RESEARCH

COMPARISON BETWEEN ULTRASONOGRAPHY AND MD CT IN EVALUATION OF OVARIAN MASSES WITH HISTOPATHOLOGICAL CORRELATION

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Abstract

Background: Ovarian masses are quite common presentation of a gynaecological pathology. It is very common among the women of reproductive age and can be seen in women of all age groups. The Objectives is to evaluate role of USG and CT in differentiate benign and malignant lesions and correlating them with intraoperative and histopathological findings. **Materials and Methods:** This was a hospital based cross sectional study of 50 patients referred from the inpatient ward as well as outpatients. The patients suspected clinically to have ovarian masses were prospectively studied by both USG and CT scan. All the ultrasound and CT findings were subjected to interpretation. Intraoperative and histopathological data of the respective cases were collected from the respective departments. Statistical analysis was done with the calculations of Sensitivity, specificity and positive predictive value. **Result:** Out of all lesions, 26% were malignant lesions, 28% were benign and 18% were borderline lesions. Most common malignant lesion was serous cystadenocarcinoma n=6 (46%), followed by mucinous cystadenocarcinoma n=3 (23%).Most common benign lesion was serous cystadenoma n=10 (36%).**Conclusion:** Mostly benign and malignant ovarian mass are serous cystadenoma and serous cystadenocarcinomas respectively.

INTRODUCTION

Among gynaecological malignancy, cancer of ovary is the commonest cause of death and fifth most common reason of cancer deaths in females.[1] Ultrasonography is the basic tool for detection and characterisation of ovarian masses.[2] The benefits of USG are availability, low costs, safety and simplicity of the examination, accuracy in both detecting and characterizing ovarian mass. Given the above-mentioned advantages, USG is the modality of choice for imaging suspected ovarian masses. However, the shortcomings with this modality includes limited field of view, obscuration of pelvic organs by the presence of bowel gas, inherent limitation dependant on patient size and its dependence on the skill and experience of the operator. CT is mainly used primary imaging for find out the extent of ovary malignancies, detecting persistent and recurrent tumours. Advantages of CT oral and rectal contrast opacification of GIT, IV contrast enhancement of blood vessels and viscera and high spatial resolution. CT scan is used for tumour delineation, characterisation and increasing conspicuity of peritoneal implants. CT can be used to predict the success of primary debulking surgery in women with metastatic ovarian carcinoma.[3]

MATERIALS AND METHODS

This study was conducted at teaching Hospitals attached to Bapuji Education Association J.J.M. Medical College, Davangere. Bapuji Hospital, Chigateri General Hospital Women and Child Hospital. Sample size was 50 patients. Duration of study was 2 years. Permission for the study was obtained from the College Institutional Ethics Committee prior to commencement.

Inclusion Criteria

- All study subjects with suspected ovarian mass
- Ovarian masses incidentally detected by USG.

Exclusion Criteria

- Pregnant women
- Patients with renal insufficiency or elevated urea, creatinine levels that can be exacerbated by contrast used for enhanced CT
- Patients who are allergic to the contrast used for enhanced CT
- Patients who are not willing to give informed consent
- Patient with ovarian mass managing conservatively.

Method of collection of data: The population consists of cases referred from IPD as well as OPD for evaluation of suspected ovarian masses.

i. Detailed history and relevant clinical examination was done.
ii. On suspicion of having ovarian masses, patients were prospectively studied by both USG and CT scan.
iii. All the ultrasound and CT findings were subjected to interpretation.
iv. Intraoperative and histopathological data of the respective cases were collected from the respective departments.
v. Finally correlation between USG findings and CT findings was performed with the surgical-pathological findings separately.

Equipment used:

- GE LOGIQ P9 Ultrasound system
- Toshiba Activion 16 slice MDCT scanner

Ultrasound technical parameters:

- Patients on empty stomach and with fully distended bladder.
- Appropriate gain settings in grey scale and colour Doppler.
- Appropriate PRF settings for colour Doppler.

