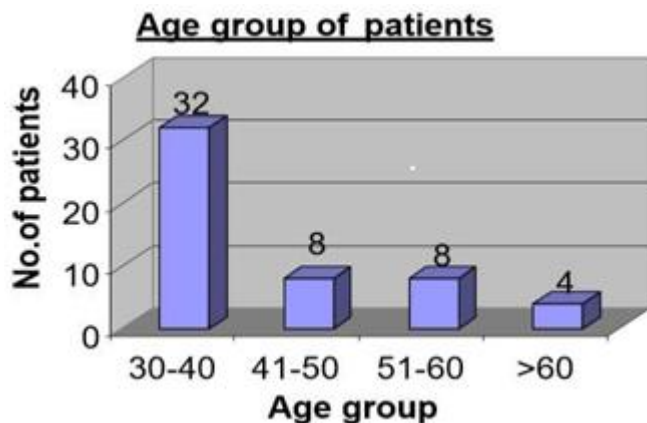
DIAGNOSIS	NO OF CASES
ADENOMYOSIS	12
FIBROID	24
CA CERVIX	10
CA ENDOMETRIUM	3
ENDOMETRIAL POLYP	2
NORMAL	1
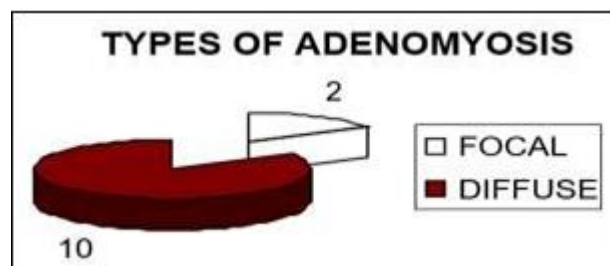
Adenomyosis Detection Transabdominal USG

Transabdominal Ultrasound		Present	Absent	Total
		HPE		
	Present	4	0	4
	Absent	8	0	8
	Total	12	0	12

Trans-Vaginal Ultrasound		Present	Absent	Total
		HPE		
	Present	7	0	7
	Absent	5	0	5
	Total	12	0	12

Adenomyosis Detection MRI

MRI		Present	Absent	Total
		HPE		
	Present	11	1	12
	Absent	0	0	0
	Total	11	1	12

TYPES OF ADENOMYOSIS

Detection of Fibroid Transabdominal USG among total cases

Transabdominal USG		Present	Absent	Total
		HPE		
	Present	19	4	23
	Absent	5	24	29
	Total	24	28	52

Detection of Fibroid Transvaginal USG among total cases

	HPE			
		Present	Absent	Total
Trans-Vaginal USG	Present	24	3	27
	Absent	0	25	25
	Total	24	28	52

Detection of Fibroid by MRI among total cases

	HPE			
		Present	Absent	Total
MRI	Present	24	1	25
	Absent	0	27	27
	Total	24	28	52
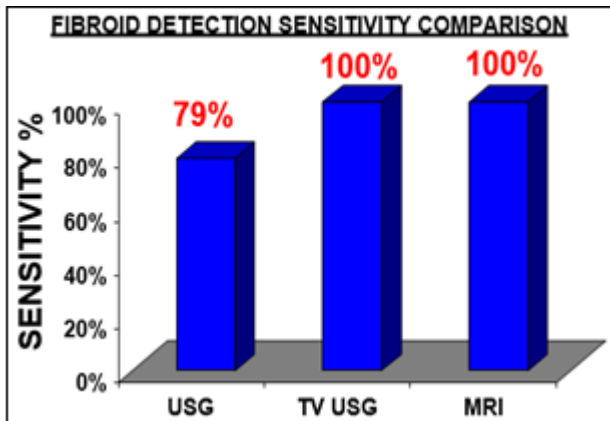
Detection of Endometrial Carcinoma by MRI and TV USG among total cases

|	HPE			
		Present	Absent	Total
TV USG and MRI	Present	3	1	4
	Absent	0	48	48
	Total	3	49	52

5. Discussion

- Tran abdominal USG, transvaginal USG and MRI were performed on 52 patients who were referred from the Department of Obstetrics and Gynaecology for evaluation of uterine mass lesions.
- The patients were in the age group ranging from 30 to 65 yrs. 32 patients in 30 to 40 yrs, 8 in 40 to 50 yrs, 8 in 50 to 60 yrs. and 4 over 60 yrs., with the mean age of 42.5 yrs.
- 68% of the patients were in the premenopausal age group, 33% of the patients were in the postmenopausal age group. In our study most of the patients were in the reproductive age group.
- The total patients were sub grouped into 5 depending upon the histopathological diagnosis. Adenomyosis –12 patients; Fibroid –24 patients; Endometrial carcinoma –3 patients, Carcinoma cervix -10patients, Cervical polyp -2 patients. Among the total patients 17 had adnexal lesions, 4patients had mass lesions and 13 had cysts.
- In classifying myometrial mass lesions, the diagonal agreement between USG and MRI is 54%, between transvaginal USG and MRI is 67%. Localizing the site of lesion and number of lesions is best with MRI.

