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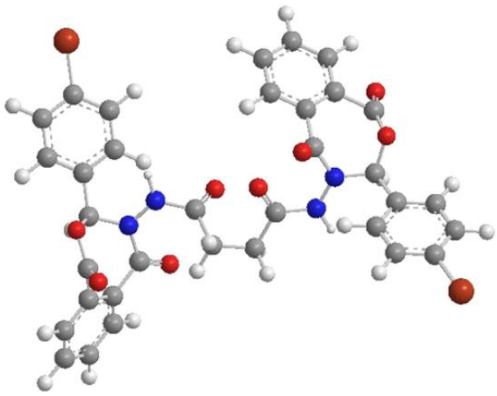

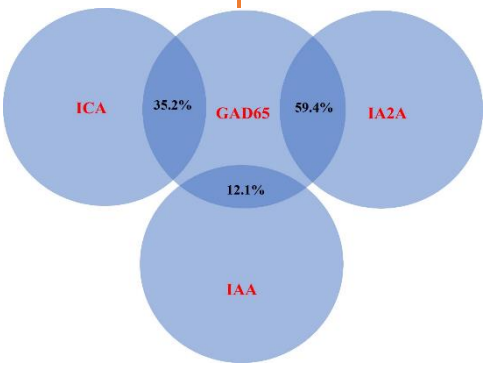

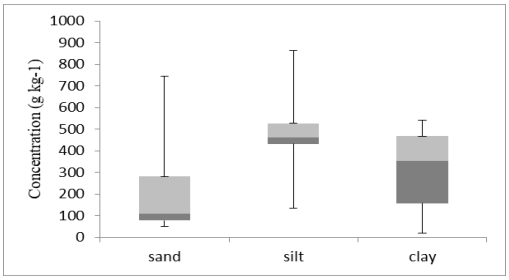

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Role of Magnetic Resonance Imaging in Characterization and Management of Uterine Leiomyoma

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Abstract

Background: The most frequent benign disease affecting women of reproductive age is uterine leiomyoma. Magnetic Resonance Imaging (MRI) is the current state of art imaging modality for localization and characterization. **Objective:** To determine the relevance of MRI in the Characterization and management of leiomyoma and to analyze clinical practice advantages of MRI findings. **Patients and Methods:** This study included 50 individuals with uterine fibroids detected By trans-abdominal or trans-vaginal US. MRI was done to confirm, characterize and pinpoint their exact location and any abnormal characterization**. Results:** There was a significant ($p \leq 0.05$) association between the impression of fibroid (non-degenerated, degenerated leiomyoma), post-gadolinium enhancement of fibroid and histopathological findings. There was no significant relationship between MRI (T1-weighted image) results, and MRI (T2-weighted image), their histological findings, and management. **Conclusions:** leiomyomas can provide a standard signal during MR imaging, but larger tumour may display a variety of degeneration patterns that significantly alter the look of the lesion. MRI provide better fibroid characterization, helps differentiate degenerated from non-degenerated leiomyoma and guides in choosing safe and better management procedure.

Introduction

The most frequent diseases that women of reproductive age confront are uterine leiomyoma, also known as myoma or fibroids of the uterus, which are essentially benign and originate from the smooth muscle of the uterus [1]. According to an epidemiological analysis, women in affluent nations have a cumulative incidence of 70–80% of this uterine leiomyoma by age 50 [2].

Many factors are considered risk factors for uterine fibroid, including black race, age, premenopausal status, high blood pressure, family history, time since last birth, food additives and consumption of soy milk. However, some factors have been shown to reduce the risk of uterine fibroids, such as oral contraceptives or the injectable medroxy progesterone acetate contraceptive solution [3]. In 30% of cases, uterine fibroids, in turn, cause morbidity due to abnormal uterine bleeding (heavy menstrual bleeding inducing anaemia) and pelvic pressure (urinary symptoms, constipation, and tenesmus) [4]. Therefore, current management strategies are mainly directed toward surgical interventions [1].

