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Original Research Article

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

Milind Mukund Sule[1], Ishika Yadhav[2], Divyesh Goswami[3]

[1]Assistant professor, Department of Radiology, Pacific Medical College and Hospital, Bhilon Ka Bedla Pratap Pura, Girwa Rajasthan – 313001

[2]3rd Year Resident, Department of Radiology, Pacific Medical College and Hospital, Bhilon Ka Bedla Pratap Pura, Girwa Rajasthan – 313001

[3]Associate Professor, Department of Pathology, Nootan Medical College and Research Center, Visnagar-384315

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Corresponding Author: Dr. Ishika Yadhav

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Abstract:

Background: Even though MRI is an expensive technique, not every lesion or mass of the uterus can be visualized on ultrasound due to obscuration of the pelvis by bowel gas; hence, both studies are mandatory to conclude the uterine mass in addition to the histopathology of the uterine mass.

Method: In 90 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 63 (70%) had pain, 33 (36.6%) had bleeding PV, 27 (30%) had discharged PV, 6 (6.6%) had a mass abdomen, 6 (6.6%) had loss of weight and appetite pre-menopausal, and 30 (33.3%) were post-menopausal. According to their histopathological report, they were classified into five groups: adenomyosis was affected in 21 patients, fibroids were observed in 42 individuals, endometrial cancer was in 6 patients, and cervical cancer was polyp. Out of ten women, two had adnexal pathology.

Conclusion: To localize, characterize, and evaluate the number of uterine lesions, both benign and malignant, along with their staging in pelvic pathologies, MRI was found to be more precise and the gold standard in comparison to USG. Most times, MRI had an edge over USG in detecting endometrial invasion in the case of endometrial carcinoma and staging in the case of cervical carcinoma.

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

Introduction

Mass lesions in the uterus are a commonly encountered problem globally. Over the years many imaging modalities like trans-abdominal ultra sound, transvaginal ultra sound (TVS), colour Doppler, computed tomography, Magnetic Resonance imaging (MRI) have been tried to characterize fibroids. But even today, ultrasound is the screening imaging modality of choice [1]. A definitive characterization of the lesion is important to decide on the treatment modality. In the case of uterine fibroids, myomectomy or hysterectomy can be planned depending upon its characteristics; this status is the need for a definitive preoperative diagnosis [2]. In the case of submucosal fibroids, if the endometrial surface circumference is more than 50%, it can be resected hysteroscopically; otherwise, it should be resected laparoscopically [3]. Similarly for intramural fibroids, depending on the number and site of the lesion, laparoscopic resection or hysterectomy can be planned. It states the need for the exact location and extent of the lesion by various measurements like size and circumference. There is a need for better imaging modality for definitive characterization of uterine mass lesions, leading to the use of MRI as a diagnostic tool in preoperative evaluation. MRI is a recently devised modality that is done in sagittal, axial, and coronal planes using body surface coil T1 and T2 weighted sequences [4]. Hence, an attempt is made to assess and compare these two modalities in characterizing uterine fibroids and compare their sensitivity and positive productivity values by using histopathology CHDE as gold standard.

Material and Method

90 (ninety) patients regularly visited to Pacific Medical College and Hospital, Bhilon ka Bedla Pratap Pura, Girwa Rajasthan-313001 were studied.

Inclusion Criteria: Patients suspected of having uterine tumors. Aged between 25 to 60 years and given consent in writing that they were ready for treatment, they were selected for the 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 Transabdominal ultrasound, transvaginal 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 Samsung V8 ultrasound machine with a 2.5-5 MHz convex probe and a 4.0-9.0 mHZ transvaginal probe. The MRI was performed using a Siemens 1.5 tesla MRI system "Magnetom Essenza" with Tim + Dot technology with a CP spine array coil. 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 is homogeneous, echogenic/ hypoechogenic in contrast to the myometrium, and the endometrial thickness is measured from the myometrial-endometrial junction (outer echogenic layer) to the opposite myoendometrial 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 (subserosal, intramural, and subserosal), 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 nabothian cyst, polyps, or tumor 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, ascites, 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 the myometrium is measured at the same level. Both T1 and T2-weighted 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, transabdominal ultrasound, and transvaginal ultrasound to characterize and diagnose uterine mass lesions were compared to histological findings after hysterectomy, myomectomy, fractional curettage, and cervical biopsy. The study of duration was from June 2024 to February 2025.

