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Role of 2D ultrasonography, colour Doppler & MRI in evaluation of adnexal masses

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Abstract
Background: Adnexal masses present a special diagnostic challenge in differentiating between benign and malignant lesions. Determination of malignancy is vital and is based largely on imaging appearances. However, ultrasonography(US), Colour Doppler (CD) and Magnetic Resonance Imaging (MRI) are the modalities available which carry no radiation risk and yet valuable in reaching a definitive diagnosis.
Settings and design: Twenty six female patients suspected clinically to have adnexal mass or detected to have adnexal mass either on US or on MRI were included in this study. All these cases were imaged with US with CD & MRI. The final diagnosis was determined by histopathology or definitive imaging and/or clinical diagnosis. A total of 30 masses were detected.
Results: 28 Out of 30 masses were detected on US. 30 masses were detected on MRI. Definitive diagnosis on US could be obtained in 60% lesions. CD added to the definitive diagnosis of 2 masses. The definitive diagnosis on MRI could be obtained in 25 masses.
Conclusion: Our findings support the possibility that Ovarian masses constituted most of the masses, followed by tubal masses and uterine masses (3.33%) of which 93.33% masses could be detected on US. CD did not add further information in detection of masses. All the adnexal masses detected clinically/on US were detected on MRI.

Keywords: adnexal masses, US and CD, US and MRI

Introduction

Adnexal masses present a special diagnostic challenge because it is difficult to differentiate between benign & malignant lesions clinically. Diagnosis of malignancy is vital and imaging is the most important part of evaluation of adnexal masses. Since surgery may ultimately be the most appropriate management for symptomatic adnexal masses, and the surgical technique and extent is different for benign and for malignant adnexal masses, hence discrimination between benign and malignant lesions becomes vital.

Adnexal masses are frequently found in both symptomatic and asymptomatic women.

During adolescence, 50% of adnexal neoplasms are mature cystic teratomas (often known asdermoid cysts). Women with gonads that contain a Y chromosome have a 25% chance ofdeveloping a malignant neoplasm (most commonly a dysgerminoma). Endometriosis isuncommon in adolescent women but may be present in as many as 50% of those who present with a painful mass. In sexually active adolescents, one must always consider a tubo-ovarianabscess as the cause of an adnexal mass [1, 2].

In women of reproductive age who have had adnexal masses removed surgically, mostare benign cysts or masses. Ten percent of masses are malignant; though in patients younger than 30 years many are of low malignant potential. Thirty-three percent are mature cystic Teratomas, and 25% are endometrioses. The rest are serous or mucinous cystadenomas or functional cysts [3].

By the time a malignant mass becomes symptomatic, it becomes incurable. Hence imaging and quick definitive diagnosis is required for instituting early treatment to enable cure in maximum number of patients.

This motivated us to undertake this study to evaluate the commonly used imaging-modalities of ultrasound, CD and MRI in adnexal masses.

Aims & objectives

1. To evaluate the role of US, CD & MRI in suspected adnexal masses.
2. To compare the sensitivity and specificity of US with CD & MRI in evaluation of adnexal masses.

Materials and methods

Twenty six female patients suspected clinically to have adnexal mass or detected to have adnexal mass either on US or on MRI were included in this study. All these cases were imaged with US with CD & MRI. The final diagnosis was determined by histopathology or definitive imaging and/or clinical diagnosis. A total of 30 masses were detected.

Inclusion criteria

1. Female patients detected to have adnexal mass on US.
2. Age between 15 years and 50 years.

Exclusion criteria

1. Pregnant women.
2. Post op recurrence cases of adnexal masses.
3. Mass diagnosed to be arising from uterus or other pelvic structures other than ovary or fallopian tube or broad ligament.
4. Those in whom MRI is contraindicated.

Protocol

US abdomen was performed using GE voluson 730 expert followed by colour Doppler in patients suspected with adnexal masses and MRI was performed with a Philips Multiva 1.5 tesla (T) scanner using a dedicated abdomino-pelvic protocol in these patients. All pelvic MRIs included a T2-weighted fast spin echo sequence, T1-weighted non-fat-suppressed sequence. Data collection performed according to the hospital regulations, after approval by the hospital authorities and consent by the patient.