The surgical intervention is hysterectomy, myomectomy through hysteroscopy, laparoscopy or laparotomy. In these surgical interventions, when a power morcellator is used, in turn, complications, such as dissemination

of the occult malignant cells into the abdominal and peritoneal cavity and shortened survival of patients in case of misdiagnosed uterine sarcoma as a uterine leiomyoma, which is the second most common unexpected malignancy after surgery. MRI is indicated to detect the atypical appearance of fibroids, as it is also essential before fertility-preserving treatment methods like uterine artery embolization (UAE), to detect the viability of leiomyoma and following it up post-treatment and therapeutically in the form of MRI guided ultrasound focus ablation. Therefore, many researchers are trying to find innovative methods to differentiate between benign and malignant lesions of the uterus before surgery [5]. MRI of uterine leiomyoma is necessary before uterine artery embolization as a fertility preservation method preventing damage to the endometrial lining by surgery to detect viability of the leiomyoma.

Recent research on medical management has demonstrated the critical involvement of progesterone pathways in the pathophysiology of uterine fibroids; as a result, case-specific circumstances imply the use of selective progesterone receptor modulators (SPRMs) such as ulipristal acetate (UPA) is effective. These act as alternatives to surgical intervention, which is a real possibility, particularly for females hoping to maintain fertility [6]. Many diagnostic tests are available to diagnose uterine fibroid, including pelvic examination [4], ultrasound [7], hysteroscopy [8], and MRI [9]. Therefore, this study aims to determine the specific role of MRI in uterine leiomyoma.

Materials and Methods

Study setting

This prospective, observational and cross-sectional study was conducted on 50 patients from December 2021-June 2022.

Inclusion criteria

Patients with uterine leiomyoma were included regardless of age, ethnicity, or nationality.

Exclusion criteria

Pre-pubertal cases, cases with improper/incomplete MRI examination, or unavailable clinical data are excluded.

Ethical consideration

The study protocol was revised and approved by the scientific and ethical committees of the College of Medicine, University of Sulaimani, Sulaimaniyah, Iraq (No. 236 on 19/12/2021). Also, a written informed consent was obtained from patients to participate in the study.

Questionnaire

A self-prepared questionnaire was used to collect data from patients, such as occupation, age, weight, height, marital status, obstetric and gynecological history, past medical history, drug history, and family history, as well as MRI characteristics of leiomyoma.

Study protocol

The patients diagnosed with uterine fibroids by ultrasound (US) underwent MRI for more confirmation. MRI differentiate pedunculated leiomyoma from adnexal mass and characterized leiomyoma and their exact location & volume. MRI was done in three different imaging centers in Sulaimani, Iraq, using (Philips Ingenia 1.5T 2019, Siemens Magnetom Avanto 1.5T 2015 or GE HDX 1.5T 2009). The MRI sequences were practically the same in all.). The following parameters were used nearly the same way in all imaging: T1-

weighted turbo spin-echo sequences in axial and sagittal planes pre- and post-contrast, and fat-saturated T1-weighted imaging in same planes, T2-weighted turbo-spine echo sequences in axial, sagittal and coronal planes, diffusion sequences in the axial plane which are diffusion-weighted image (DWI) and apparent diffusion coefficient map (ADCmap). Each center employed a different kind of IV gadolinium-based contrast medium (Gadobutrol 1.0 mmol/ml, 8–10 Ml/patient), which contains 604.72 mg of gadobutrol/mL, and Dotarem (Gadoteric acid 0.5 mmol/mL in which 1 mL of solution contains 279.32 mg of gadoteric acid equivalent to 0.5 mmol/mL given with 14-16 mL for each patient). For all sequences, the field of view was customized to the patient size. The slice thickness was set at 5 mm.and in cases of more than one fibroid, we chose the largest one, the fibroid volume measured by ellipsoid formula (length × width × height) × 0.52.

Statistical analysis

The data were entered into SPSS, version 24 and analyzed. The chi-square test was used to estimate the relationship between the variables, and statistical significance was set when $p \leq 0.05$.

