

Efficacy of USG and MRI in the Evaluation of Ovarian Cyst

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Abstract

Background, an accurate diagnosis of ovarian cysts is of utmost importance to determine the timely treatment to preserve fertility. **Objective**, To compare the findings of l ultrasound and pelvic magnetic resonance imaging in patients with ovarian cysts. **Methods**: study was conducted in radiological department of Alhakeem Teaching Hospital in the najaf center in the period of January 2020 to October 2021,ninety six female patient was examined by magnetic resonance imaging after physical examination and ultrasound examination.

the age group between 14-70 years ,the women present with variety of symptoms include irregular cycle , abdominal pain, dysmenhorria and menorrhagia. **Results**:On US ,the adnexal lesions were simple cyst (39.4%), complex cyst (21.2%), dermoid cyst (13.8%), chocolate cyst (9.6%), Hemorrhagic cysts (9.6%),and multilocular cysts (6.4%).On MRI, the adnexal lesions were simple cyst (33.0%), complex cyst (6.4%), dermoid cyst (11.7%), chocolate cyst (20.2%), Hemorrhagic cysts (11.7%), multilocular cysts (6.4%),mucinous cyst adenocarcinoma(4.2%),serous carcinoma(4.2%),sexcord/stromal ovarian cyst(1.1%),and borderline ovarian(1.1%) . Findings of USG in Comparison to MRI Resultshave100% sensivity,94% spacificity and 94.68 accuracy.

Conclusions: : sonograpgically vague ovarian cysts of solid or complex content will be benefit from further evaluation by magnetic resonance imaging,which highly accurate for identifying the origin of the mass and characterization of its tissue content.

Keywords: USG, MRI,ovarian cyst, adnexal masses.

Introduction

The ovarian cyst is a sac within the ovary that is fluid-filled and can be seen from neonatal time to postmenopause^[1]. Ovarian cysts (caused by a failure of the follicle to break or corpus luteum cysts formed by hemorrhage in a corpus luteum) may be functional or physiological cysts^[2] Other forms of ovarian cysts include dermoid cysts (teratomas), polycystic ovaries, endometrioid cysts (chocolate cysts), and cystadenomas. Most ovarian cysts are benign, safe,

may not cause problems or signs, and can hide on their own within a little months. it may be difficult to recognize malignant from benign ovarian cysts if we do histopathological analysis^[3] . However the surgery needed to remove the cyst can cause problems such as twisting, rupture, bleeding, or pressing on the surrounding organs. Although unilocular ovarian cysts in asymptomatic premenopausal women are associated with less than 1 percent risk of ovarian malignancy, those in premenarchal and postmenopausal women are at greater risk of malignancy^[4,5]Complex ovarian cysts are associated with a major risk of malignancy and are less frequent than simple cysts. It fills complicated cysts with either blood or a rough material. Specific cysts are not connected to the normal menstrual cycle, unlike simple cysts^[6,7] . Ovarian cyst treatment is based on the presentation (cyst accident or asymptomatic outcome) and the risk of malignancy. In two cycles, most functional cysts can be handled conservatively and dissolve spontaneously. When an ovarian cyst has sever symptoms, medical attention is usually appropriate^[8] . Ultrasound(US) and magnetic resonance imaging(MRI) are the two major modalities commonly used to detect cystic pathologies^[9]

The primary imaging technique used to classify and characterize adnexal masses remains (US)^[10] . The combined experience of multiple centers worldwide has provided a wealth of knowledge that enables approximately 90% of adnexal masses to be correctly categorized based on their US characteristics^[11]. It is necessary to classify the adnexal mass in order to evaluate the patients who need surgery and to identify the type of surgery and whether a surgical subspecialist is required^[12] MR imaging is an important part of the assessment of patients with ovarian disease and its role continues to develop. MR imaging with full information, such as dermoid, chocolate, simple and hemorrhagic cysts and fibromas will detect some benign lesions. MR imaging can be more effective than other modalities for lesion description, staging, and follow-up in cases with malignant lesions .^[13] Our research aims to classify the possibilities of ultrasound and magnetic resonance imaging (MRI) in the diagnosis of the most common ovarian lesion.