Statistical analysis

The data will be entered in the Microsoft office excel 2007 and IBSS version 22 will be used for analysis. The data will be presented in the form of tables, and percentages. Paired t test will be used to assess the statistical significance. P value of < 0.05 will be considered significant.

Results

Table 1: Detection of various adnexal masses on US, CD & MRI.

Sl. No	Type of mass	US	US+CD	MRI
1.	Endometriosis	6/6 (100%)	6/6 (100%)	6/6 (100%)
2.	Haemorrhagic cyst	9/9 (100%)	9/9 (100%)	9/9 (100%)
3.	Serous cystadenoma	3/3 (100%)	3/3 (100%)	3/3 (100%)
4.	Dermoid	2/2 (100%)	2/2 (100%)	2/2 (100%)
5.	Hydrosalpinx	3/4 (75%)	3/4 (75%)	4/ 4(100%)
6.	Autoimmune oophoritis	2/2 (100%)	2/2 (100%)	2/2 (100%)
7.	Pyosalpinx	0/1 (0%)	0/1 (0%)	0/1 (0%)
8.	Mucinous cystadenoma	1/1 (100%)	1/ 1 (100%)	1/1 (100%)
9.	Subserosal uterine fibroid	1/1 (100%)	1/ 1 (100%)	1/1 (100%)
10.	Ovarian cystadenocarcinoma	1/1 (100%)	1/ 1 (100%)	1/1 (100%)
11.	Total	28	28	30

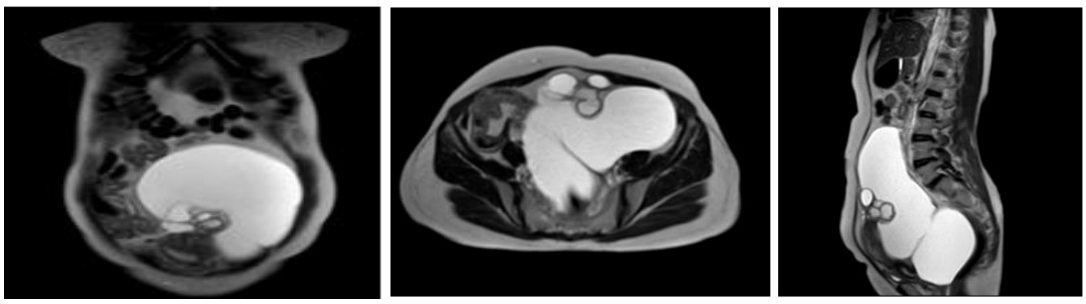
Table 2: Definitive diagnosis of various adnexal masses on US, CD & MRI.

Sl. No	Type of mass	US	US+CD	MRI
1.	Endometriosis	4/6 (66.67%)	5/6 (83.33%)	6/6 (66.67%)
2.	Haemorrhagic cyst	7/9 (77.78%)	7/9 (77.78%)	8/9 (77.78%)
3.	Serous cystadenoma	1/3 (33.33%)	1/3 (33.33%)	1/3 (33.33%)
4.	Dermoid	2/2 (100%)	2/2 (100%)	2/2 (100%)
5.	Hydrosalpinx	2/4 (50%)	2/4 (50%)	4/4 (100%)
6.	Autoimmune oophoritis	0/2 (0%)	0/2 (0%)	0/2 (0%)
7.	Pyosalpinx	0/ 1 (0%)	0/ 1 (0%)	1/ 1 (100%)
8.	Mucinous cystadenoma	1/1(100%)	1/1(100%)	1/1(100%)
9.	Subserosal uterine fibroid	0/1 (0%)	1/1 (0%)	1/1 (100%)
10.	Ovarian cystadenocarcinoma	1/1 (100%)	1/1 (100%)	1/1 (100%)
11.	Total	18	20	25

