

*Research Article***Evaluation the role of magnetic resonance imaging with diffusion weighted images in diagnosis of uterine focal lesions.****Hoda A. Abd Elsamie, MD.\*; Mahmoud I. El-Rashede, MD.\*; and Mohammed A. Mohammed, MBBCh.\***

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**Abstract**

**Objective:** The aim of this study is to highlight the role of MRI with diffusion weighted images in diagnosis of uterine focal lesions especially in differentiation between benign and malignant masses, and initial staging of known malignancies. **Patients and methods:** 34 patients with uterine focal lesion were included in the study. The patient's age ranged from 25 to 87 years old with the mean age  $\pm$  49.6 year. The all patients were referred from the Obstetrics and Gynecology department to Radio diagnosis department AT Al-Azhar Assiut University Hospital during the period from November 2017 to October 2018. **Results:** In the current study DW MRI could correctly diagnose 33 lesions out of 34 lesions. It correctly diagnosed 22/22 benign lesions (facilitate diffusion) and 11/12 malignant lesions, 11 malignant lesion were restricted diffusion; only one malignant lesion show facilitate diffuse. **Conclusion:** the present study suggests that, in addition to conventional MRI features, DW imaging provided additional tool for distinguishing uterine benign focal lesions from malignant lesions.

**Keywords:** Uterine focal lesions, Magnetic resonance imaging, Diffusion-weighted imaging.

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**Introduction**

Uterine masses as part of female pelvic masses have a broad differential diagnosis, including benign and malignant neoplasms and non neoplastic diseases. Many pelvic masses are a diagnostic challenge, given the proximity to a variety of pelvic structures and the overlap of specific imaging features among different diagnoses<sup>(1,2)</sup>

Ultrasound (US) is often the first-line imaging modality for the evaluation of uterine masses in female pelvis however; ultra-sound may be limited by poor acoustic windows and poor depth of penetration, preventing characterization of some masses. Computed tomography (CT) is limited in the pelvis by a lack of soft-tissue contrast, which becomes problematic when, for example, trying to differentiate decompressed bowel from adnexal structures. Magnetic resonance imaging (MRI), on the other hand, provides excellent contrast resolution, resulting in accurate tissue characterization and improved anatomic delineation<sup>(1,2)</sup>.

**Patients and method**

This prospective study was carried out in department of Radiodiagnosis Al-Azhar university hospital Assiut during the period from November 2017 to October 2018. Ethics committee approvals in addition to informed written consent were obtained from all patients. 34 patients with uterine focal lesions were included in the study. The patient's age ranged from 25 to 87 years old with the mean age  $\pm$  49.6 year. Inclusion criteria were patients that clinically or radiologically (U/S ,CT) had uterine focal lesion or patients suspected clinically to had uterine focal lesion as patients with abnormal vaginal bleeding with abnormal thickened endometrium seen by U/S exam. Exclusion criteria included all patients with absolute contraindication to MRI (patients having cardiac pacemakers prosthetic heart valves, cochlear implants or any metallic implants), Patient having history of claustrophobia and patients who do not consent to be a part of the study.

All the patients were subjected to the following:

- **Full history taking:** Age, Parity, Time of menopause, past history of gynecological troubles or operations and Positive family history of gynecological malignancy.
- **Gynecological examination.**
- **Ultrasound examination:** All patients had undergone preliminary pelvic ultrasound, trans-abdominal and trans-vaginal ultrasound approaches using 3-4MHz and 7-8MHz probes respectively. Color Doppler was superimposed on masses to detect vascularity. The examination was performed on high resolution Ultrasonography machine (semen's acuson x300).
- **MRI examination:** MRI was performed on a 1.5-Tesla MR imaging unit (Philips Achieva). All the patients were imaged in

the supine position using pelvic phased-array coil. Patients fast for 3 hours. Intravenous administration of an antispasmodic drug (10mg of [Visceralgine; Organon, Livron, France]) was given immediately before MR imaging to reduce bowel peristalsis.

**Results**

The 34 patients included in this study, were classified according to their lesions histopathological results; Benign group (22 lesions; 64.7%) and malignant group (12 lesions; 35.3%). The most common benign lesion was uterine leiomyoma (15/22) while the most common malignant lesion was endometrial carcinoma (7/12), Followed by cervical carcinoma (5/12) (**table 1**).