Method:

Study design & settings

Between October 2020 and February 2021, ninety four consecutive patients, with age group(14–70)years; the mean age was 39.13 years diagnosed with adnexal lesions by ultrasound and MRI in the department of radiology in Al-Hakeem in Najaf teaching hospital, the women present with variation of symptoms include abdominal swelling, irregular cycle, abdominal pain, bleeding, incidental.MR imaging was achieved on 1.5T unit of MR to do T1-

weight edimages (T1W), T2-weighted images, and fat-suppression image T1-weighted pre and post intravenous MRI contrast agent (gadolinium). Ovarian cysts have features that include shape, size, content (solid - cyst), nodal or vascular septum, and reinforcement. In addition, other features appeared includes peritoneal disease, enlarged lymph nodes and ascites. We differentiate surgical and pathologic findings with the image features. On all MR imaging features, multiple logistic regression analysis was performed without clinical details. They were classified as benign or malignant, according to the image features that were differentiated to the pathological findings and surgical.

ULTRASOUND APPARTUS:

The patients were examined by Philips (HD 11 XE) with trans vaginal transducer of 6 MHZ with additional of trans abdominal scanning by curved array 2-5 MHZ transducer in some patients .examination was performed on an ordinary table in which the patient was position supine with leg slightly flex and abducted. The patient has to empty her bladder to get better TVUS result as distended urinary bladder may distort the pelvic anatomy .The uterus was examined in longitudinal and transvers plan then adnexa was evaluated (ovaries and fallopian tube)and lastly the CUL-DE-SAC.

MRI APPARTUS:

The patients was examined by Achivasiemens 1.5 Tasla using multi-coil array and body-coils

TECHNIQE:

No preparation was required ,the patient position comfortably on the back and body- coil is located on the area to be examed in such way that the inferiorpart of coil came to lie beneath the pubic bone. The coil is saved in place with belt and the patient is then advanced head-first into the bore of the magnet .

The sequences include:

- 1- T2- tse-sagittal weighted image: to define the axis of mass with uterus.
- 2-T2-tse- transverse weighted image : planed perpendicular to the mass axis defined on sagittal series.
- 3-T2- tse-coronal weighted image: to define the relation ship between mass ,uterus and adnexa Including (ovaries, pelvic floor and sides wall)

4- T1-tse- transverse with and without fat suppression is mandatory to define fat contain ,T1bright masses .

5-whenever it is possible ,Gadolinum should be addministrated ,the contrast material used was Gadolinum chelates with dose of 0.1 (mmol / kg) given intra-venous by hand through cannula.

All scan were obtained at 5-mm thickness with 1-mm gap,FOV range from(250-375)mm.

In T1-W image.(TR 510 ms/TE 25ms) while T2-W image(TR5.0 sec /TE 110ms)