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 with uterine mass 63 (70%) had pain, 33 (26.6%) had PV bleeding, 27 (30%) had discharge PV, 6 (6.6%) had a mass abdomen, 6 (6.6%) had loss of weight and loss of appetite, 6 (6.6%) had dysmenorrhea, 60 (66.6%) were premenopausal, and 30 (33.3%) were post-menopausal.

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

(a) TV, USG Mass about 54 patients ill-defined in 9, present in 12

(b) Myometrial mass trans-abdominal USG, MRI 48 absent, 12 ill-defined, 36 present

(c) Myometrial mass transvaginal USG, MRI 48 absent, 6 ill-defined, 36 present

Table 3: (a) Categorizing myometrial mass trans-abdominal and trans-vaginal in USG, MRI— submucosal 6, subserosal 12, submucosal 6, submucosal + subserosal 6, total 33.

(b) Categorizing myometrial mass transvaginal USG, MRI–9, intramural 9, subserosal 3, subserosal 9, subserosal, subserosal 6, total 36.

Table 4: Comparison of Sensitivity detection of adenomyosis.

(a) Comparison of sensitivity detaching of adenomyosis 93 USG, 174 TV, USG 243.

(b) Comparison of sensitivity of fibroid detaching MRI 84, USG, 100 TV, USG, 100 MRI.

Table 1: Clinical Manifestation of patients of uterine mass lesions

Clinical Manifestations	No. of patients (90)	Percentage (%)
Pain	63	70
Bleeding PV	33	36.6
Discharge PV	27	30
Abdominal Mass	6	6.6
Loss of weight and appetite	6	6.6
Dysmenorrhoea	6	6.6
Menopausal status - 1)Premenopausal	60	66.6
2)Post-menopausal	30	33.3