Results

Table 1 shows patients' ages ranged from 19 to 77 years old, with a mean age of 44.6 years. At the same time, the patients' weights varied from 50 - 90 kg, with a mean weight of 71.4 kg. The sample's median height was 162 cm, ranging from 150 cm at the lowest point to 174 cm at the highest. Patients' mean body mass index (BMI) was 27.2 kg/m² with a minimum value of 19.5 and a maximum value of 34.7. The average age of menarche was 12.6 years, ranging from 11 to 14 years. The number of pregnancies varied from 0 to 12, with a mean of 2.98. The fibroid volume ranged from 2.0 to 2060 cm^3 with a mean volume of 243.5.

Table 1: Descriptive characteristics for continuous measures.

Characteristic	Minimum	Maximum	Mean±SD
Age (Years)	19.0	77.0	44.6±10.8
Weight (Kg)	50.0	90.0	71.4±10.8
Height (m)	1.50	1.74	1.62±0.06
BMI	19.5	34.7	27.2±3.9
Age of menarche (Years)	11.0	14.0	12.6±0.64
Number of pregnancies (gravida)	0.0	12.0	2.98±2.89
The volume of fibroid (cm^3)	2.0	2060.0	243.5±365.3
Kg: Kilogram; m: Meter; BMI: Body Mass Index; cm: Centimeter			

The bulk of the patients (66%) were housewives. Menorrhagia was the most prevalent clinical manifestation, followed by abdominal pain, pelvic pain, backache, and leg pain. Most patients (73%) were more than normal weight (46% overweight and 28% obese), and around 80% were married. About 84% had a history of abortion, contraception was used in 74%, and breastfeeding was observed in 56% of the cases. In comparison, 24% and 6% of patients had a history of hypertension and diabetes, respectively. Multiple fibroids (≥3 in number) were present in 48%, followed by single fibroids (40%) and fibroids (12%). The outline of the fibroid was lobulated in 58% of cases and well-circumscribed in 42% of cases. According to the International Federation of Gynecology and Obstetrics classification of fibroid (FIGO), 24% of the fibroid cases were subserosal pedunculated (FIGO7), 18% were submucosal-subserosal with ≥50% were intramural (hybrid 2-5),16% were utterly intramural (FIGO 4),12% were submucosal with ≥50% were intramural (FIGO2), and 10% were subserosal with ≥50% intramural (FIGO5). Another 10% were cervical (FIGO8). Only 2% were 100% intramural and contacting endometrium (FIGO3), 6% were subserosal with <50% intramural (FIGO6), and 2% were submucosal with <50% intramural (FIGO1). Regarding the location of the fibroids, most of them (no.=13) was anterolateral, 36% were placed on follow-up, 34% underwent myomectomy, and a hysterectomy was done for 30% of cases. Regarding histology, 59.4% had degenerated leiomyoma, and 40.6% displayed

ordinary leiomyoma (classic or not degenerated leiomyoma). On MRI, T1-weighted images revealed that 64% of fibroids had homogeneous low signal intensity, 24% had homogenous intermediate signal intensity and 6% were heterogeneous and heterogeneous with high signal T1 areas. T2-weighted images revealed heterogeneity in 34% of the fibroids, low homogeneous signal intensity, heterogeneous with high T2 areas in each of the 28% of fibroids, and homogenous intermediate signal intensity in 10% of the fibroids. While 40% of the fibroids had homogeneous enhancement after contrast, 32% had heterogeneous enhancement with non-enhancing parts, and the remaining 28% displayed heterogeneous enhancement (Table 2).

Table 2: Sociodemographic variables and descriptive statistics regarding fibroids, their management, and MRI variables.