The Distribution of Patients According to Ultrasound Diagnosis of Ovarian Cyst

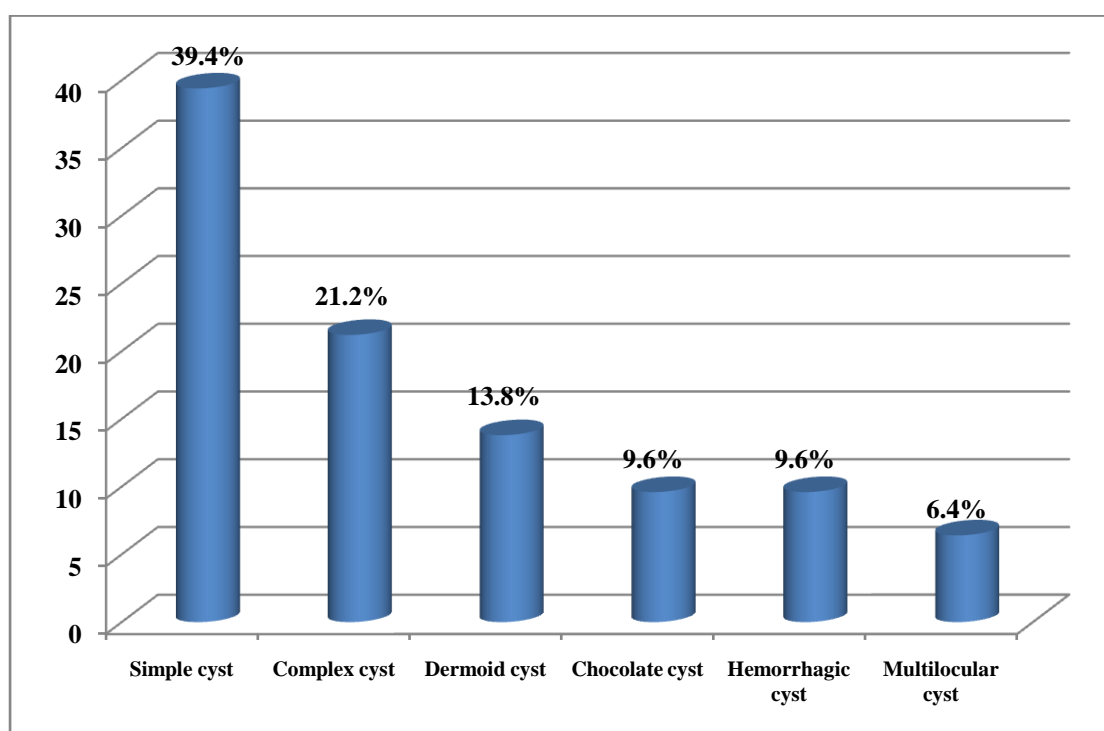


Figure 2: Distribution of patients according to ultrasound diagnosis of ovarian cyst

The Distribution of Patients According to MRI Diagnosis of Ovarian Cyst

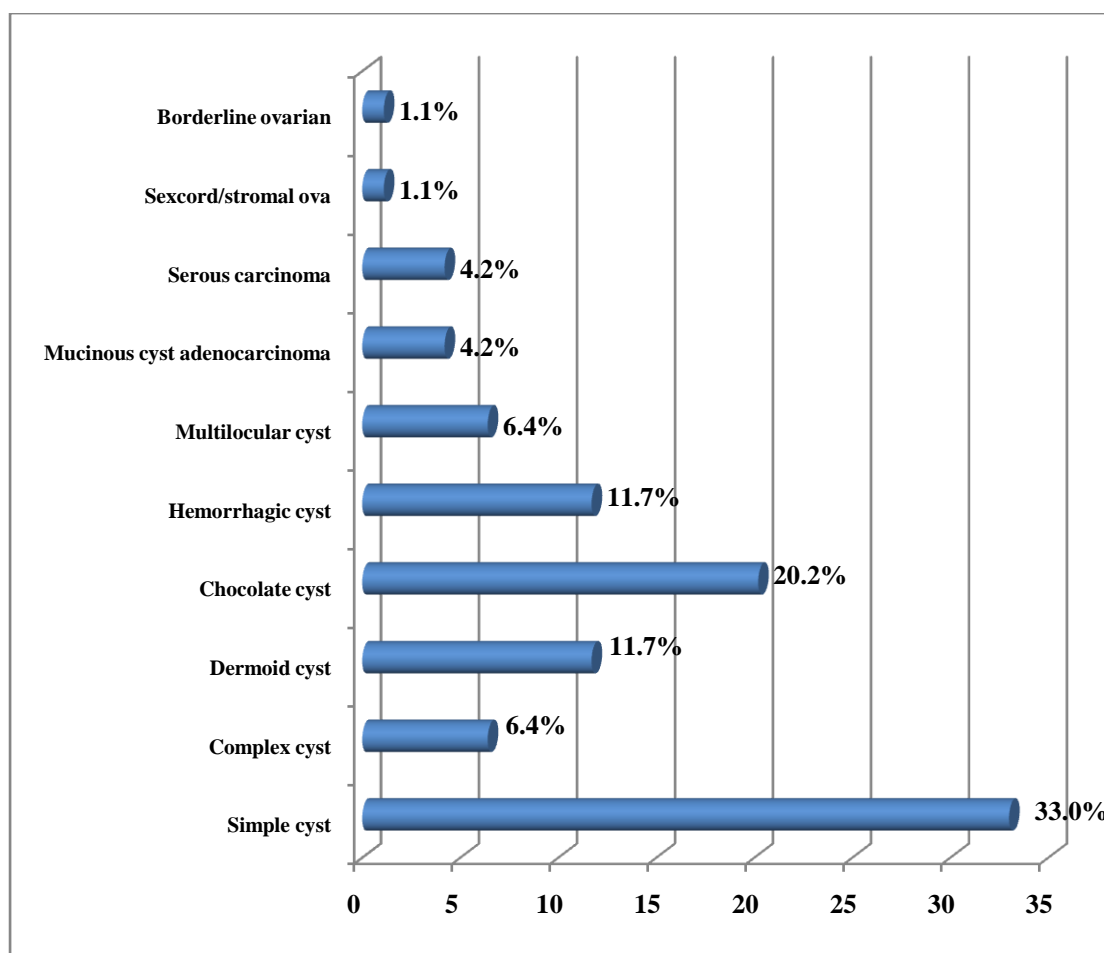


Figure 3: Distribution of patients according to MRI diagnosis of ovarian cyst

Sensitivity, Specificity, Positive predictive value, Negative predictive value and Overall Accuracy of US Results in Diagnosis of Ovarian Cyst in Comparison to MRI Results