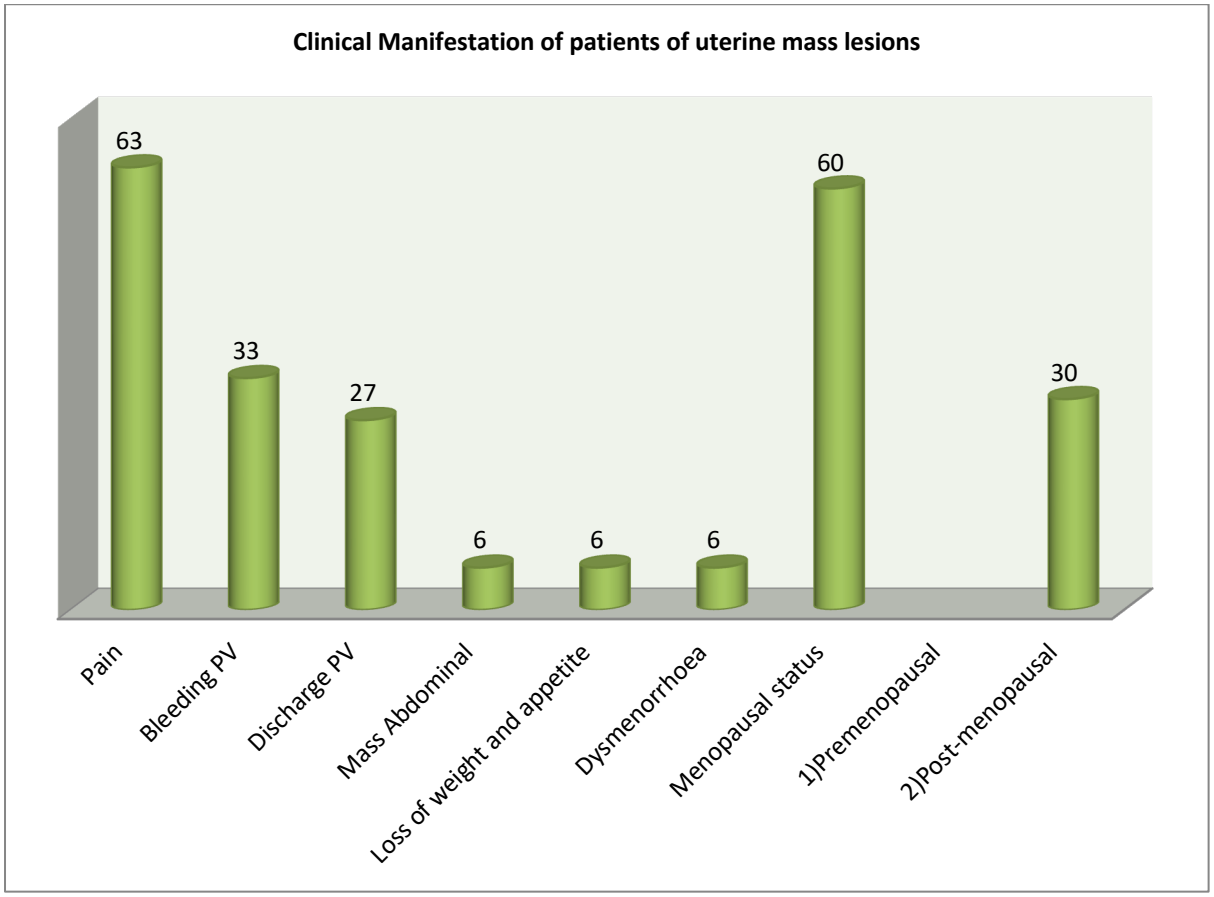

Figure 1: Clinical Manifestation of patients of uterine mass lesions

Table 2: Comparison of modalities in detection of myometrial mass on TAS and TVS

Myometrial Mass on TAS and TVS			
Absent	**Ill-defined**	**Present**	**Total**
54	9	27	90
Myometrial Mass transabdominal USG and MRI			
48	6	36	90
Myometrial Mass transvaginal USG and MRI			
48	6	36	90

