e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(11); 1001-1007

Original Research Article

MRI Study of Uterine Mass Lesions in Correlation with Trans-Abdominal, Trans-Vaginal Ultrasound using HPE as a Gold Standard

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Received: 13-09-2023 / Revised: 17-10-2023 / Accepted: 19-11-2023

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Conflict of interest: Nil

Abstract

Background: Although MRI is an expensive technique compared to USG, USG examination can't encompass every lesion or mass of the uterus due to the obscuration of the pelvis by bowel gas; hence, both studies are mandatory to conclude the uterine mass apart from the histopathology of the uterine mass.

Method: In 30 adult women with uterine masses, transabdominal ultrasound, transvaginal ultrasound, and MRI were performed in all patients. The observations were compared.

Results: The clinical manifestations were: 21 (70%) had pain, 11 (36.6%) had bleeding PV, 9 (30%) had discharged PV, 2 (6.6%) had a mass abdomen, 2 (6.6%) had loss of weight and appetite pre-menopausal, and 10 (33.3%) were post-menopausal.

According to their histopathological report, they were classified into five groups: adenomyosis was affected in 7 patients, fibroids were observed in 14 individuals, endometrial cancer was in 2 patients, and cervical cancer was polyp. Out of ten women, two had adnexal pathology.

Conclusion: TVS is a good screening modality, but MRI is definitely better for proper characterization and localization of fibroid, enabling clinicians to select the most appropriate management in clinical practice today.

Keywords: magnetic resonance imaging, histopathology, ultrasonography, uterine mass fibroid

Introduction

MRI appears to be an important pathology in diagnosing uterine pathologies, with an overall precision rate of 91–93%, particularly when contrast techniques are used [1]. Another widely used modality for evaluating pelvic pathology is ultrasonography. The advantage is that USGs are promptly available, reducing cost, and ensuring the safety and simplicity of the examination. However, the drawbacks of this modality include limited field of view, obstruction of the pelvis by bowel gas, and its dependence on the skill and expertise of the radiologist. A few lesions may get away from the field of view occasionally. MRI is expensive as compared to USG. It is also not advisable for patients with certain metallic implants and claustrophobic patients [2,3].

Among the reproductive age group, 15 to 20% of women are said to have a lesion of the uterus [4]. Hence, a detailed evaluation of uterine mass lesions with respect to number, location, size, and other measurements of degenerative changes within the lesions and the extent of the lesions is performed using trans-abdominal USG and trans-vaginal USG and correlated with the MRI final diagnosis by imaging mass compared with histopathological reports.

Hence, an attempt was made to compare MRI and USG in the detection of uterine mass or lesion and compare them with histopathological reports so that obstetrician, gynaecologist, or surgeon can have an ideal conclusion before and after surgery and such patients can be treated efficiently to avoid morbidity and mortalities.

Material and Method

30 patients regularly visited to Siddhartha Medical College hospital beside YSR Health University, Gunadala, Vijayawada, NTR district, Andhra Pradesh-520008 were studied.

Inclusive Criteria: Patients suspected of uterine tumours Aged between 25 to 60 years and given consent in writing that they were ready for treatment, they were selected for study.

Exclusion Criteria: Patients are not ready to undergo both TVS and MRI. The histopathology report was either incomplete or not accessible, and patients with claustrophobia were excluded from the study.