Characteristic	Category	No.	%
Occupation	Housewife	33	66.0
	Employee	17	34.0
Chief complaint	Menorrhagia	30	60.0
	Abdominal pain	8	16.0
	Pelvic pain or heaviness	3	6.0
	Backache	1	2.0
	Leg pain	1	2.0
	Incidental findings	7	14.0
BMI	Normal (18.5-24.9)	13	26.0
	Overweight (25-29.9)	23	46.0
	Obese (≥30)	14	28.0
Marital status	Married	40	80.0
	Single	10	20.0
Parity	Para	34	68.0
	Nullipara	16	32.0
Abortion	Yes	8	16.0
	No	42	84.0
Contraception	Yes	37	74.0
	No	13	26.0
Breastfeeding	Yes	28	56.0
	No	22	44.0
Hypertension	Yes	12	24.0
	No	38	76.0
Diabetes mellitus	Yes	3	6.0
	No	47	94.0
Family history of fibroid	Yes	10	20.0
	No	40	80.0
Past surgical history	Yes	29	58.0
	No	21	42.0
Vitamin D. deficiency	Yes	16	32.0
	No	34	68.0
Number of fibroids	1	20	40.0
	2	6	12.0
	≥3	24	48.0
Outline	Well circumscribed	21	42.0
	Lobulated	29	58.0
FIGO-type	Submucosal with <50% intramural(FIGO1)	1	2.0
	Submucosal with ≥50% intramural(FIGO2)	6	12.0
	100% intramural, contacts endometrium(FIGO3)	1	2.0
	Intramural(FIGO4)	8	16.0
	Subserosal ≥50% intramural(FIGO5)	5	10.0
	Subserosal <50% intramural(FIGO6)	3	6.0
	Sub-serosal pedunculated(FIGO7)	12	24.0
	Cervical(FIGO8)	5	10.0
	Submucosal - subserosal and ≥50% intramural (hybrid)	9	18.0
Impression of fibroid	Ordinary (non-degenerated)	17	34.0

	Degenerated	33	66.0
Associated findings	Yes	8	16.0
	No	42	84.0
Management	Follow-up	18	36.0
	Myomectomy	17	34.0
	Hysterectomy	15	30.0
Histopathology	Ordinary (non-degenerated)	13	40.6
	Degenerated	19	59.4
MRI variable			
T1 -weighted image	Homogenous low SI	32	64.0
	Homogenous intermediate SI	12	24.0
	Heterogeneous SI	3	6.0
	Heterogeneous with high signal T1 areas	3	6.0
T2-weighted image	Homogenous low SI	14	28.0
	Homogenous intermediate SI	5	10.0
	Heterogeneous SI	17	34.0
	Heterogeneous with highT1 signal areas	14	28.0
Contrast enhancement	Homogenous enhancement	20	40.0
	Heterogeneous enhancement	14	28.0
	Heterogeneous enhancement with non-enhancing areas	16	32.0
DWI & ADC map	Low signal DWI & Low ADC map signal(No Restricted Diffusion)	12	24.0
	Low signal DWI & high ADC map signal(No Restricted Diffusion) (Cellular Fibroid)	22	44.0
	Low signal DWI & low ADC map signal with high signal areas (No restricted diffusion)	15	30.0
	High Signal DWI &low ADC map Signal (Restricted diffusion)	1	2.0
SI: Signal intensity, ADC: Apparent diffusion coefficient, BMI: Body mass index, DWI: Diffusion Weighted image			

There was no significant correlation between T1-weighted images MRI findings of fibroids and how they were managed (p=0.437) and histological findings (p=0.733). Most fibroids on the T2-weighted images (no.=17) were heterogeneous signal intensity. There was no significant relationship between MRI T2-weighted image results of fibroids and their management (p=0.080) and histological findings (p=0.113). Also, there was no significant correlation between fibroids' therapy and their MRI contrast enhancement image findings (p=0.562). But, there was a significant correlation between MRI contrast enhancement image findings and histopathological features (p=0.0099). There was no significant association between the impression of fibroid-type (ordinary or degenerated) from MRI findings and its management (p=0.754). Nevertheless, there was a significant association between the appearance of fibroid type from MRI findings and histopathological findings of fibroids (p=0.002). The majority of patients (75.0%) with ordinary MRI (non-degenerated) had ordinary histological traits, while 80.0% of patients with degenerated MRI findings shared the same characteristics (Table 3).

Table 3: Correlation between MRI findings (T1-weighted image, T2-weighted image, impression of fibroid, and contrast enhancement), management and histopathological findings.