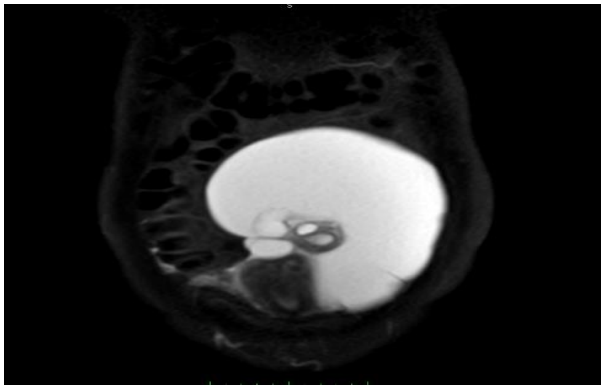
Table 3: US, CD, MRI & Histopathological examination correlation.

Sl. No	Type of mass	US	US+CD	MRI	HPE
1.	Endometriosis	4/6 (66.67%)	5/6 (83.33%)	6/6 (66.67%)	5/ 6
2.	Haemorrhagic cyst	7/9(77.78%)	7/9 (77.78%)	8/9 (77.78%)	4/9
3.	Serous cystadenoma	1/3 (33.33%)	1/3 (33.33%)	1/3(33.33%)	3/3
4.	Dermoid	2/2 (100%)	2/2 (100%)	2/2 (100%)	2/2
5.	Hydrosalpinx	2/4 (50%)	2/4 (50%)	4/4 (100%)	2/4
6.	Autoimmune oophoritis	0/2 (0%)	0/2 (0%)	0/2 (0%)	0/1
7.	Pyosalpinx	0/ 1 (0%)	0/ 1 (0%)	1/ 1 (100%)	1/1
8.	Mucinous cystadenoma	1/1(100%)	1/1(100%)	1/1(100%)	
9.	Subserosal uterine fibroid	0/1 (0%)	1/1 (0%)	1/1 (100%)	1/1
10.	Ovarian cystadenocarcinoma	1/1 (100%)	1/1 (100%)	1/1 (100%)	1/1
11.	Total	18/ 30	20/ 30	25	21/30

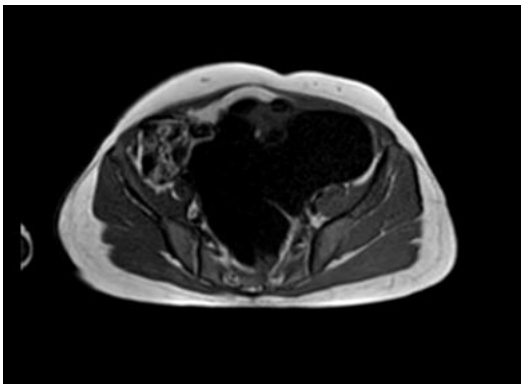
Left adnexa- hydrosalpinx, ovarian cystadenoma.



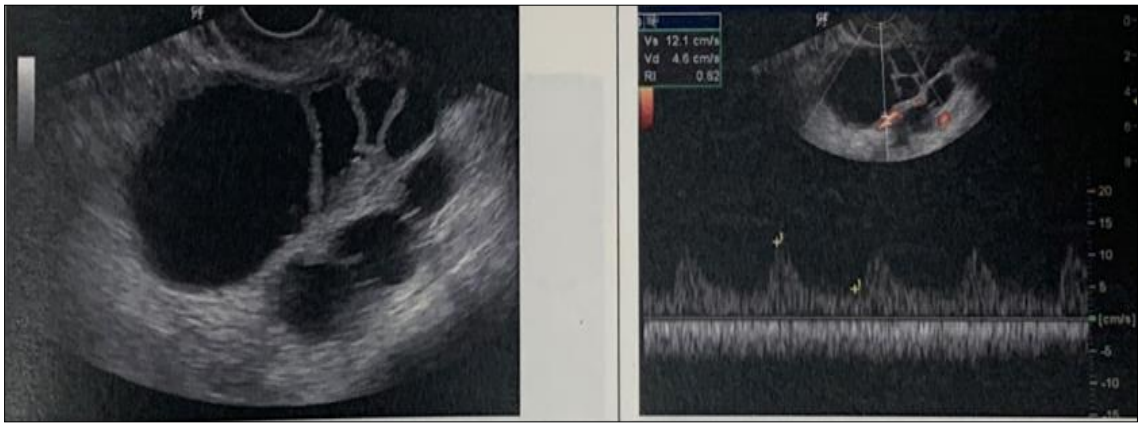
T2 CORONAL, AXIAL & SAGITTAL Sequences showing hyperintense large convoluted tubular cystic lesion with incomplete septations in left adnexa- hydrosalpinx, ovarian cystadenoma.