**Table (1): Histopathological results of the all studied lesions (no=34).**

Lesions	No.	Percent %
<b>A) Benign lesions:-</b>	22	64.7 %
1) Leiomyoma	15	44.117%
2) Endometrial hyperplasia	2	5.882 %
3) Endometrial polyp	3	8.823 %
4) Focal uterine adenomyosis	2	5.882 %
<b>B) Malignant lesions:-</b>	12	35.3 %
1) Endometrial carcinoma	7	20.588 %
2) Cervical carcinoma	5	14.705 %
<b>Total</b>	<b>34</b>	<b>100%</b>

**Discussion**

This study included 34 patients with uterine focal lesions. Their ages ranged from 25 to 87 years with the mean age ± 49.6 year. The studied 34 lesions were divided into benign and malignant lesions, with uterine leiomyomas the most common benign uterine lesion (15/22 lesions) followed by endometrial polyp (3/22 lesions) and endometrial carcinoma was the commonest malignant lesion (7/12 lesions) followed by cervical carcinoma (5/12 lesions). This agrees with Kilickesmez O, et al., who stated that according to their study leiomyomas is the most common benign lesion of the uterus while endometrial carcinoma is the most

common malignant lesion followed by cervical cancer<sup>(5)</sup>.

In the present study all ordinary leiomyomas showed low SI on DW and ADC images likely owing to the “T2 blackout effect” while degenerated leiomyomas showed low SI on DW images and high SI on ADC images which mean that all leiomyomas showed diffusion negative (facilitated diffusion).

This was in agreement with results of Thomassin-Naggara, et al.,<sup>(6)</sup>, who found that all leiomyomas either ordinary (15 lesion) or degenerated (7 lesions) had DWI low signal

intensity & Namimoto et al.,<sup>(7)</sup> who concluded that all studied ordinary leiomyomas (95) were diffusion negative with low SI on DWI.

In the current study, All benign endometrial lesions (3 polyps and 2 hyperplasia) are diffusion negative; 4 lesions showed low SI on DW images at high b value (b=1000) and with high SI on ADC images while 1 endometrial hyperplasia showed high SI on both DW images and ADC images. The studied 7 malignant endometrial cancer: 6 were diffusion positive, being of high SI on DW images at high b values (b=1000) and with low SI on ADC images with exception of 1 endometrial cancer which was diffusion negative being with intermediate high SI on DW images at high b value (b=1000) and with high SI on ADC images.

Our results were nearly going with results of a study performed by Wang et al.,<sup>(8)</sup> who used b value of 1000 s/mm<sup>2</sup> and found that endometrial carcinoma like normal endometrium displayed hyper intense signal on DWI, while all endometrial polyps displayed intermediate signal or a relatively lower signal compared to the spared myometrium.

Our study showed 85.7% sensitivity and 100% specificity of DWI and ADC images in diagnosis of endometrial lesions. This agreed with Bharwani et al.,<sup>(9)</sup> who stated that the addition of DWI to conventional MRI has increased the sensitivity and specificity to 86% and 100% respectively in diagnosis of uterine endometrial lesions & Kamiyama Y. et al.,<sup>(10)</sup> reported that the sensitivity and specificity of DWI in endometrial lesions was 100% and 81% respectively. We had one false negative lesion which diagnosed radiologically as benign endometrial hyperplasia while histopathology results proved it to be a well differentiated adenocarcinoma owing to its low cellularity. This was in coincidence with Whittaker et al.,<sup>(4)</sup> who reported that some malignant tumors have low cellularity (eg, well-differentiated adenocarcinoma) and hence more limited water restriction that can be not seen at DWI.

In our study all cervical malignancies are diffusion positive being of high SI on DW

images at high b values (b=1000) and of low SI on ADC images with sensitivity and specificity of 100%. This nearly matched with other studies such as, Hoogendam et al.,<sup>(11)</sup> who reported that in cervical tumors, the DWI and ADC images gave sensitivity and specificity of 90% and 94% respectively & Chen et al.,<sup>(12)</sup> that revealed high sensitivity and specificity of 96% and 100% respectively..

## Conclusion

In conclusion, the present study suggests that, in addition to conventional MRI features, DW imaging provided additional tool for distinguishing uterine benign focal lesions from malignant lesions. DW-MR imaging enables qualitative and quantitative assessment of tissue diffusivity. DW images in conjunction with ADC images are effective in differentiations between benign and malignant uterine focal lesion. Malignant lesions show restricted diffusion pattern with high SI on high b values images with low SI on ADC images. Benign lesions shows facilitate diffusion with low SI on DWI. In our study the accuracy of DWI and ADC images in differentiation between benign and malignant uterine lesions reaches about 97.05%. (91.6%) Sensitivity, (100%) Specificity, (100%) PPV, (95.6%) NPV.

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