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Original Article

Role of USG and CT scan in evaluating ovarian lesions

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ABSTRACT

Introduction: Ultrasonography (USG) helps by detecting lesions, giving idea about its internal structure and also gives opportunity to evaluate other abdominal organs. However, evaluation by CT scan can give additional information which can modify the course of treatment and/or suggest prognosis of the patient.

Methodology: 84 patients were included, evaluated with USG and CT scan of abdomen and pelvis. Ovarian pathologies were categorized as benign, malignant and metastasised and the results of CT and USG were compared.

Results: 84 patients were evaluated. The disease prevalence of malignant lesions was 55.95% on USG and 54.76% on CT Scan. CT Scan was more sensitive (97.8%) than USG (85.1%) but sonography (94.5%) was more specific than CT Scan (92.1%). USG had higher positive predictive value (95.2%) as compared to CT Scan (93.7%) to diagnose malignant lesions. But negative predictive value of CT Scan (97.2%) was higher than USG (83.3%) to rule out malignant lesions.

Conclusion: CT scan and sonography are comparable in differentiating malignant from benign ovarian tumors. CT scan was more sensitive than USG, but sonography is more specific than CT scan in diagnosis of malignant lesions. USG has high positive predictive value as compared to CT scan to diagnose malignant lesions.

Keywords: Ovarian malignancy, USG, CT scan

INTRODUCTION

Ovary is the third most common site of primary malignancy in female genital tract after cervix and endometrium accounting for 30% of all cancers of female genital tract. Ovaries are paired organs measuring 4 x 2.5 x 1.5 cm each in dimension situated one on each side of uterus close to lateral pelvic wall. [1]

Ovaries are subjected to monthly endocrine and traumatic insult during ovulatory cycle and are a prime site for tumor genesis. The primary and secondary carcinomas of ovary are frequent with a variety of pathologic pattern which is seen in all age and ethnic groups.[2] Its mortality rate exceeds the combined mortality of both endometrium and cervical neoplasm.[3] Fifty percent of ovarian tumors are benign tumors. Out of the rest, 90% are epithelial and remaining 10% are those

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resulting from metastasis.[4]

Ultrasound plays an important role in evaluation of ovarian pathology. In present years, USG is widely accepted as first line radiological investigation for ovarian pathology. It is non-invasive, cheap, quick, free of radiation hazards, comfortable for patients, easy to re-perform and very accurate in hands of skilled operator. With color Doppler it is possible to evaluate vascularity of lesion. Spectral Doppler waveform characteristics (e.g., resistive index, pulsatility index) correlate well with malignancy but generally add little information to morphologic considerations. Ultrasonographic contrast media helps in determination of exact extent of lesion and vascularity of lesion.

CT scan is the preferred technique in the pretreatment evaluation of ovarian lesions, it is very helpful to define the extent of disease, evaluate benign and malignant ovarian pathology and staging of malignant lesion. It can detect actual density of lesion. Other investigations like MRI, radionuclide scanning, etc. are also helpful in ovarian pathology.

There is very little data available for correlation studies between USG and computed tomography of ovarian lesions. This study was conducted with a view to find out the diagnostic value of USG and computed tomography and its correlation with histopathological diagnosis.

METHODOLOGY

Study Sample: The present prospective study aimed at following up suspected cases of ovarian lesions presenting at radiology department of Dhiraj general hospital, by using GE Logiq P5, Philips HD7 AND HD9 USG machines and 16 Slice Siemens Multidetector CT scan machines.

Inclusion Criteria:

1. Only those patients willing to participate in the study were included.
2. Patients referred to the radiology department for ovarian lesions investigation, and found to have positive findings, were included in this study
3. All accidentally diagnosed cases of ovarian lesions were also be included in this study.

Exclusion Criteria:

Patients presenting to radiology department not willing for examination or written consent, were excluded from this study.

Clinical : All patients were subjected to a detailed clinical history and examination as outlined in Proforma (Annexure- I).

A. Investigations : Following routine blood investigations were done in all patients:
Complete haemogram including hemoglobin level, total and differential count, Erythrocyte sedimentation rate. Renal function test including blood urea and creatinine. Random blood sugar estimation; fasting blood sugar and 2 hours post prandial if required. HIV and Hepatitis if required.