Computed tomography technical parameters and imaging protocol:

The head is positioned first supine with arms extended above the level of head. IV contrast opacification is achieved with 100-120 ml of nonionic contrast media(0.9ml/kg body weight)by infusing at the rate of 3ml/sec. Dual phase study is done with arterial phase at 20-40sec and venous phase at 70-90 sec. Thewindowwidthforsofttissueis350-400 HUandforboneis1500-2000 HU. The window level for soft tissue is 50 HU and for bone is 450 HU. Reconstruction is done with a slice thickness of 1.25 mm. All images are viewed in a range of soft tissue window settings.

Statistical Analysis: Sensitivity, specificity and positive predictive value will beanalysed.

RESULTS

Most of ovarian masses belongs to 56-65 years of age. Out of 50 masses, malignant, benign and borderline lesions were 13(26%), 28(56%) and 9(18%) respectively. Most common malignant lesion was serous cystadenocarcinoma n=6 (46%), followed by mucinous cystadenocarcinoma n=3 (23%).Most common benign lesion was serous cystadenoma n=10 (36%)

Table 1: Shows morphological distribution of Malignant ovarian lesions (size of the lesion, solid, cystic and solid + cystic components, septations and vascularity of the lesion) Total number: USGn=11,CT n=10 cases

Findings	USG (%)	CT (%)
Size(>10cm), solid component, vascularity, septation (>3mm)	6 (55%)	4(40%)
Size(>10cm), solid component, vascularity	6 (55%)	6 (60%)
Size(>10cm), solid component	8 (73%)	6 (60%)
Solid components and septations (>3mm)	7 (64%)	7 (70%)
Vascularity, septations (>3mm)	7(64%)	7 (70%)
Solid component, vascularity	10 (91%)	9 (90%)
Solid component, vascularity, septations (>3mm)	5 (45%)	8 (80%)

Table 2: Shows morphological distribution of Benign ovarian lesions (size of the lesion, solid, cystic and solid + cystic components, septations and vascularity of the lesion) Total number: USG n=22, CT n=18 cases

Findings	USG (%)	CT (%)
Size(>10cm), solid component, vascularity, septation (>3mm)	0	0
Size(>10cm) ,solid component, vascularity	3 (14%)	0
Size(>10cm), solid component	4 (18%)	3 (17%)
Solid components and septations (>3mm)	3 (14%)	1 (5.5%)
Vascularity,septations (>3mm)	0	0
Solid component, vascularity	0	2 (11%)
Solid component, vascularity, septations (>3mm)	0	0

Table 3: Accuracy of CT in finding out benign and malignant lesions

CT diagnosis	Histopathological diagnosis		
Ovarian masses	Malignant	Benign	Total
Malignant	12	1	13
Benign	1	27	28
Total	13	28	41

Sensitivity- 92%Specificity-96%
PPV-92%,NPV-96%Accuracy-95%

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Table 4: Diagnostic accuracy of USG in differentiating benign from malignant lesions

USG Dx	Histopathological Dx		
Ovarian masses	**Malignant**	**Benign**	**Total**
Malignant	11	2	13
Benign	2	26	28
Total	13	28	41

Sensitivity 84.6% Specificity- 92.8%
PPV-84.6%, NPV-92.8%, Accuracy-90.2%

Table 5: Role of USG in detecting cystic lesions

USG diagnosis	Histopathological diagnosis		
Ovarian masses	**Cystic**	**Non-cystic**	**Total**
Cystic	40	2	42
Non cystic	1	7	8
Total	41	9	50

Sensitivity- 97.5%Specificity- 78%
PPV-95%, NPV-87.5%, Accuracy-94%

DISCUSSION

On Ultrasound, Benign ovarian conditions appear as simple anechoic lesions with thin cyst wall, when complicated with hemorrhage or infection they show internal echoes or thin septations with no vascularity within them.

On CT, Benign ovarian conditions appear as well defined thin walled fluid attenuation with mild wall enhancement. When complicated they show high density fluid content.[4]

Endometriosis occurs mostly in premenopausal women in the third decade of life.[5]Ultrasound finding of endometriomas are complex cysts, either unilocular/multilocular, ground glass appearance due to diffuse, homogeneous, low to medium level internal echoes.[6]Due to multiple bleeding and re-bleeding, they may develop irregular walls and echogenic mural nodules. Cyst may sometimes be difficult to differentiate them from malignant masses when it having thin or thick septations. On CT, they appear as thick walled fluid attenuating lesions with high density fluid, they show wall enhancement.[4]

On USG, a tubo-ovarian abscess presents as an adnexal mass with a thickened echogenic wall and sometimes hypoechoic areas with thick and irregular septations.