STIR CORONAL: Hyperintense

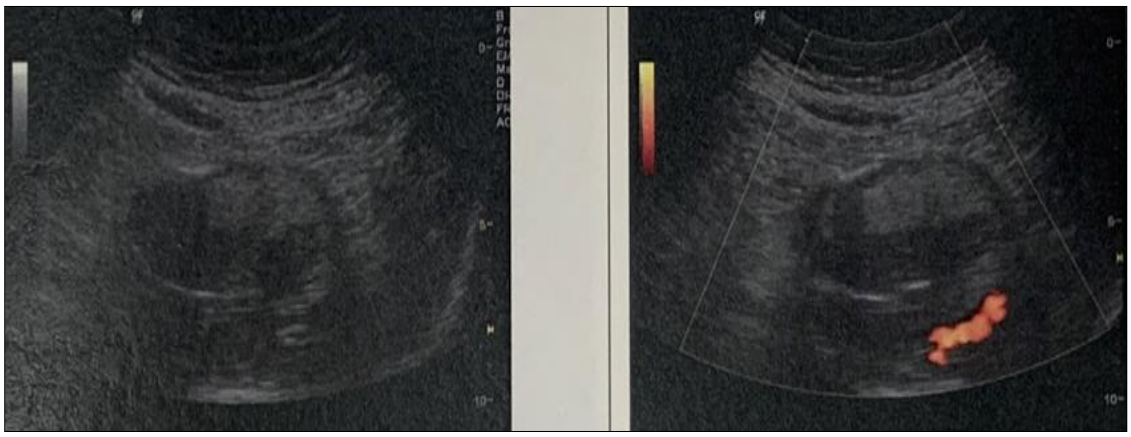


T1 AXIAL: Hypointense

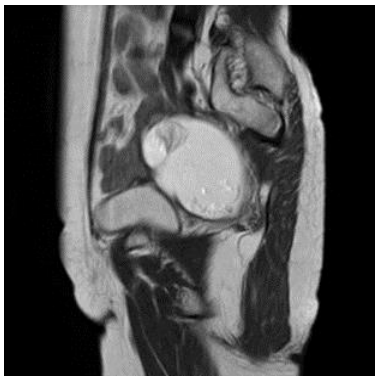


US, US+CD: Multiple septae with solid component showing vascularity

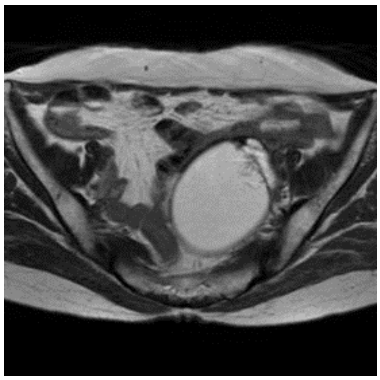
Dermoid



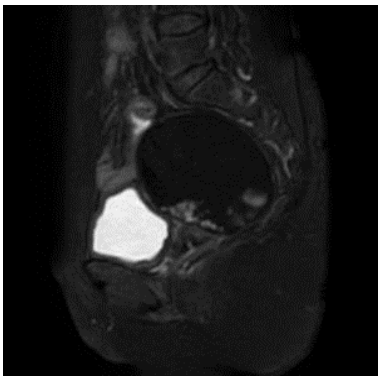
US, US+CD: Heteroechoic lesion with echogenic contents and adjacent vascularity