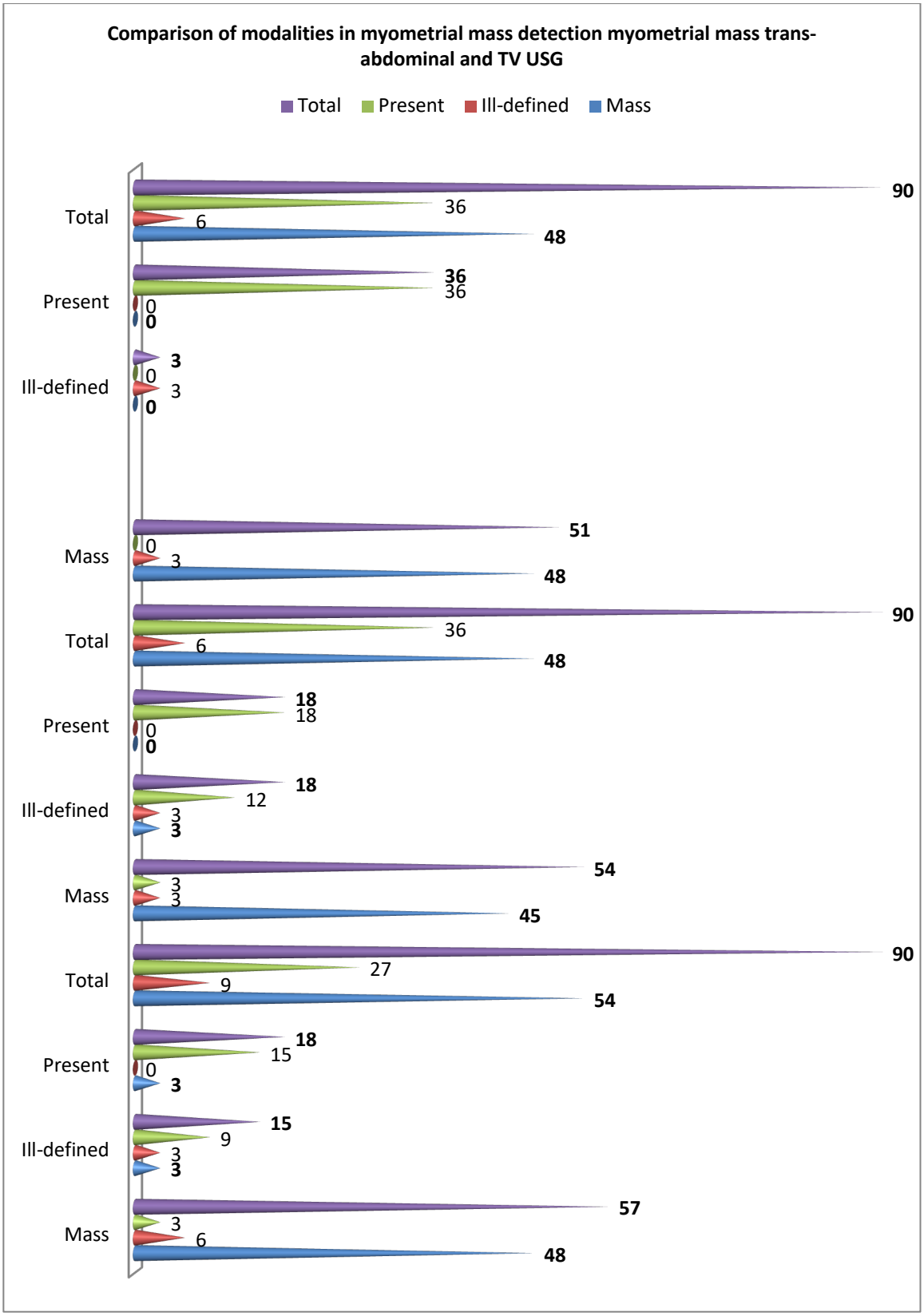

Figure 2: Comparison of modalities in myometrial mass detection myometrial mass trans-abdominal and TV USG

Table 3: Categorizing Myometrial mass Transabdominal and Transvaginal in USG, MRI

	Submucosal	Intramural	Subserosal	Subserosal+intramural	Total
TAS	0	15	6	12	33
TVS	3	15	3	15	36