B. Radiological Investigation: All of them were subjected to transabdominal sonography with full bladder technique with 3.5MHz transducer and if required transvaginal sonography after voiding with 6.5 MHz transducer. Contrast enhanced CT Scan of abdomen and pelvis with 16-slice
Siemens Multidetector CT scan machine.

RESULTS AND DISCUSSION

The present study was carried out at department of Radiodiagnosis and imaging at SBKS Medical College and Dhiraj General Hospital Pipariya from November 2014 to October 2016. Total 96 patients with clinically suspected ovarian pathology were subjected to USG and CT Scan. All patients underwent gynecology examination prior to referral for sonography.

The findings obtained by ultrasound were compared with those of CT Scan to determine the accuracy of modality in diagnosis of ovarian pathologies and degree of echotexture detail provided by each method. Out of 96 patients who were referred to us, 4 were pregnant females and 8 were known postoperative cases of ovarian malignancies, so they were excluded from study. Thus, total 84 patients were examined and compared with Radiological and histopathological diagnosis. The salient observations are as follows.

Table 1: Demographic profile study population

Age group (years)	No. of Case	Percentage
0-10	2	2.3%
11-20	3	3.5%
21-30	24	28.5%
31-40	22	26.1%
41-50	14	16.6%
51-60	8	9.5%
61-70	8	9.5%
>70	3	3.5%
Total	84	100%

Table 2: Final radiological diagnosis of benign lesions

Types of conditions	No. of cases	Percentage
Haemorrhagic cyst	9	23.6%
Tuboovarian abscess	6	15.7%
Mucinous cystadenoma	6	15.7%
Mature cystic teratoma	5	5.9%
Simple cyst	4	10.5%
PCOD	3	13.1%
Serous cystadenoma	3	13.1%
Brenner tumour	1	2.6%
Endometrioma	1	2.6%

The study comprised of 84 females, between age groups of 0 - 80 years.

The peak incidence was observed in the age group 21 – 30 years, which comprised 24 (28.5%) of patients. Ovarian lesions were observed least frequently in paediatric 5 cases (0 – 20 years) and 11 cases in geriatric age group (> 60 years) patients.

In this study, 38 of the 84 lesions were benign and 43 were malignant. Of the benign lesions, hemorrhagic cyst was most common benign lesion presenting in 9 (23.6%) cases. The second most common lesion was mucinous cystadenoma 6 (15.7%) cases.

Table 3: Clinical Presentation of study population

COMPLAINTS	No. of Patients	Percentage
Pain	42	50
Mass	30	35.7
Back ache	30	35.7
Wt. Loss	28	33.3
Menstrual irregularity	34	40.4
Dysmenorrhea	28	33.3
Infertility	11	13

Pain was the most common presentation seen in 50% of cases, followed by menstrual irregularity in 40.4% of patients. Minimum number of patients presented with lump, dysmenorrhea, weight loss and infertility. Back pain and weight loss were the most common complaints in ovarian malignancies. Abdominal pain was chief complaint of hemorrhagic cyst.

Infertility was seen in 100% patients of PCOD.

Table 4: Site of Involvement

Types of conditions	Left	Right	Bilateral	Total
Benign tumour	19	8	11	38
Malignant	10	19	14	43
Metastasis	-	-	3	3
Total	29	27	28	84

Table 5: Association between CA 125 and ovarian tumours

	CA 125
Ovarian malignancy	38 (82%)
Benign lesions	7 (18%)

In our study, out of 46 malignant lesions, 38 (82%) showed raised CA-125 levels. Out of 38 benign lesions 7 (18%) showed raised CA-125 levels. In 4 cases of Tubo-ovarian abscess and 1 case of endometriosis, raised levels of CA 125 was detected.

Table 6: Comparison of pathological diagnosis and USG findings.

Pathological diagnosis	No. of lesions	Correctly diagnosed at with USG	Correctly diagnosed with CT
Benign	38	37(97.4%)	36(95.8%)
Malignant	43	38(88%)	43(100%)
Metastasis	3	2(66.6%)	3(100%)
Total	84	77(91.6%)	82(97.6%)

Out of 38 patients with benign tumours, 37 patients were correctly diagnosed on USG, while 36 (95.8%) were correctly diagnosed when CT was done. Out of total 43 patients with malignant tumours, 38 (88%) patients were correctly diagnosed on USG, while 43 (100%) patients were correctly diagnosed when CT was done.