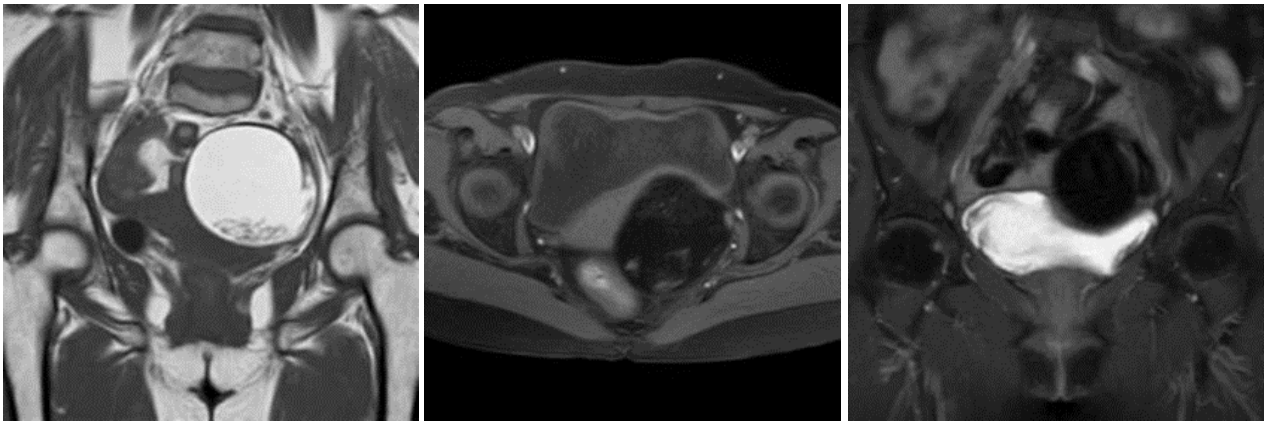
T2 SAGGITAL: Hyperintense Discussion



T2 SAGGITAL: Hyperintense



T2 SPAIR: Fat suppression +



T1: Hyperintense T1 FS: Hypointense T1 FS C+: Enhancing solid component

Discussion

28 (93.3 %) Out of 30 masses were detected on US. 30 masses were detected on MRI. There were 24 ovarian masses, 5 fallopian tube masses and 1 uterine mass. The uterine fibroid was mistaken as ovarian mass on imaging (which turned out to be subserosal uterine fibroid), hence included in the study. Definitive diagnosis on US could be obtained in 18(60%) lesions. CD added to the definitive diagnosis of 2 (6.67%) masses. The definitive diagnosis on MRI could be obtained in 25(83.33 %) masses.

Twenty six female patients (30 masses) suspected clinically to have adnexal mass or detected to have adnexal mass either on US or on MRI were included in this study.

All these cases were imaged with US with CD & MRI.

Transvaginal ultrasonography was done in few selected cases.

Intravenous contrast was used in some cases for MRI.

The final diagnosis was determined by histopathology or definitive imaging and/or clinical diagnosis.

Conclusion

Ovarian masses (80%) constituted most of the masses, followed by tubal masses (16.67 %) and uterine masses (3.33%). 93.33% masses could be detected on US. CD did not add further information in detection of masses. All the adnexal masses detected clinically/on US were detected on MRI. Definitive diagnosis on US could be obtained in 60% of masses. CD added to the definitive diagnosis in 6.67% of the cases. In 83.33% of cases, the definitive diagnosis on MRI could be obtained.

MRI is thus superior to US and CD in detection and also characterisation of adnexal masses. Hence it is felt that MRI could replace US and CD in evaluation of adnexal masses.

The sensitivity and accuracy of US, US with CD and MRI in detection of adnexal masses were 93.33%, 93.33% and 100% respectively. As there were no true negatives, the specificity could not be calculated. The sensitivity and accuracy of US, US with CD and MRI to give definitive diagnosis of adnexal masses were 60%, 66.67% and 83.33% respectively. As there were no true negatives, the specificity could not be calculated.

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