T1-weighted image categories	**Management**			**p-value**	**Histopathology**		**p-value**
	Follow-up	**myomectomy**	**hysterectomy**		**Ordinary**	**Degenerated**	
	No., %				**No. %**		
Homogenous low	12 (37.5)	11 (34.4)	9 (28.1)	p=0.437	9 (45)	11 (55)	p=0.733
Homogenous intermediate	3 (25)	3 (25)	6 (50)		3 (33.3)	6 (66.7)	
Heterogeneous	1 (33.3)	2 (66.7)	0 (0.0)		1 (50)	1 (500	
Heterogeneous with high T1 areas	2 (66.7)	1 (33.3)	0 (0.0)		0 (0.0)	1 (100)	
T2 –weighted image categories							
Homogenous low	5 (35.7)	4 (28.6)	5 (35.7)	p=0.080	6 (66.7)	3 (33.3)	p=0.113
Homogenous intermediate	2 (40)	0 (0.0)	3 (60)		1 (33.3)	2 (66.70	

Heterogeneous	6 (35.3)	10 (58.8)	1 (5.9)		5 (45.5)	6 (54.5)	
Heterogeneous with high signal areas	5 (35.7)	3 (21.4)	6 (42.90		1 (11.1)	8 (88.9)	
Contrast enhancement							
Homogenous enhancement	9 (45)	5 (25)	6 (30)		8 (72.7)	3 (27.2)	
Heterogeneous enhancement	4 (28.6)	7 (50)	3 (21.4)	p=0.562	4 (40)	6 (60)	p=0.0099
Heterogeneous enhancement with non-enhancing areas	5 (31.3)	5 (31.3)	6 (37.5)		1 (10)	10 (90)	
Impression of fibroid							
Ordinary leiomyoma (non-degenerated)	5 (29.4)	6 935.3)	6 (35.3)		9 (75)	3 (25)	
Degenerated leiomyoma	13 (39.4)	11 (33.3)	9 (27.3)	p=0.754	4 (20)	16 (80)	p=0.002

There was a significant relationship between vitamin D deficiency with number of fibroids. At the same time, there was no significant relationship between a history of previous surgery (p=0.878), family history of fibroids (p=0.215), and BMI (p=0.106) with the number of fibroids (Table 4).

Table 4: Association between the history of previous surgery, vitamin D deficiency, family history of fibroids, and BMI with the number of fibroids.

Variable	**Number of fibroids**			**p-value**
	1	**2**	**≥3**	
Past surgical history (No., %)				
Yes	11 (37.9)	4 (13.8)	14 (48.3)	p=0.878
No	9 (42.9)	2 (9.5)	10 (47.6)	
Vitamin D deficiency (No., %)				
Yes	3 (18.7)	4 9250	9 (56.3)	p=0.043
No	17 (50)	2 (5.9)	15 (44.1)	
Family history of fibroids (No., %)				
Yes	3 (30)	0 (0.0)	7 (70)	p=0.215
No	17 (42.5)	6 (15)	17 (42.5)	
Body mass index (No., %)				
Normal	8 (61.5)	0 (0.0)	5 (38.5)	p=0.106
Overweight	10 (43.5)	3 (13)	10 (43.50	
Obese	2 (14.3)	3 (21.4)	9 (64.3)	

Ordinary fibroids were 17 (non-degenerated leiomyoma) with 76.5% homogenous low signal intensity on the T2-weighted image, and 33 fibroids degenerated with 45.5% heterogeneous signal intensity on the T2-weighted image. There was a significant association between T2-weighted image findings and the impression of fibroids (p<0.001). Out of 20 fibroids with homogenous enhancement, 88.2% (no.=15) fibroids were ordinary (non-degenerated), 14 fibroids with heterogeneous enhancement, 36.4% (n=12) with degenerated features, and 16 fibroids with heterogeneous enhancement with non-enhancing areas degenerated. There was a significant association between the impression of fibroid findings and contrast enhancement (p<0.001) (Table 5).

Table 5: Correlation between T2–weighted images and impression of fibroid, and the association between the impression of fibroid and it is contrast enhancement.