Malignant lesions were predominantly hypoechoic. In 27 malignant lesions wall thickness was more than 3 mm. Internal septations and solid component were prominent features of malignancy. There was wall irregularity seen in 41.6% of cases of malignancies. Ascites and pleural effusion were also associated with ovarian malignancies.

On CT scan peritoneal deposits were seen in majority of malignant lesions. Fat and calcification was a prominent feature of teratomas. Brenner tumour showed bilateral calcification. Ascites and pleural effusion were also found to be associated with malignancies

Table 7: Predominant findings on USG

	ECHO			Wall thickness		Septations	Inner wall structures		Ascites
Types of conditions	Hyper	Hypo	Mixed	>3mm	<3mm		Smooth	Irregular	
Benign tumour	3	17	22	1	20	25	28	3	5
Malignant	8	20	16	27	3	35	6	35	20

Table 8: Predominant findings on CT SCAN

Types of condition	Benign	Malignant
Peritoneal deposits	0	28
Calcification	10	2
Ascitis	4	25
Enhancement	10	35
Metastasis	0	24

The disease prevalence of malignant lesions in this study was 55.95% on USG and 54.76% on CT Scan. In evaluation of ovarian lesions, CT Scan (97.8%) was more sensitive than USG (85.1%) but sonography (94.5%) was more specific than CT Scan (92.1%) in diagnosis of malignant lesions. USG (95.2%) had higher positive predictive value as compared to CT Scan (93.7%) to diagnose malignant lesions. But negative predictive value of CT Scan (97.2%) was higher than USG (83.3%) to rule out malignant lesions. Positive likelihood ratio of USG was 15.74 as compared to CT Scan (12.39), means that if USG detects malignancy there will be 15.7 times more chances of having malignancy as compare to 12.3 times on CT Scan.

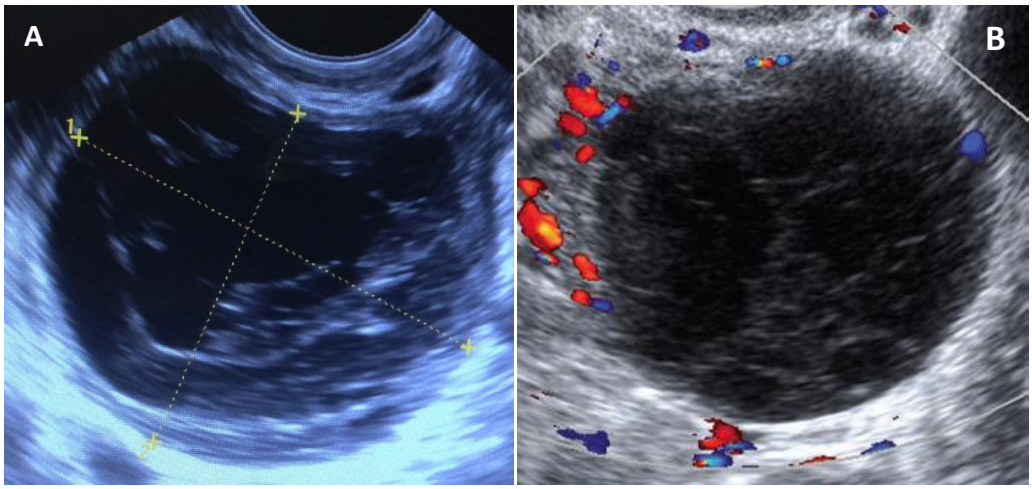

Figure 1: (A) Sonographic image shows thin walled ovarian cyst with multiple septa & echoes (B) Color Doppler shows peripheral Doppler signals and lack opf internal vascularity: Hemorrhagic ovarian cyst in 25 year old woman.

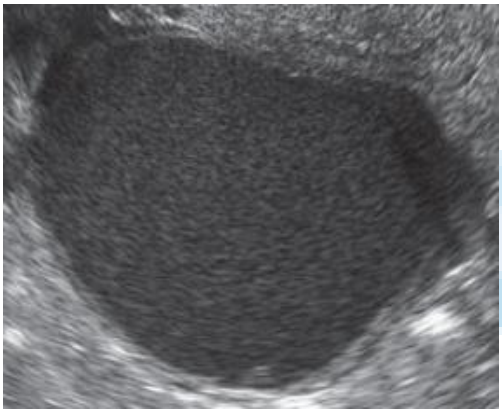

Figure 2: Sonography image of endometrioma showing cyst with homogeneous low level internal echoes in 29-year-old woman.

