ORIGINAL RESEARCH ARTICLE

Assessment of Role of MRI in Detecting Pelvic Masses in Females

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A B S T R A C T

Introduction: Magnetic Resonance Imaging (MRI) has several advantages over computed tomography and ultrasonography. The major contribution of MRI in evaluating pelvic pathologies lies in its ability to determine whether a mass is truly ovarian in origin and to accurately identify certain benign entities e.g. dermoid cyst, endometriomas, haemorrhagic cysts and fibromas. Hence, the present study was undertaken for assessing the role of MRI in detecting pelvic masses in females.

Material and methods: A total of 180 female subjects who reported with pelvic masses were enrolled. Complete demographic data and past medical history of all the subjects was obtained. Through clinical examination was done and clinical history was also obtained and recorded. Ultrasonography (USG) was done in all the patients. On second visit, MRI was done followed by histopathologic examination. All the results were obtained were subjected to statistical analysis and comparison. SPSS software was used for assessing level of significance.

Results: Uterine masses were diagnosed on ultrasound, MRI and histopathology in 81 cases each. Ovarian masses were identified in 25 cases, 83 cases and 85 cases on USG, MRI and histopathology respectively. Adnexal findings were obtained in 6 cases, 11 cases and 14 cases respectively on USG, MRI and histopathology respectively. On MRI examination, uterine fibroid leiomyoma were found to be present in 31.67 percent of the cases, simple ovarian cyst in 22.22 percent of the cases, cervical carcinoma in 16.11 percent of the cases and ovarian malignancy in 17.78 percent of the cases.

Conclusion: MRI has significant utility in identification of spectrum of pelvic masses in females.

Key words: MRI, Pelvic Masses

INTRODUCTION

Magnetic Resonance Imaging (MRI) is an imaging modality that has been developed and used since mid-1970s. MRI has several advantages over computed tomography and ultrasonography. One important feature is its non-invasiveness. A second feature that makes MRI particularly attractive is its capability for multiplanar imaging. A third advantage of MRI is its excellent tissue-differentiating capabilities. A fourth advantage of MRI is its intrinsic sensitivity to flowing blood. Both arterial and venous abnormalities can be assessed by MRI.[1-3] The major contribution of MRI in evaluating pelvic pathologies lies in its ability to determine whether a mass is truly ovarian in origin and to accurately identify certain benign entities e.g. dermoid cyst, endometriomas, haemorrhagic cysts and fibromas. It precisely defines the internal architecture of ovarian masses.[4-6] Hence; the present study was undertaken for assessing the role of MRI in detecting pelvic masses in females.

MATERIAL AND METHODS

The present study was conducted with the aim of assessing the role of MRI in detecting pelvic masses in females. A total of 180 female subjects who reported with pelvic masses were enrolled. Complete demographic data and past medical history of all the subjects was obtained. Through clinical examination was done and clinical history was also obtained and recorded. The optimal assessment of pelvic massed was done using a multidisciplinary approach, based on physical examination, laboratory tests and imaging techniques. Ultrasonography (USG) was done in all the patients. All patients underwent pelvic ultrasonography by using both curvilinear (3-5 MHz) and linear (6-9 MHz) probes, with the patient in supine position. On second visit, MRI was done followed by histopathologic examination. All MRI procedures were carried by 1.5 Tesla with 60 cm bore size, system length 160 cm. Axial images were obtained using 256 x 256 matrix, 32 cm field of view and 4mm slice thickness. Coronal T2-weighted image (T2WI) and short T1 inversion recovery (STIR), sagittal T2WI and axial T2WI, T1WI, and STIR images were taken. Fat-suppressed T1W sequences before and after intravenous injection of gadolinium were also taken wherever needed. These pathologies were assessed for size, shape, signal intensity, character, and post contrast enhancement. All the results were obtained were subjected to

Lesions	USG	MRI	Histopathology
Uterine	81	81	81
Ovarian	25	83	85
Adnexal	6	11	14
Inconclusive	68	5	0
Total	180	180	180