Ultrasound diagnosis	MRI diagnosis		Total
	Malignant ovarian cyst	Benign ovarian cyst	
Malignant ovarian cyst	10	5	15
Benign ovarian cyst	0	79	79
Total	10	84	94

Sensitivity of US= $10/10 * 100 = 100.0\%$

Specificity of US= $79/84 * 100 = 94.0\%$

PPV of US= $10/15 * 100 = 66.7\%$

NPV of US= $79/79 * 100 = 100.0\%$

Overall accuracy of US= $(10+79)/94 * 100 = 94.68\%$

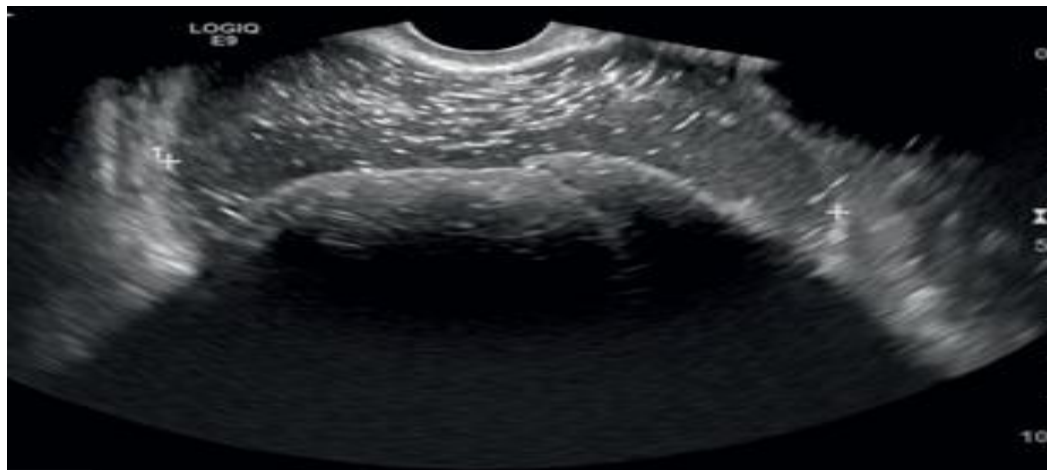
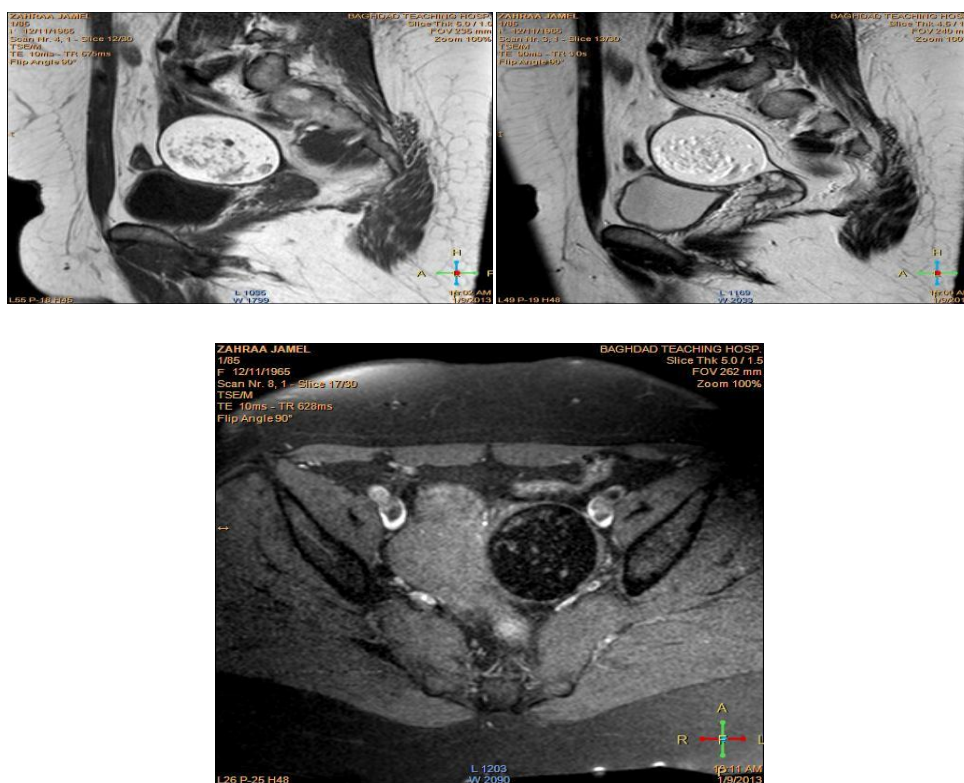