On CT, an adnexal abscess is appear as a soft tissue mass with central areas of low attenuation, thick irregular walls are commonly present and it may be difficult to distinguishovarian abscess from a necrotic tumour or endometrioma based solely on the CT finding.[4]

Sonographic reassessment of masses with patterns suggesting benign disease may be an alternative to immediate surgical exploration in a selected population (ie, those with poor surgical risk).[7,8]

Computed tomography: Germ cell tumours show heterogenous attenuation with fat and calcifications. Cystadenomas are predominantly cystic lesions with thin walls and thin septations (<3mm thick).They show mild wall and septal enhancement on post contrast study.Other benign tumoursare solid homogenously enhancing lesions and of varying sizes.

Malignant ovarian tumours:

Ovarian carcinoma (serous/mucinous cystadenocarcinoma/ endometrioid carcinoma/ poorly differentiated carcinoma): On Ultrasound, irregular wall, >3mmseptations,papillary projections, solid components and more than 9cm size are suspicious for malignancy.[9]

Malignantlesionsusuallyproduceasignificantincrease incolourDopplerflow signals secondary to angiogenesis. The colour content of the tumour probably reflects tumour vascularity better than any other Doppler parameter.[10]As colour and duplex US become more widely available, their potential value for differentiating benign and malignant masses is being explored. Malignant tumours often have neovascularity that consists of blood vessels with walls that have little or no smooth muscle support. These vessels frequently have a characteristic waveform with a low resistive index (RI<0.4) (peak systolic and diastolic Doppler shift/peak systolic Doppler shift) and pulsatility index value <1.9 Doppler findings can highly suggest the diagnosis of benign versus malignant papillary projection, although an overlap exists, especially with borderline tumors.[11]

On CT, they appear as complex cystic lesions with solid components as muralnodules/papillarities/ thick septations (>3mm thick) and associated peritoneal metastasis is a common finding.[12,13]

b. Malignant germ cell tumours: (dysgerminoma, yolk sac tumor, immature teratoma) On ultrasonography, complex solid/cystic mass, with calcification, mural nodulations, papillarities (immature teratoma) are seen. Predominantly solid with cystic areas or cystic masses with increased vascularity on colour doppler study (dysgerminoma).

On CT, they appear as heterogenous lesions with solid/cystic areas, calcifications and fat attenuation. Solid components show intense enhancement. Other associated findings like metastases to lymph nodes or other solid organs and ascites can be seen.[14]

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Metastases

Involvement of ovaries is usually bilateral and appear as solid or solid/cystic masses. Imaging alone cannot differentiate them from primary ovarian tumours. Appreciation of the spectrum of CT findings in peritoneal carcinomatosis is essential for accurate evaluation of scans in patients with abdominopelvic malignancies.[15]

Anechoic lesions have high chances of being benign tumours, usually mucinous cystadenomas or serous cystadenomas. As the % of echogenic material increases, the chances of malignancy also increases. Two exceptions to thisrule ie

1. Lesions with very echogenic foci whichare virtually always benign teratomas.
2. Groups of tumours that are totally or near-totally echogenic. These are actually less percentage to be malignancies than mixed-density tumours (large anechoic component). In mixed-echogenicity tumours that are not teratomas, there was no way of differentiationb/benign and malignant lesions with an acceptable degree of accuracy in an individual case.[16]

CONCLUSION

CT is a better tool than USG in detection, differentiating benign from malignant lesions, assessing extension, vascularity of lesions and detection of lymphadenopathy and distant metastasis in case of ovarian tumours. USG is a better modality in assessing cystic nature of the lesions. Improved detection and characterisation of ovarian masses contributes to better diagnostic accuracy and consequent reduction of false positive findings and invasive procedures which leads to a significant reduction of morbidity and mortality.

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