Table-1: Distribution of lesions on USG, MRI and histopathology

Diagnosis	Number of patients	Percentage of patients
Uterine fibroid leiomyoma	57	31.67
Simple ovarian cyst	40	22.22
Cervical carcinoma	29	16.11
Ovarian malignancy	32	17.78
Others	22	12.22

Table-2: Nature of lesions studied by MRI

Figure-1: T2 weighted sagittal section of MRI of pelvis of a 32 year old reveals diffusely bulky uterus. Anterior myometrium appears bulky in thickness and heterogeneous in signal intensity. Ill-defined varying signal with vague borders seen in the anterior myometrium – suggestive of adenomyosis with few hyperintense foci embedded within the lesion – likely hemorrhagic foci. Smaller similar signals were seen in the posterior segment – likely smaller adenomyomas.

statistical analysis and comparison. SPSS software was used for assessing level of significance.

RESULTS

In the present study, a total of 180 female subjects with presence of pelvic masses were enrolled. Mean age of the patients was 52.8 years. Sixty percent of the patients were of urban residence. Among these 180 subjects, uterine masses were diagnosed on ultrasound, MRI and histopathology in 81 cases each (Table-1). Ovarian masses were identified in 25 cases, 83 cases and 85 cases on USG, MRI and histopathology respectively. Adnexal findings were obtained in 6 cases, 11 cases and 14 cases respectively on USG, MRI and histopathology respectively. On MRI examination, uterine fibroid leiomyoma were found to be present in 31.67 percent of the cases, simple ovarian cyst in 22.22 percent of the cases, cervical carcinoma in 16.11 percent of the cases and ovarian malignancy in 17.78 percent of the cases (Table-2).

DISCUSSION

Pelvic masses in female patients have a broad differential diagnosis, including benign and malignant neoplasms and non-neoplastic diseases. Dedicated MR images on T2 weighted sagittal section of a 32 year old revealing diffusely bulky uterus. Anterior myometrium appears bulky in thickness and heterogeneous in signal intensity (as shown in Figure 1). Ill-defined varying signal with vague borders seen in the anterior myometrium – suggestive of adenomyosis with few hyperintense foci embedded within the lesion – likely hemorrhagic foci. Smaller similar signals were seen in the posterior segment – likely smaller adenomyomas. Another MRI pelvis of a 36 year old T2 weighted axial section reveals left ovarian endometriotic cyst with T2 shading (as shown in Figure 2). Mild free fluid is also seen in the pelvis. Many pelvic masses are a diagnostic challenge, given their proximity to a variety of pelvic structures and the overlap of specific imaging features among different diagnoses. 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. MRI, on the
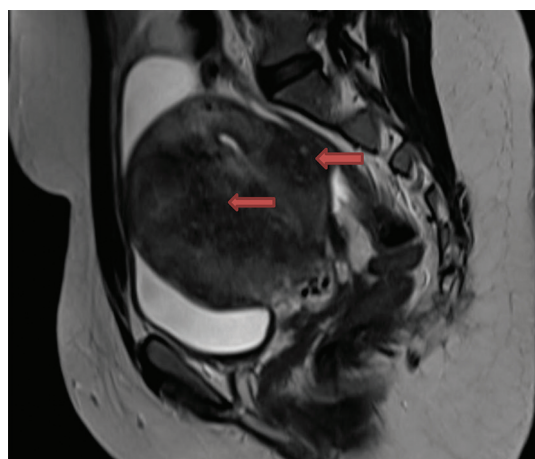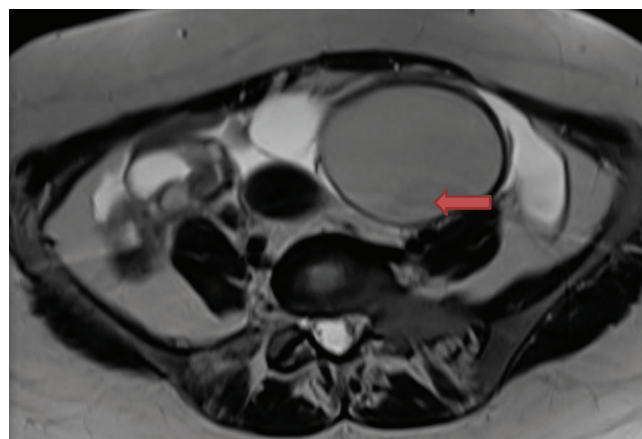