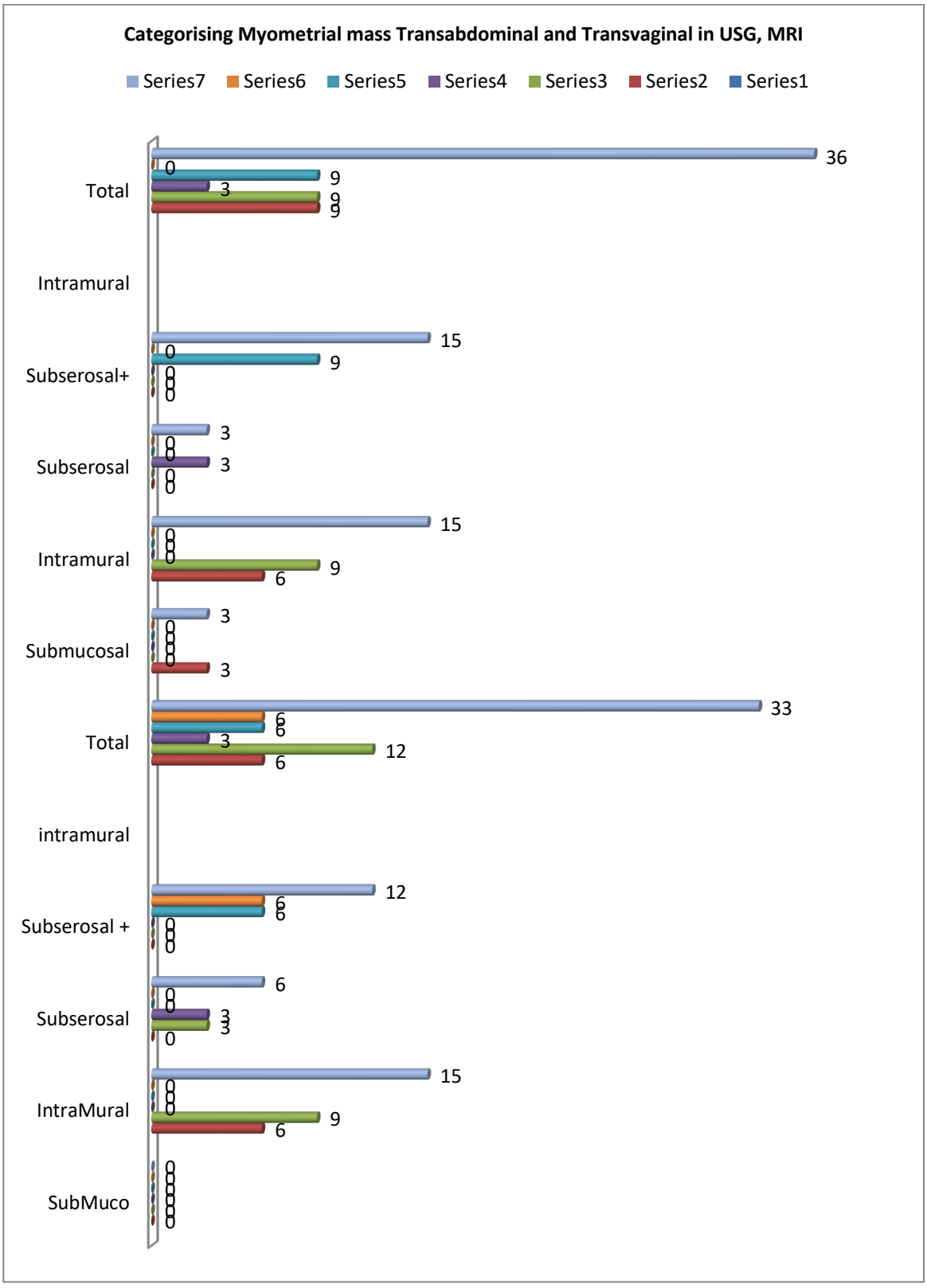

Figure 3: Categorising Myometrial mass Transabdominal and Transvaginal in USG, MRI