Method: Every patient underwent Tran's abdominal ultrasound, a trans-vaginal ultrasound, and an MRI. Depending upon the final diagnosis, they received endometrial curettage, cervical biopsy, myomectomy, or hysterectomy. The final histopathology report was treated as the gold standard for comparing the findings and final diagnosis of each imaging modality. Grey scale diagram transabdominal and transvaginal ultrasonography were performed using Esota mylab6 3500 series equipment with a 3.5 megahertz convex probe and a 5.0 megahertz transvaginal probe. The MRI was performed using a Philips Ingenia 1.5 tesla superconducting magnatone with a CP spine array coil. A preliminary abdominal examination as well as a speculum and vaginal examination were done. The bladder was full and optional conditions were met when the transabdominal ultrasound was conducted, then the bladder was emptied and the transvaginal ultrasound was performed. During both ultrasound tests, the following uterine parameters were noted. Endometrium homogeneous, echogenic / hypoechogenic in contrast to myometrium, endometrial thickness – measured from myometrial endometrial junction (outer echogenic layer) to the opposite myo-endometrial junction. The presence or absence of endometrial cavity fluid, any mass lesion inside the endometrium, and the characteristics of any mass present are all factors to consider (single or numerous). The myometrium was examined for the presence of any myoma, its location (sub-serosal, intramural, and sub-serosal), the number of lesions, their echogenicity, and calcification. cystic change within the lesion and shadowing. Any cysts in the myometrium, whether single or many, were noted, as well as their location, such as anterior or posterior myometrium. Is there an indentation on the bladder wall as a result of the lesion? Is the cervix healthy or unhealthy? Is a nabothain cyst, polyps, or tumour present? Is there a depression on the bladder as a result of the mass? Bilateral adnexa were performed to determine if the ovary was normal or abnormal and, if so, whether there were any masses or cystic abnormalities. Other conventional abdominal organ examinations were carried out, with any positive findings for hydronephrosis, ascitis, or lymphadenopathy being recorded.

The maximum junctional zone thickness was measured, and the junctional thickness was assessed using MRI in addition to the ultrasonogram data. The thickness of a single junctional zone is measured at its thickest point, and the thickness of myometrium is measured at the same level. Both T1 and T2-weighed images revealed the severity of the lesions. The number and location of the lesions were also noted. In instances of endometrial lesions, the quantity of myometrial invasion was quantified, while in cases of carcinoma of the cervix, the size of the lesions was measured. The abilities of MRI, trans-abdominal ultrasound, and trans-vaginal ultrasound to characterise and diagnose uterine mass lesions were compared to histological findings after hysterectomy, myomectomy, fractional curettage, and cervical biopsy.

The study of duration was September 2022 to October 2023.

Statistical analysis: Cohen's kappa and Z values are determined by comparing two modalities for diagnosing mass lesions in the uterus, such as trans-abdominal USG-MRI and trans-vaginal USG-MRI, which are classified by percentage. Cohen's kappa is used to compare the modalities correlation. The statistical analysis was carried out in SPSS software.

Observation and Results

Table 1: Clinical manifestations of patients of uterine mass 21 (70%) had pain, 11 (26.6%) had PV bleeding, 9 (30%) had discharge PV, 2 (6.6%) had mass abdomen, 2 (6.6%) had loss of weight and loss of apetite, 2 (6.6%) had dysmenorrhoea, 20 (66.6%) were premenopausal, 10 (33.3%) were post-menopausal.

Table 2: Comparison of modalities in myometrial mass detection myometrial mass trans-abdominal in –

(a) TV, USG – Mass about 18 patients ill defined in 3, present in 4
(b) Myometrial mass trans-abdominal USG, MRI 16 absent, 4 ill defined, 12 present
(c) Myometrial mass trans-vaginal USG, MRI 16 absent, 2 ill defined, 12 present

Table 3: (a) Categorising myometrial mass trans-abdominal and trans-vaginal in USG, MRI – sub mucosal 2, sub-serosal 4, sub muco 2, sub muco+subsero 2, Total 11

(b) Categorising myometrial mass trans-vaginal USG, MRI – 3 Intra mural, 3 sub-serosal, 1 sub-sero, sub-sero=subsero 2, Total 12

Table-4: (a) Comparison of sensitivity detaching of adenomyosis 31 USG, 58 TV,
USG, 81

(b) Comparison of sensitivity of fibroid detaching MRI 79, USG, 100 TV, USG, 100 MRI