Figure2: T2 weighted axial section of MRI of pelvis of a 36 year old reveals left ovarian endometriotic cyst with T2 shading. Mild free fluid is also seen in the pelvis.

other hand, provides excellent contrast resolution, resulting in accurate tissue characterization and improved anatomic delineation.[6,7] Hence; the present study was undertaken for assessing the role of MRI in detecting pelvic masses in females.

In the present study, a total of 180 female subjects with presence of pelvic masses were enrolled. Among these 180 subjects, uterine masses were diagnosed on ultrasound, MRI and histopathology in 81 cases each. Ovarian masses were identified in 25 cases, 83 cases and 85 cases on USG, MRI and histopathology respectively. Adnexal findings were obtained in 6 cases, 11 cases and 14 cases respectively on USG, MRI and histopathology respectively. Shaha PR et al assessed the role of MRI in female pelvic mass lesions and to exploit the tissue characterization capability of MRI. Among 100 cases, on MRI, the maximum number of patients was having uterine lesions (48) followed by ovarian lesions (40),

inconclusive adnexal/ovarian lesions (6), adnexal lesions (4). Two patients had normal findings. This correlated well with histopathology results, which showed the maximum number of patients were having uterine lesions (48) followed by ovarian lesions (41), adnexal lesions (5). Normal findings were observed in two patients. Due to excellent depiction of pelvic anatomy, non-invasiveness and absence of ionizing radiation, MRI is an excellent tool for assessment of utero-ovarian disorders, for detecting and characterization of various diseases, and staging patients with carcinomas where accurate diagnosis will make an impact on their surgical and medical management planning.[8] Female pelvic masses most commonly originate from the reproductive tract, although they may arise from other organs and tissues in the pelvis, such as the gastrointestinal or urinary tracts. Many pelvic masses are common entities such as uterine leiomyoma, ovarian cysts, and dermoid tumors. However, less common tumors such as uterine sarcomas, fallopian tube carcinomas, peritoneal neoplasms, gastrointestinal neoplasms, and metastatic disease should also be considered. Accuracy in diagnosis and staging is extremely important because of the obvious therapeutic implications. The evaluation of a pelvic mass begins with clinical history and physical examination. Imaging characterization often starts with ultrasound and finally proceeds to MRI. Each of these modalities has a role in the work-up of pelvic masses and has its own advantages and disadvantages. Ultrasound is the least invasive and most cost-effective diagnostic tool. MRI demonstrates excellent soft tissue contrast resolution, resulting in accurate tissue characterization and improved anatomical delineation and has been shown to be superior to ultrasound for characterizing adnexal masses.[9, 10]

In the present study, on MRI examination, uterine fibroid leiomyoma were found to be present in 31.67 percent of the cases, simple ovarian cyst in 22.22 percent of the cases, cervical carcinoma in 16.11 percent of the cases and ovarian malignancy in 17.78 percent of the cases. Boaventura CS et al evaluated the indications for performing magnetic resonance imaging of the female pelvis at a referral center for cancer. The indications for performing the examination were classified according to the American College of Radiology (ACR) criteria. The mean age of the patients was 52.6 ± 14.8 years, and 49.8% were perimenopausal or postmenopausal. The majority (63.9%) had a history of cancer, which was gynaecologic in 29.5% and non-gynaecologic in 34.4%. Of the patients evaluated, 44.0% had clinical complaints, the most common being pelvic pain (in 11.5%) and bleeding (in 9.8%), and 34.7% of patients had previously had abnormal findings on ultrasound. Most (76.7%) of the patients met the criteria for undergoing magnetic resonance imaging, according to the ACR guidelines. In the majority of the cases evaluated, magnetic resonance imaging was clearly indicated according to the ACR criteria.[11]

CONCLUSION

From the above results, the authors conclude that MRI has significant utility in identification of spectrum of pelvic masses in females.

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