Table 4: Comparison of Sensitivity detection of adenomyosis

Details	Sensitivity	Percentage (%)
USG	93	103.3
TV USG	174	193.3
MRI	243	270.0

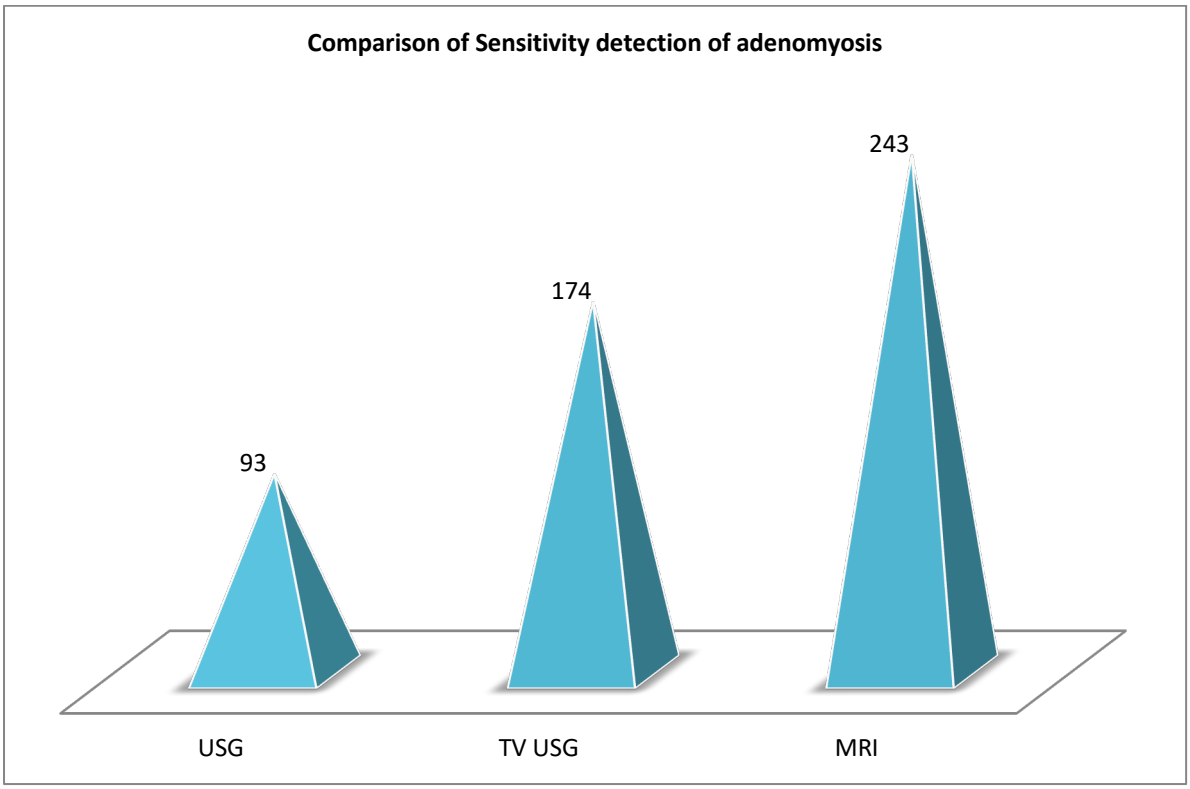

Figure 4: Comparison of Sensitivity detection of adenomyosis

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 Rajasthan population The clinical manifestations were: 63 (70%) had pain, 33 (36.6%) had bleeding PV, 27 (30%) had discharge PV, 6 (6.6%) had mass abdominal, 6 (6.6%) had loss of weight and appetite, 6 (6.6%) had dysmenorrhea, 60 (66.6%) were premenopausal, and 30 (33.3%) were postmenopausal (Table 1). In comparison of modalities in myometrial mass detection, myometrial transabdominal TV, USG study 54 had an absence of mass, 9 had ill-defined mass, and 27 had presence of mass. In myometrial mass trans-abdominal USG, MRI 48 had absences of mass, 6 had ill-defined masses, and 36 had presences of mass.

In the myometrial mass transvaginal USG MRI study, 48 had absences of mass, 6 had ill-defined masses, and 36 had the presence of masses (Table 2). In categorizing myometrial mass abdominally and transvaginally in USG, MRI 15 had an intramural mass, 6 had subserosal, and 12 had subserosal + intramural. In categorizing myometrial transvaginal USG, MRI 3 had submucosal, 15 had intramural, 3 had subserosal, and 15 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 [5,6,7]. Accurate assessment of uterine mass studies remains an important component of clinical research endeavors 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 a 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 submucosal 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 characterize, localize, 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 visualizing 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 transabdominal 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 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 distinct 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 Pacific Medical College and hospital, Bhilon ka Bedla Pratap pura, Girwa Rajasthan – 313001

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