ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Validity of Magnetic Resonance Imaging (MRI) in Characterizing Benign and Malignant Uterine Endometrial Cavity Masses.

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ABSTRACT

The objective of this study was to determine whether Magnetic resonance imaging (MRI) images and enhancement features could help accurately to distinguish benign uterine from malignant endometrial cavity mass and determine the myometrial invasion. A total of 75 women with clinically suspected uterine endometrial cavity mass were prospectively studied. MRI was carried out on a 1.5 T system using T1, T2 and fat-suppressed T1-weighted sequences before and after intravenous injection of gadolinium. The endometrial lesions were examined for several features including size, shape, character, signal intensity, and enhancement. Secondary signs such as ascites, peritoneal disease, and lymphadenopathy were noted. We compared the imaging features with the surgical and pathologic findings. All MR imaging features were categorized as benign or malignant without knowledge of clinical details, according to the imaging features which were compared with the surgical and pathological findings. Fifty two (70%) cases of benign and 23 (30%) cases of malignant on histopathology. Mean age (45 year), size of mass range from 4 mm-6 cm. MRI correctly diagnosed 18 cases with malignant and false negative diagnosis 5 case with malignant lesion, MRI correctly diagnosed 47 cases with benign lesions and false negative diagnosis 5 case. For characterizing lesions as malignant, the sensitivity of MRI were 78%. MRI is sensitive for differentiation benign and malignant endometrial cavity mass.

Keywords: Magnetic resonance imaging (MRI), Sensitivity, Specificity, uterus, endometrial lesion.

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ISSN: 0975-8585

INTRODUCTION

The carcinoma of endometrial is the most malignancy in pelvic of female and can develop in any endometrial whether atrophic or normal or hyperplastic. At early stage the large tumors are seen with tumor seen to corpus of uterus in 74% of patient [1, 2].

Ultrasonography (US) continues to be the primary imaging modality used to initial seen of pelvic organ of female. Ultrasonography is used in large regions of the world is noninvasive, not cost and not use radiation [3].

US is posterior to CT (computed tomography) in demonstrated the wall of pelvic pelvic extension and metastasis, computed tomography and magnetic resonance imaging are modalities of choice in staging endometrial tumor than US [4].

Magnetic resonance imaging (MRI), with contrast and different sequence, is better than US and CT in demonstrated early invasion to cervix and invasion to myometrium. MRI is approximately equal to CT in demonstrated lymph nodes enlarged but MRI is inferior to CT in detecting abdominal metastasis distinguish intraperitoneal, omental and mesenteric metastasis from bowel [5]. MRI with used multiplanar sequence with different coil with used fat suppression technique to demonstrated anatomy of uterine zone and metastasis [6,7].

The objective of study to see if the magnetic resonance imaging (MRI) can be differentiate endometrial cavity mass whether benign or malignant on the basis of their morphologic features and enhancement patterns or not.

PATIENTS AND METHODS

Between January 2014 and February 2016, 75 consecutive patients (range of age, 20–85 years; mean age, 45 years) presented with endometrial cavity mass by ultrasound examination whether single or multiple underwent preoperative MRI in department of radiology in Hilla teaching hospital, Iraq, followed by operative exploration. The median time from scanning to surgery was 35 days (range, 2 days to 70 days). between initial ultrasound scanning with MRI and surgery.

MRI performed with multiplanar sequence with fat suppression technique using T1 and T2 with different planes (axial, sagittal and coronal) to see the endometrial cavity mass whether sold or cystic, intensity, texture, homogencity, site of mass (fundal, body) and to see if there is any soft tissue extension and lymph nodes metastasis. Two radiologists were asked for the help to see the MRI without known the clinical feature of subjects. Some patients were excluded from this study because they refuse to do surgical exploration or that who had surgery before 6 month before initiation of this study.

Protocol of MRI:

MRI 1.5 T units of Philips system was used. MRI was performed with multiplanar sequence with different coils for imaging of abdomen and pelvis, the coil of body used alone for imaging of pelvis for patient with sever ascites of sever obese or large mass than 15 cm in diameter there is tow radiologist see the imaging without known of history or clinical presentation of patients, used T1, T2 weighted sequence and fat suppression technique the thickness differ from 7-9 mm in section thickness.

RESULTS

Seventy five subjects with different signs and symptoms were admitted to Hilla teaching hospital. Table (1) shows the signs and symptoms of patients, age of patients included in this study range from 20-85 years mean age (45 year) table (2) show age of patients, then do ultrasound examination, in ultrasound examination show the patient to have whether endometrial mass or not and if present the mass show the size of mass, appearance, presence calcification or absent, complex fluid collection in endometrial cavity, then do MRI examination in department of radiology in Hila teaching hospital followed by operative exploration in department of surgery in the same hospital during the period from January 2014 to February 2016.

ISSN: 0975-8585

Table 1. Clinical presentation of patients

Clinical feature	No. (%)
Irregular menses	47(63%)
Pelvic pain &fever	13(17%)
Palpable pelvic mass	8 (11%)
Urinary symptom	7 (9%)
total	75(100%)

Table 2. Distribution of endometrial cavity mass in relation to age of patients

Age group	No. (%)
20-30 years	4 (5%)
30-40 years	11 (15%)
40-50 years	29(39%)
50-60 years	11(15%)
60-70 years	10 (13%)
70-80 years	7 (9%)
80-85 years	3 (4%)
total	75 (100%)

All patients underwent operative exploration with histopathological examination and compared with preoperative MRI examination. Regarding the sizes of endometrial mass, the range was from 1-14 cm.