Variable	T2-weighted image findings				p-value
	Homogenous low	Homogenous intermediate	Heterogeneous	Heterogeneous with highT1 signal areas	
Impression of fibroids (No., %)					
Ordinary leiomyoma(non-degenerated)	13 (76.5)	2 (11.8)	2 (11.8)	0 0.0%	p<0.001
Degenerated leiomyoma	1 (3.0)	3 (9.1)	15 (45.5)	14 (42.4)	
Association between the impression of fibroid and contrast enhancement (No., %)					
	Ordinary		**Degenerated**		
Homogenous enhancement	15 (88.2)		5 (15.1)		p<0.001
Heterogeneous enhancement	2 (11.8)		12 (36.4)		
Heterogeneous enhancement with non-enhancing areas	0 (0.0)		16 (48.5)		

There was no significant relationship between fibroid volume and its management (p=0.09) and between FIGO-type of fibroids and their management (p=0.087) (Table 6).

Table 6: Relationship between fibroid volume, FIGO fibroid types and their management.

Variable	Management			p-value
	1*	2**	3***	
Volume category (No., %)				
1.(≥ 4cm^3)	3 (75.0)	0 (0.0)	1 (25)	p=0.09
2.(>4and≤123cm^3)	11 (45.8)	5 (20.8)	8 (33.3)	
3.(>123and≤380cm^3)	3 (23.1)	6 (46.2)	4 (30.8)	
4.(>380cm^3)	1 (11.1)	6 (66.7)	2 (22.2)	
FIGO category (No., %)				
1	0 (0.0)	0 (0.0)	1 (100)	p=0.121
2	5 (83.3)	0 (0.0)	1 (16.7)	
3	0 (0.0)	1 (100)	0 (0.0)	
4	2 (25)	4 (50)	2 (25)	
5	2 (40)	1 (20)	2 (40)	
6	0 (0.0)	3 (100)	0 (0.0)	
7	3 (25)	6 (50)	3 (25)	
8	3 (60)	0 (0.0)	2 (40)	
2-5	3 (33.3)	2 (22.2)	4 (44.5)	

1*Follow-up, 2**Myomectomy, 3***Hysterectomy

Discussion

Every clinician may now concentrate on MRI-based diagnosis for all conceivable uterine fibroids case scenarios thanks to a broad variety of advances in diagnostic tools in the medical profession. Additionally, with the advancement in accessibility, modernity, and complexity of radiological techniques, the management of uterine fibroids has also demonstrated superior outcomes when using MRI, which has changed the rules in uterine fibroid management and its diagnosis. Therefore, to assess the MRI findings of uterine leiomyoma and improve clinical practice through standardized MRI examinations and reporting of uterine leiomyoma, the current study set out to ascertain the function of MRI in uterine leiomyoma.

The results of this study are supported by James, 2006 who showed that most fibroids were related to parity [10]. According to this study, most fibroids were triggered by early menarche and the use of contraceptives, which agreed with that of Pritts et al., 2015 [11]. Our outcomes were also supported by James, 2006 who mentioned that fibroids were most frequently seen in females with a recent surgery history [10]. Furthermore, based on the studies conducted by Hajhashemi et al., 2019 [12] and Halder et al., 2014 [13], there was a

correlation between vitamin D supplementation, D3 serum levels and uterine leiomyoma, which is consistent with this study.

According to Donnez and Dolmans, 2016, obesity and high blood pressure may contribute to the development of leiomyoma [4], supporting the current study's findings. Cerdeira et al., 2020 demonstrated that most fibroids have occurred in numerous sets or single instances, with incidence ranging between 45 and 55% and 35% and 40%, respectively, regarding the number of fibroids [14]. This agrees with the present study that fibroids were>3 in 48%, followed by single in 40% of cases. Munusamy et al., 2017 demonstrated that intramural fibroids had the most significant incidence [15], while most fibroids were subserosal pedunculated in this study. Regarding the association between T1-weighted-image MRI findings and management, T1-weighted image analysis revealed variations in intensity, which can be explained by Nakai et al., 2017 [16], as the numerous dilated vessels filled with red blood cells that were considered the cause of hyperintensity that adequately explains the findings of the T1-weighted image of MRI in this study and also smooth muscle component results.