Discussion

The present study of uterine mass lesions in correlation with trans-abdominal and trans-vaginal ultrasound using HPE as a gold standard in the Andhra Pradesh population The clinical manifestations were: 21 (70%) had pain, 11 (36.6%) had bleeding PV, 9 (30%) had discharge PV, 2 (6.6%) had mass abdominal, 2 (6.6%) had loss of weight and appetite, 2 (6.6%) had dysmenorrhoea, 20 (66.6%) were premenopausal, and 10 (33.3%) were post-menopausal (Table 1). In comparison of modalities in myometrial mass detection, myometrial trans-abdominal TV, USG study 18 had absence of mass, 3

had ill-defined mass, and 9 had presence of mass. In myometrial mass trans-abdominal USG, MRI 16 had absences of mass, 2 had ill-defined masses, and 12 had presences of mass. In the myometrial mass transvaginal USG MRI study, 16 had absences of mass, 2 had ill-defined masses, and 12 had the presence of masses (Table 2). In categorising myometrial mass abdominal and trans-vaginal in USG, MRI 5 had intramural mass, 2 had sub-serosal, and 4 had subserosal + intramural. In categorising myometrial trans-vaginal USG, MRI 1 had sub-mucosal, 5 had intramural, 1 had subserosal, and 5 had subserosal + intramural (Table 3). In comparison to the sensitivity of detection of adenomyosis, 31% was USG, 58% was TV USG, and 81% was MRI. In comparison of sensitivity of fibroid detection, 79% USG, 100% TV USG, and 100% MRI (Table 4) These findings were more or less in agreement with previous studies [5-7].

Accurate assessment of uterine mass studies remains an important component of clinical research endeavours as well as clinical management because many conservative therapeutic options rely on this information [8]. An optional imaging modality must have sensitivity for the detection of these lesions, and any discrepancy between the volume predicted by imaging and the actual pathological measurement should be small. Finally, measurable patient characteristics influencing the accuracy of the imaging modality need to be understood.

Definitive characterization of the lesion is important to decide on the treatment modality; for example, for myoma, myomectomy or hysterectomy can be done, but in the case of adenomyosis, hysterectomy is the treatment of choice for a definitive cure [9]. In the case of submucosal fibroid, if the endometrial surface circumference is more than 50%, it can be resected hysteroscopically; otherwise, it should be resected laparoscopically [10]. The same way for intramural fibroids, depending on the number and site of the lesion, laparoscopic resection or hysterectomy can be planned. It is stated that the exact location and extent of the lesion by various measurements like size and circumference have to be confirmed by MRI because the number of fibroids is predominantly sub-mucosal and small-sized [11], but it is reported that for picking up cystic degeneration within the fibroids, TVS and MRI are useful, and for calcification, TAS or TVS are more useful [12].

Summary and Conclusion

In the present correlative study to characterise, localise, and evaluate the number of lesions, both malignant and benign, along with their staging in pelvic pathologies, MRI is found to be more precise and many times the gold standard in comparison to USG. In cases of adenomyosis, MRI turned out to be more accurate in its diagnosis, whereas USG was found indeterminate in visualising the junctional zone. In cases of fibroids, in aiding their number and location, MRI was more superior to trans-abdominal and trans-vaginal USG. In endometrial lesions, transvaginal sonography can be used as a great screening tool, as trans-abdominal sonography was found to be less specific. MRI was found to be crucial in determining myometrial invasion. In the case of endometrial carcinoma, an MRI conclusion alone can't be conclusive; hence, histopathological studies can confirm the hyperplasia or carcinoma. USG lacks its specificity and sensitivity in relation to MRI but acts as a great screening tool in evaluation and further management as it is cost-effective and less time-consuming. MRI is a more precise pre-operative imaging modality for diagnosing and distinguishing the district features of various lesions with the help of HPE.