In all 75 patients, the diagnosis was confirmed with surgical and histological evaluation which included 52 (70%) patients with benign and 23 (30%) patients with malignant mass. Table 3 and 4 show histopathological finding of benign and malignant lesions .

Table 3. Types of malignant endometrial cavity mass among 23 cases

Uterine mass	No.
Endometrial carcinoma	17(74%)
Carcinosarcoma	6 (26 %)
Total	23(100%)

Table 4. Types of benign endometrial cavity mass among 52 cases

Uterine mass	No. (%)
Submucosal leiomyoma	**33 (63%)**
Endometrial polyp	**19 (37%)**
Total	**52(100%)**

Table 5: Validity, positive and negative predictive value for diagnosing endometrial cavity malignant on MRI

	Malignant	Benign	Total
MRI positive	TP 18	FP 5	23
MRI negative	FN 5	TN 47	52
Total	23	52	75

Sensitivity: TP/TP+FN 18/18+5*100=78 %
Specificity: TN/TN+FP 47/47+5*100=90 %
Positive predictive value TP/FP+TP 18/5+18*100=78 %
Negative predictive value: TN/TN+FN 47/47+5 = 90%

- TP: true positive
- TN: true negative
- FP: false positive
- FN: false negative

Majority of benign lesions (29; 39%) were found in female age group 40-50 year and majority of malignant lesions (10; 20%) found in age group range 60-70 years.

In seventy five lesions—benign are 52 (70%) and malignant are 23 (30%) examination by magnetic resonance imaging. The sensitivity of diagnosis of malignant lesion on MRI was 78 %. There are multiple features of malignancy the large size, presence of ascites, septum, irregular wall, the pattern of enhancement (early), solid lesion, lobulated outline.

Low signal intensity fibrous core were seen in polyps diagnosis, seen in 40 patients with polyps or leiomyoma (76%). Intramural cysts seen in 15 of those with polyps and only seen in 4 patients with carcinoma.

The most features of carcinoma (invasion and necrosis of myometrium) were seen in 20 out of 23 subjects while invasions of myometrium was shown only in two cases.

The enhancement heterogenous was seen in carcinoma caused by necrosis in carcinoma. The polyp and carcinoma both hypointense on enhanced pattern to the myometrium.

Out of 23 cases (30%) which showed malignant mass histopathologically, MRI correctly diagnosed 18 cases with malignant lesion but failed to diagnose 5 cases with malignant.

The sensitivity of MRI were 78 %, and specificity 90%. for malignant lesions.

DISCUSSION

Endometrial carcinoma (EC) represents the most common gynecological malignancy in developing countries and manifests with abnormal vaginal bleeding in perimenopausal women. MRI is the imaging modality of choice for preoperative staging of EC and is accurate in evaluation the depth of myometrial invasion and the presence of cervical stromal infiltration [8].

In this study the sensitivity of MRI for identifying malignancy was 91.3% and its specificity was 96%, which is a rate close to obtained by Carlo Bellonia et al [9].

In this study, the sensitivity and specificity were high. This finding goes with finding obtained by Manfredi et al [10] who found that the sensitivity of MRI was and specificity 80% and 91% respectively.

The polyp of endometrium heterogeneous intensity on T2, hypo intense on T1 and distended endometrial cavity the larger one, the smaller polyp not seen on MRI because disappear with surrounding endometrium so there is distinguish feature of carcinoma from polyp on basis of core of fibrous and different signal intensity and cyst of intramural these feature not enough to avoid biopsy, the polyp of endometrium appear well defined ,the cyst of intramural smooth walled hypo intense core [11,12].

In this study we focused MRI features that are most useful to predict malignancy and will emphasize how these features differ from those of benign disease. Although many physicians are understandably concerned about the failure to detect an endometrial malignancy, it is important to realize that the majority of endometrial carcinoma usually appeared as relatively homogenous, intermediate –signal intensity masses on T2 –weighted images this finding similar to finding by Posniak et al [13].

The contrast study in this study found not useful to diagnosis the polyp from carcinoma, however the heterogeneous enhancement found in carcinoma due to necrosis, no enhancement is not always associated with polyp diagnosis, no enhancement is common in polyp due to therapy of tamoxifen [12].

The result in this study appear that both polyp and carcinoma of endometrium cavity can distinguish on MRI according to shape, size and invasion of myometrium.

The polyps diagnosis on basis of core of fibrous, cyst of intramural and not invasion while the carcinoma invasion of myometrium with irregular shape and lack cyst of intramural however the accuracy depend on biopsy only.

ISSN: 0975-8585

CONCLUSIONS

MRI is more sensitive for differentiation benign and malignant endometrial cavity masses. That certain imaging features and the degree of enhancement on MRI images are helpful in differentiating endometrial masses, despite some overlap between the endometrial masses whether benign or malignant (as result cannot depend on MRI preoperatively to decide not to do surgery). Thus, imaging findings may contribute incremental value to clinical parameters in providing prognostic information, consequently improving the quality of the data used in therapeutic planning.

ACKNOWLEDGEMENTS

The author is thankful to department of Radiology/ Hilla teaching hospital/ Babylon Health directorate, Iraq, for the facilities provided in the completion of the work. The author also thankful to Prof. Alaa H. Al-Charrakh /Babylon University, for critical review and checking of the manuscript.

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