- Among total 52 cases, the sensitivity of USG in detecting fibroid is 79%, specificity is 86%, Transvaginal ultrasound in detecting fibroid the sensitivity is 100%, specificity is 89%, MRI the sensitivity is 100%, specificity is 96%.
- In detecting endometrial carcinoma in our study, MRI is 100% sensitive but specificity is 97%..
- Among 12 positive cases of adenomyosis comparing to histopathological examination, sensitivity of transabdominal ultrasound is 33% in detecting adenomyosis, Sensitivity of transvaginal ultrasound is 58%, Sensitivity of MRI is 92%.
- The final diagnosis by MRI significantly alters the surgical management. All the lesions of the uterus are better characterized by MRI. Better localization of the site and exact number can be detected with MRI. Exact measurements, circumference of the lesion and degenerative changes can be told by MRI. The exact extent of the mass lesions was better depicted in MRI which helps in staging the tumour.
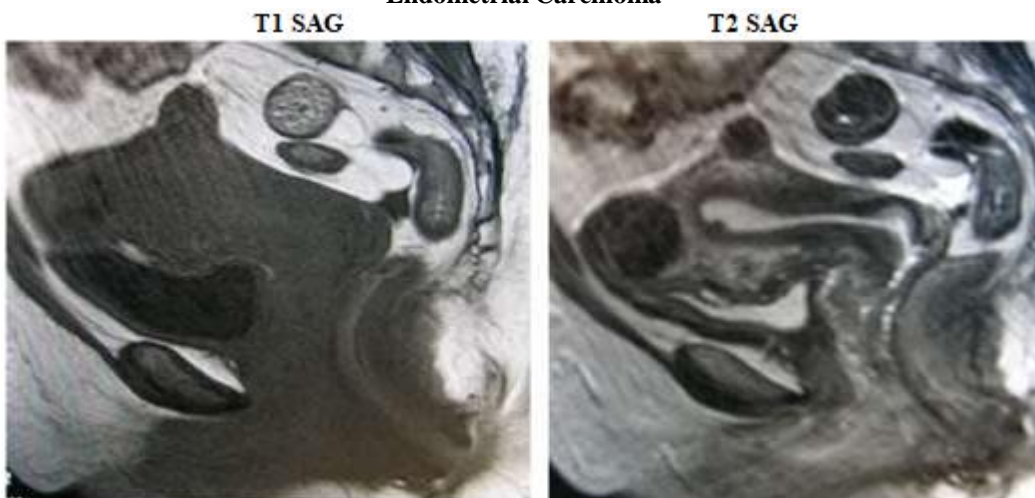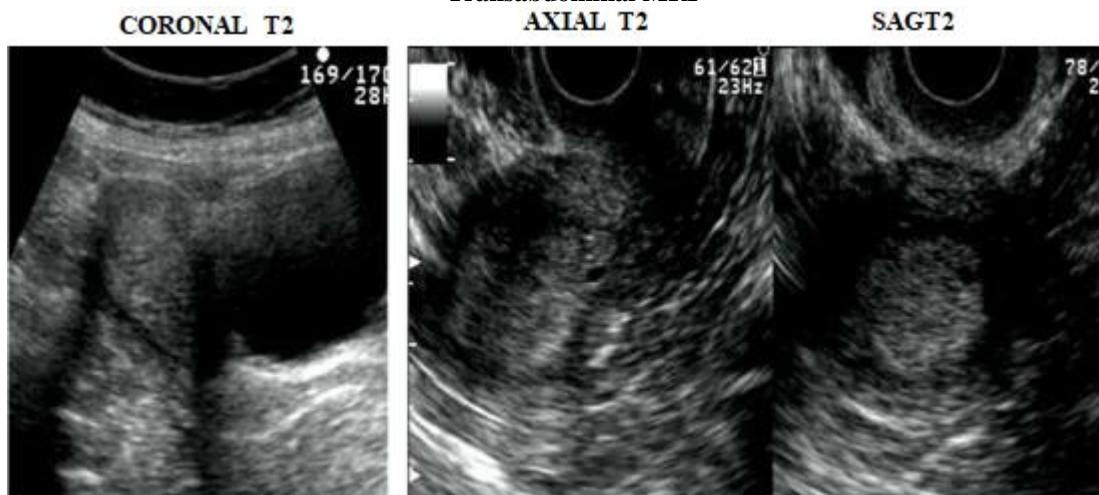
Adenomyosis