Limitation of study: The majority of benign lesions could not be followed by histopathology. Lack of trans-vaginal sonography in unmarried women and cases of carcinoma of the cervix Lack of MRI in patients with metallic implants and cardiac pacemakers

- The research work has been approved by the Ethical Committee of Siddhartha Medical College Hospital beside YSR Health University, Gunadala, Vijayawada, NTR district, Andhra Pradesh (520008).
- There is no conflict of interest.
- Self Funding

Table 1: Clinical Manifestation of patients of uterine mass lesions

Clinical Manifestations	No. of patients (30)	Percentage (%)
Pain	21	70
Bleeding PV	11	36.6
Discharge PV	9	30
Mass Abdominal	2	6.6
Loss of weight and appetite	2	6.6
Dysmenorrhoea	2	6.6
Menopausal status 1) Premenopausal	 20	 66.6
2) Post-menopausal	10	33.3

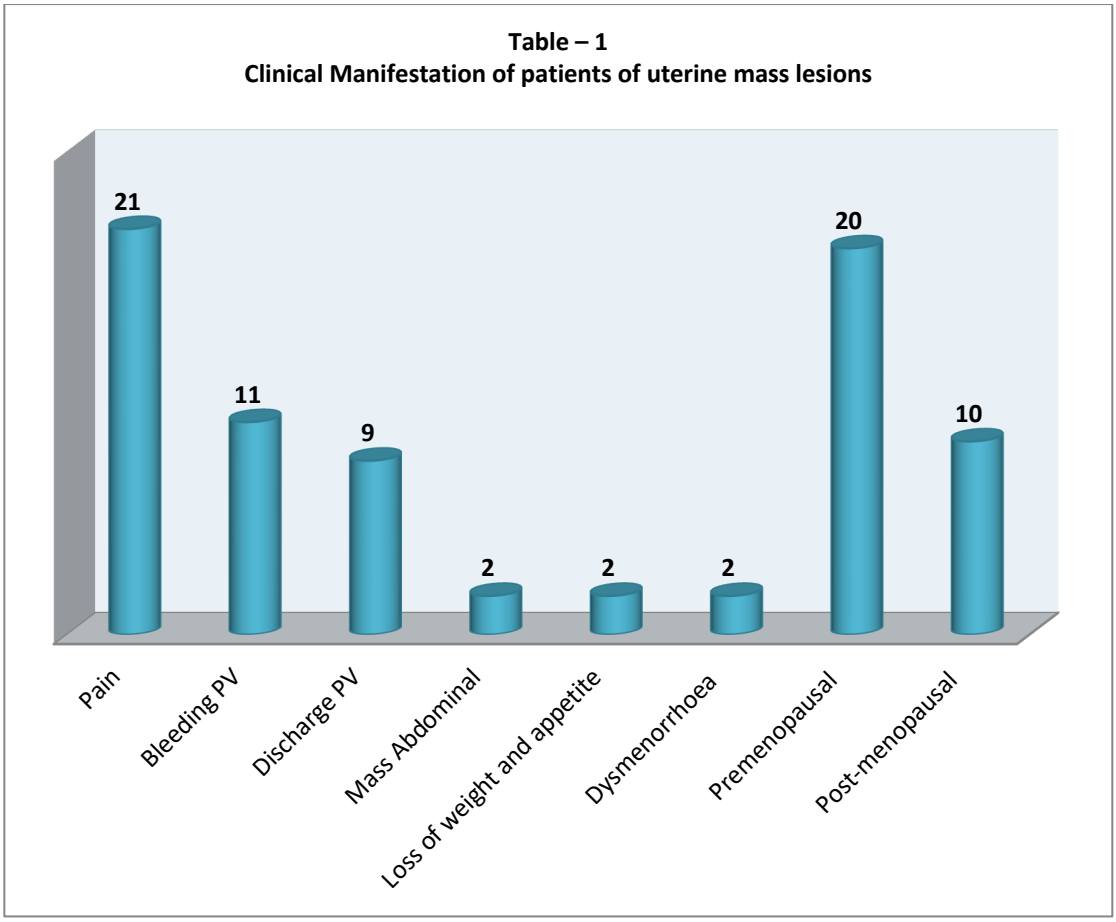


Table 2: Comparison of modalities in myometrial mass detection myometrial mass trans-abdominal and TV USG