In the present study, according to T2-weighted image MRI analyses, most of the fibroids were heterogeneous, and myomectomy was done for most of them. In addition, hysterectomy was also done for most fibroids with homogeneous low signal intensity and heterogeneous with highT1 signal areas and a percentage of homogeneous intermediate signal intensities. These findings are in accordance with Foti et al., 2015 [17], Posh S et al., 2020 [18], and Krentel et al., 2017 [19]. The current study shows that fibroids on MRI T2 –weighted images with heterogeneous signal intensity and highT1 signal regions had degenerated histological characteristics. On the other hand, the correlation between MRI T2-weighted image and histological findings in fibroids with homogeneous low signal intensity and homogenous intermediate signal intensity regions did not reach statistical significance. This is consistent with Foti et al., 2015 [17] and Posh et al., 2020 [18]. Whereas when contrast enhancement is considered, there was a significant correlation between MRI contrast enhancement findings and histopathological features in the present study.

In the present study, follow-up is recommended in most cases following MRI findings, followed by myomectomy and hysterectomy. This confirms Murase et al., 1999 [20] because MRI plays a role in treating leiomyoma by helping to plan surgery and monitoring the response to drug therapy. Regarding the correlation between MRI results and histological characteristics, most patients with ordinary MRI findings exhibited ordinary (non-degenerated pattern) histopathological characteristics. Similarly, patients with degenerated MRI findings had degenerated pattern histopathological findings. The correlation between the outcomes was significant, consistent with that of Sakamoto et al., 1991 [21], who concluded that TVS was a decent screening method. MRI is unquestionably better for accurately characterizing and localizing fibroids, allowing physicians to choose the most suitable therapy in routine clinical practice.

Regarding the correlation between T2-weighted image results and the impression of fibroids, there is a significant correlation between T2-weighted results and the impression of fibroids. The findings indicated a connection between contrast and the perception of fibroid findings. These findings are consistent with previously published studies [18]. MRI scans can assist in distinguishing between uterine myoma and sarcoma since a characteristic MR picture for a myoma can be detected. To put it another way, uterine myoma has a clear boundary and is mainly spherical. In the T1-weighted image, signals for the normal muscle layer are comparable or lower, but in the T2-weighted image, signals for mass are markedly inferior to those for the normal muscle layer. Therefore, the validation of MR images enables the diagnosis of myoma. However, an entirely different imaging finding from the one previously reported is seen when degeneration happens in a myoma [22].

Conclusions

MRI has superior contrast resolution and multi-planar capabilities so that uterine leiomyoma can be recognized, localized, and distinguished from other masses of adnexal origin from focal adenomyosis. By impression of fibroid from MRI findings, we can differentiate ordinary (non-degenerated) From degenerated leiomyoma through which appropriate management strategy decided However, the diagnosis is frequently histological in the presence of widespread necrosis and bleeding. However, MRI contribution is crucial for selecting the best therapeutic approach and monitoring patients following treatment. The limitation of the study includes a small sample that applies to only some of the population. The patient's desire affects the management line, as some refuse surgical intervention, and others prefer myomectomy to hysterectomy. Most of the gynecologists in our locality decide operation based on the ultrasound findings and pass the MRI except for suspicious cases like for differentiation of pedunculated uterine leiomyoma from ovarian mass and when they want to exclude other differentials.

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Conflict of interest

The authors confirm that they are not affiliated with or involved in any organization or entity with financial interests.