TRANSABDOMINAL MRI

USG TVS
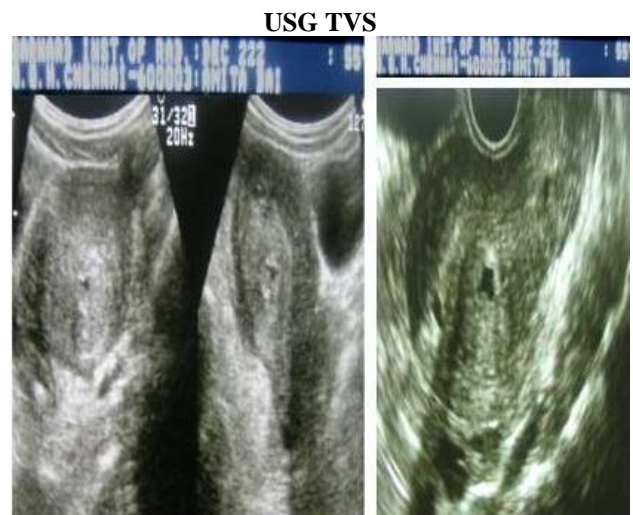
MRI
T1   SAG Coronal   T2 Axial T2

FIBRIOD UTERUS
Transabdominal

USG — TVS

Endometrial Carcinoma

T1 SAG — T2 SAG

Transabdominal MRI

CORONAL T2 — AXIAL T2 — SAGT2

MRI
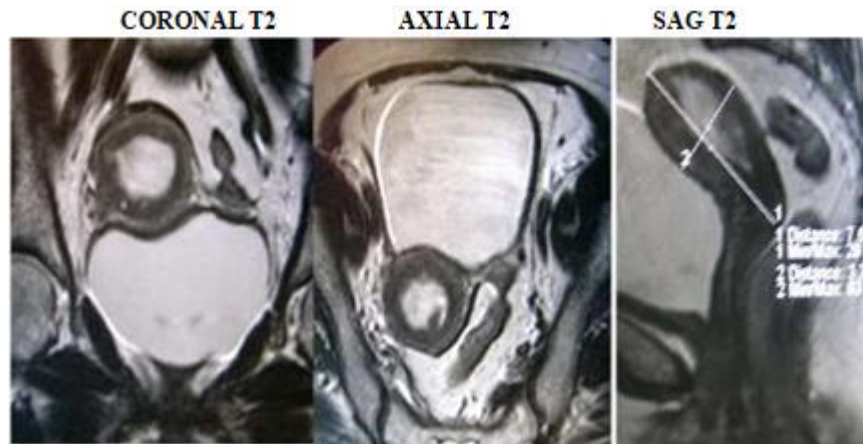
6. Conclusion

1) High spatial resolution MR imaging with CP spine Array coil is accurate for characterisation, localisation and evaluation of the number of lesions in benign uterine mass lesions and for staging of malignant mass lesions.

2) Pelvic MRI is the best modality to diagnose adenomyosis. Tran abdominal USG can be used as a screening modality to diagnose myometrial masses like fibroid. Calcific degeneration is better identified by Tran abdominal USG and Transvaginal USG. Cystic degeneration is better identified with Transvaginal USG and MRI. Sub mucosal lesions are better characterised by MRI than Transvaginal USG.

3) In endometrial lesion detection Transvaginal USG can be used as a screening modality. Tran abdominal USG is not useful. T2 weighted sequences and contrast enhanced T1 weighted MRI sequences are useful in lesion characterisation. In cases of endometrial carcinoma MRI diagnosis cannot obviate the need for endometrial biopsy. Myometrial invasion & extension of lesion are better detected by MRI in case of endometrial carcinoma.

4) In cervical lesions MRI detects even smaller nabothian cysts than Transvaginal USG and Tran abdominal USG. Cervical polyps are accurately diagnosed.

5) Extent of ca cervix, parametrial invasion, body or vaginal extension, haematometrocolpos and haematosalphinx are better detected in MRI than Transvaginal and Tran abdominal USG which helps in accurate staging.

6) As the surgical approach for fibroid and adenomyosis are drastically different, MRI should be used in preoperative evaluation of all suspected cases of adenomyosis and infertility.

7) Finally we conclude that pelvic MR Imaging compared to Transabdominal and Transvaginal USG is a well tolerated, non invasive and accurate modality to characterise uterine mass lesions with excellent histopathological correlation.

8) It is therefore an ideal and accurate preoperative imaging modality for characterising, localizing and detecting number & extent of uterine masslesions.

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