Myometrial Mass trans abdominal TV USG					
Particular	**Type**	**Mass**	**Ill-defined**	**Present**	**Total**
USG Mass	Mass	16	2	1	19
	Ill-defined	1	1	3	5
	Present	1	0	5	6
	Total	18	3	9	30
Myometrial Mass trans abdominal USG, MRI					
USG Mass	Mass	15	1	1	17
	Ill-defined	1	1	4	6
	Present	0	0	7	7
	Total	16	2	12	30
Myometrial Mass trans Vaginal USG, MRI					
Trans vaginal USG mass	Mass	16	1	0	17
	Ill-defined	0	1	0	1
	Present	0	0	12	12
	Total	16	2	12	30

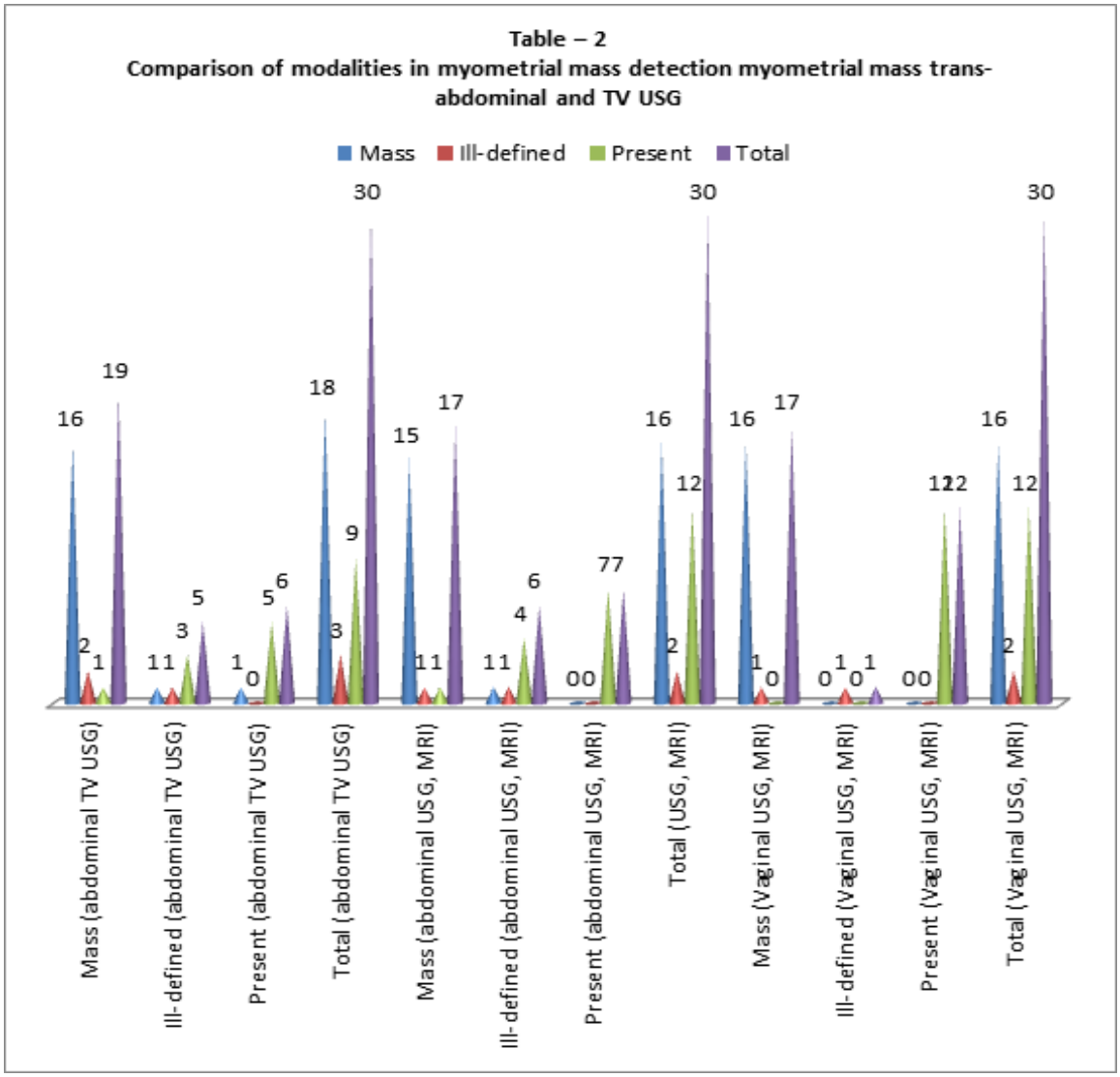


Table 3: Categorising Myometrial mass Trans abdominal and Trans vaginal in USG, MRI

MRI							**Total**
Intramural sub-mucosal			Sub-serosal+ Intra Mural				
	Sub-serosal				Sub Mucosal + sub serosal		
Categorizing mytometrial mass trans abdominal							
USG	Sub Muco	0	0	0	0	0	0
	Intra Mural	2	3	0	0	0	5
	Sub serosal	0	1	1	0	0	2
	Subserosal + intramural	0	0	0	2	2	4
	Total	2	4	1	2	2	11
Categorizing mytometrial trans vaginal USG MRI							
TV USG	Sub mucosal	1	0	0	0	0	1
	Intramural	2	3	0	0	0	5
	Sub serosal	0	0	1	0	0	1
	Sub serosal+ Intramural	0	0	0	3	2	5
	Total	3	3	1	3	2	12