Figure -4o years old patients presenting with lower abdominal pain .

A- Trans vaginal ultrasound show hyper echoic solid mass(dermoid cyst)in left ovary.



B- T2WI and T1WI sagittal and T1WI axial with fat suppression show left ovarian dermoid cyst .

Discussion

The study was achieved on 94 females who had clinically suspected ovarian lesions who were primarily investigated with U/S then by MRI.

On US 96 patients with ovarian were detected The adnexal lesions were simple cyst (39.4%), complex cyst (21.2%), dermoid cyst (13.8%), chocolate cyst (9.6%), Hemorrhagic cysts (9.6%),and multilocular cysts (6.4%).

On MRI 96 patients with ovarian lesions. The adnexal lesions were simple cyst (33.0%), complex cyst (6.4%), dermoid cyst (11.7%), chocolate cyst (20.2%), Hemorrhagic cysts (11.7%), multilocular cysts (6.4%),mucinous cyst adenocarcinoma(4.2%),serous carcinoma(4.2%),sexcord/stromal ovarian cyst(1.1%),and borderline ovarian(1.1%).

Sensitivity, specificity, positive predictive value, negative predictive value and overall accuracy of US results in diagnosis of ovarian cyst in comparison to MRI results.

on U/S four cystic mass suspected as malignant whereas MRI diagnosed no case as malignant and four cases as benign which confirm by histopathology.

The sensitivity of US results in diagnosis of malignant ovarian cyst was (100.0%) that mean ultrasound was able to diagnosed all patients with malignant ovarian correctly.The specificity of US results in diagnosis of benign ovarian cyst was (94.0%) that mean ultrasound was able to diagnosed (94.0%) patients with benign ovarian correctly. Positive predictive value was (66.7%) that mean those diagnosed as malignant ovarian cyst by US was (66.7%) being malignant ovarian cyst by MRI and negative predictive value was (100.0%) that mean all those diagnosed as benign ovarian cyst by US being diagnosed as benign ovarian cyst by MRI and overall accuracy was (94.68%). In this study I observed that accuracy of diagnosis onultrasound was also depended on a sonographer with skills and good knowledge regarding characteristic features of adnexal lesions and their differential diagnosis

Benign lesions like simple cysts, hemorrhagic cysts, and small paraovarian cysts, small endometroid cysts and hydrosalpinx should be followed up rather than subjecting patient for MRI. Only those patients which are suspected for malignancy, not able to assess the site of origin in large size tumors and not regressing in size on follow up scan should be subjected for MRI. current study validity results are close to results of pooja et al 2019 ^[14]

The finding in this study MRI is best reserved for problem solving when U/S results are notdiagnostic or ambiguous because, although it is mor accurate to diagnosis, it is also more expensive.the signal intensity appearancesof ovarian cysts make possible a systemic approach

to diagnosis. dermoid, endometriomas, leiomyomas, fibromas, and other lesions can be accurately diagnosed on the basis of T1-W, T2-W, and fat-suppression T1-W MRI imaging findings. This result is like to finding by Amela Sofic et al., 2018^[15]

Conclusion

The strengths of MRI in the assessing of an ovarian mass are its ability to exactly determine the origin of a lesion and to describe its content. Common sense would dictate which patients with a suspected ovarian mass would benefit from MRI if their sonographic studies are technically limited. Our work also advises that if sonography detects an adnexal mass with cystic or solid-cystic, a great mass, or a questionable pedunculated uterine fibroid versus ovarian neoplasm, would benefit from MRI further evaluation.

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