References

1.Farris M, Bastianelli C, Rosato E, et al. (2019). Uterine fibroids: an update on current and emerging medical treatment options. Therapeutics and Clinical Risk Management. 157-78.
2.Morhason-Bello IO, Adebamowo CA. (2022). Epidemiology of uterine fibroid in black African women: a systematic scoping review. BMJ Open. 12(8):e052053.
3.Smith EM, Alvarez JA, Kearns MD, et al. (2017). High-dose vitamin D3 reduces circulating hepcidin concentrations: A pilot, randomized, double-blind, placebo-controlled trial in healthy adults. Clinical Nutrition. 36(4):980-85.
4.Donnez J, Dolmans M. (2016). Manejo de fibromas uterinos: del presente al futuro. Human Reproduction Update. 665-86.
5.Żak K, Zaremba B, Rajtak A, et al. (2022). Preoperative differentiation of uterine leiomyomas and leiomyosarcomas: current possibilities and future directions. Cancers. 14(8):1966.
6.Yang H, Li X-C, Yao C, et al. (2017). Proportion of Uterine Malignant Tumors in Patients with Laparoscopic Myomectomy: A National Multicenter Study in China. Chinese Medical Journal. 130(22):2661-65.
7.Yang H, Li X-C, Yao C, et al. (2017). The proportion of uterine malignant tumours in patients with laparoscopic myomectomy: a national multicenter study in China. Chinese Medical Journal. 130(22):2661-65.
8.Seshadri S, El-Toukhy T, Douiri A, et al. (2015). Diagnostic accuracy of saline infusion sonography in the evaluation of uterine cavity abnormalities prior to assisted reproductive techniques: a systematic review and meta-analyses. Human Reproduction Update. 21(2):262-74.
9.Lin G, Yang LY, Huang YT, et al. (2016). Comparison of the diagnostic accuracy of contrast-enhanced MRI and diffusion-weighted MRI in the differentiation between uterine leiomyosarcoma/smooth muscle tumour with uncertain malignant potential and benign leiomyoma. Journal of Magnetic Resonance Imaging. 43(2):333-42.
10.James AH. (2006). von Willebrand disease. Obstetrical & Gynecological survey. 61(2):136-45.
11.Pritts EA, Vanness DJ, Berek JS, et al. (2015). The prevalence of occult leiomyosarcoma at surgery for presumed uterine fibroids: a meta-analysis. Gynecological Surgery. 12(3):165-77.

12.Hajhashemi M, Ansari M, Haghollahi F, et al. (2019). The effect of vitamin D supplementation on the size of uterine leiomyoma in women with vitamin D deficiency. Caspian Journal of Internal Medicine. 10(2):125.
13.Halder SK, Sharan C, Al-Hendy O, et al. (2014). Paricalcitol, a vitamin D receptor activator, inhibits tumour formation in a murine model of uterine fibroids. Reproductive Sciences. 21:1108-19.
14.Cerdeira AS, Tome M, Lim L. (2020). The value of MRI in management of uterine fibroids in pregnancy. European Journal of Obstetrics and Gynecology and Reproductive Biology. 256.
15.Munusamy MM, Sheelaa WG, Lakshmi VP. (2017). Clinical presentation and prevalence of uterine fibroids: a 3-year study in 3-decade rural South Indian women. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 6(12):5596-602.
16.Nakai G, Yamada T, Hamada T, et al. (2017). Pathological findings of uterine tumours preoperatively diagnosed as red degeneration of leiomyoma by MRI. Abdominal Radiology. 42:1825-31.
17.Foti P, Tilocca C, Sigona A, et al. (2015). Benign neoplasms of the uterus: MR imaging of leiomyomas with radiologic pathologic correlation. WCRJ. 2(2):E516.
18.Posh S, Rafiq S, Manzoor F, et al. (2020). Accuracy of magnetic resonance imaging in assessing types of degeneration in leiomyomas. Journal of Mahatma Gandhi Institute of Medical Sciences. 25(2):99.
19.Krentel H, Cezar C, Becker S, et al. (2017). From clinical symptoms to MR imaging: diagnostic steps in adenomyosis. BioMed Research International. 1-6.
20.Murase E, Siegelman ES, Outwater EK, et al. (1999). Uterine leiomyomas: histopathologic features, MR imaging findings, differential diagnosis, and treatment. Radiographics. 19(5):1179-97.
21.Sakamoto R, Ikata T, Murase M, et al. (1991). Comparative study between magnetic resonance imaging and histopathologic findings in ossification or calcification of ligaments. Spine. 16(11):1253-61.
22.Shimizu A, Tanaka H, Iwasaki S, et al. (2016). An unusual case of uterine cotyledonoid dissecting leiomyoma with adenomyosis. Diagnostic Pathology. 11:1-7.