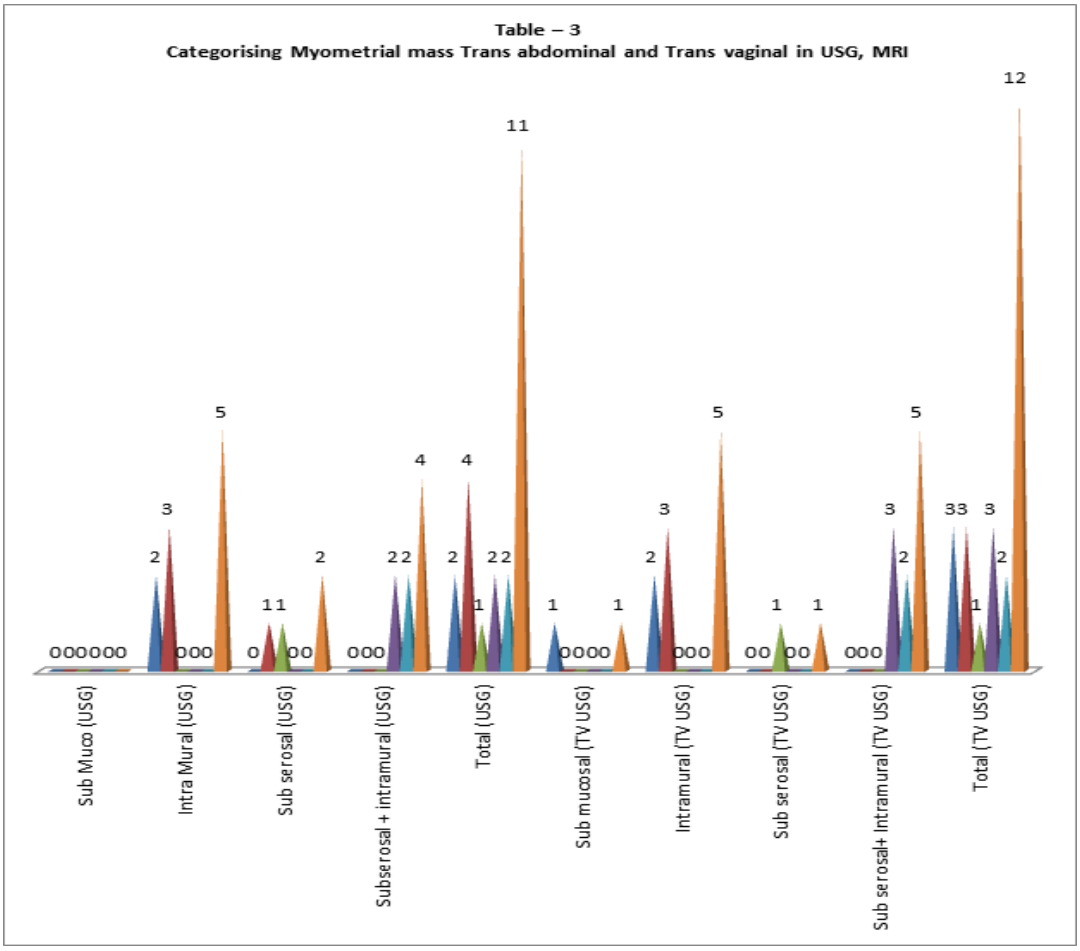


Table – 3
Categorising Myometrial mass Trans abdominal and Trans vaginal in USG, MRI
Sub Muco (USG)
Intra Mural (USG)
Sub serosal (USG)
Subserosal + intramural (USG)
Total (USG)
Sub mucosal (TV USG)
Intramural (TV USG)
Sub serosal (TV USG)
Sub serosal+ Intramural (TV USG)
Total (TV USG)

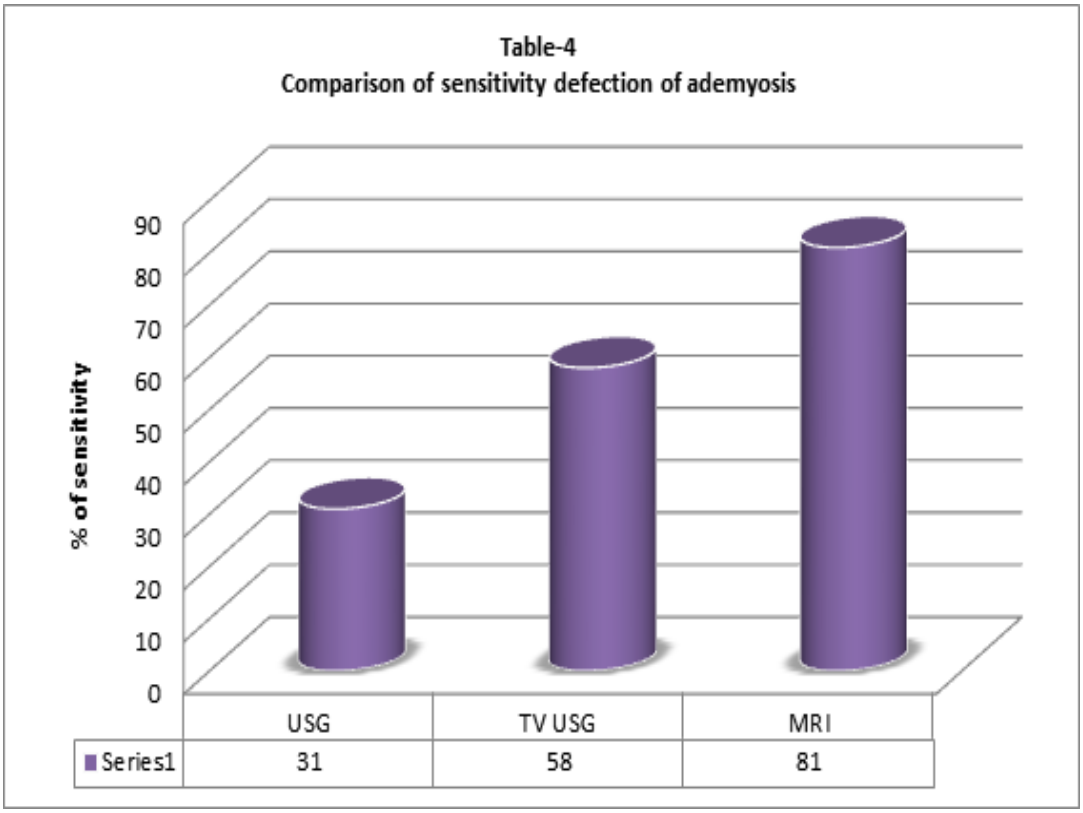
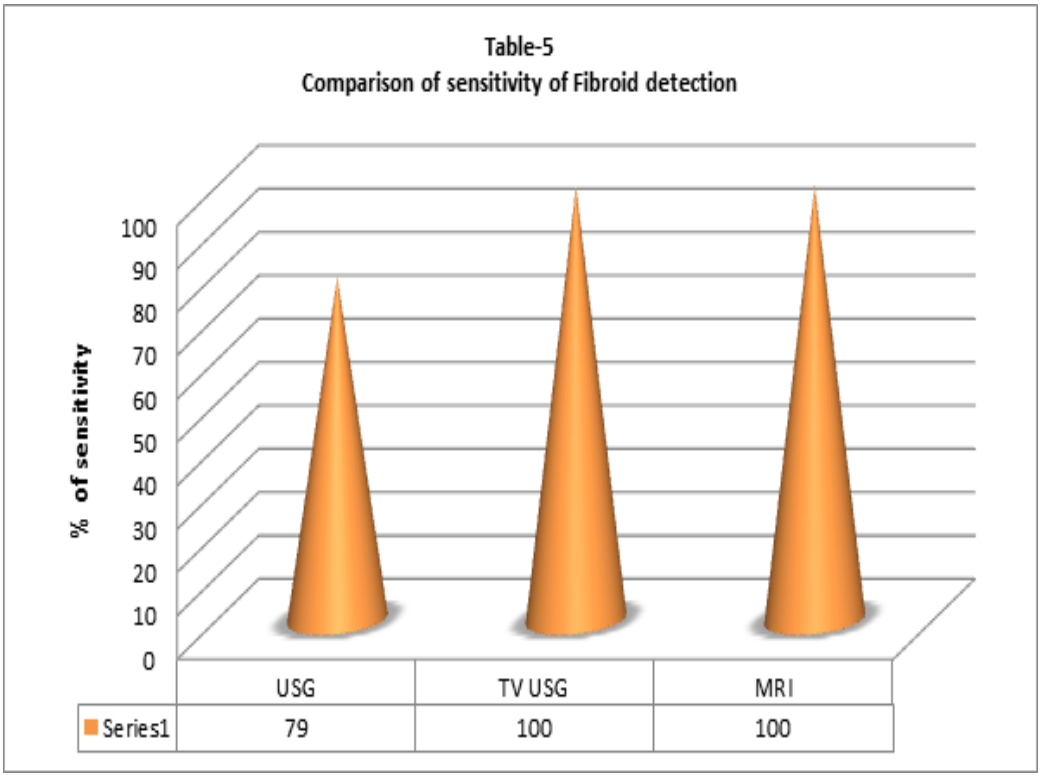


Table-4
Comparison of sensitivity defection of ademyosis
% of sensitivity
0
10
20
30
40
50
60
70
80
90
USG
TV USG
MRI
Series1
31
58
81

Table-5
Comparison of sensitivity of Fibroid detection



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