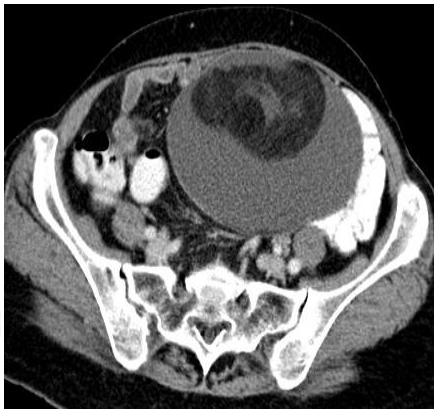

Figure 3 : Axial CT scan image showing mature cystic teratoma arising from left ovary with macroscopic fat and fluid.

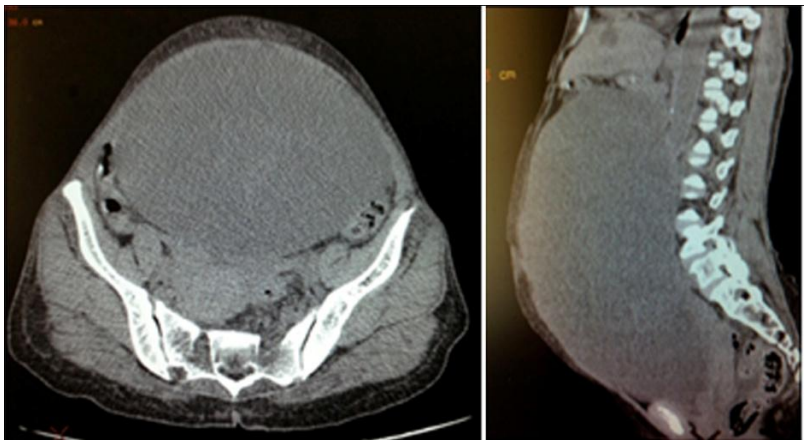

Figure 4: Axial and sagittal CT scan images showing large cystic lesion with thin septa arising from pelvic- serous cystadenoma.

Table 9: Comparative values of USG and CT SCAN in ovarian lesions

	USG	CT SCAN
Sensitivity	85.11 %	97.83 %
Specificity	94.59 %	92.11 %
Positive Predictive Value	95.24 %	93.75 %
Negative Predictive Value	83.33 %	97.22 %
Positive Likelihood Ratio	15.74	12.39
Negative Likelihood Ratio	0.16	0.02
Disease prevalence	55.95 %	54.76 %

Table 10: Sensitivity and specificity of multidetector computed tomography in differentiating benign from malignant adnexal masses in different studies

Author	Sensitivity (%)	Specificity (%)
Kinkel et al[13]	81	87
Tsili et al[14]	90	88
Liu et al[15]	87	100
Our study	97	92

DISCUSSION

Ovarian cancer is one of the most common gynecological malignancies in India and worldwide.5,6 However, it has the highest mortality among all gynecologic malignancies. The major reason for the poor prognosis is that, at the time of diagnosis, approximately 75% of patients have diseases that are at an advanced stage.7 The early detection of ovarian carcinoma continues to be a formidable challenge and an elusive task. The risk of a woman developing ovarian cancer is 1 in 71.8 Adnexal masses can be benign or malignant and the benign masses greatly outnumber malignant ones.9 In our study 45% of patients had benign lesion and 55% had malignant lesion. This discrepancy was mainly due to selection bias. When an ovarian mass is detected, there are two major issues: to determine whether it is benign or malignant and then if it is malignant, to look for the extent of disease.10,11 Precise characterization of an adnexal lesion is important, Because of the obvious significant differences in prognoses between early and advanced cancers, early detection with accurate staging is of paramount importance.12 However, we understand that surgery has a role in definite diagnosis and the further characterization of masses.

CONCLUSION

CT scan and sonography proved to be excellent noninvasive modalities to differentiate ovarian masses from benign and malignant lesions and both imaging techniques seemed to be comparable in differentiating malignant from benign ovarian tumors. CT scan was more sensitive than USG, but sonography is more specific than CT scan in diagnosis of malignant lesions. USG has high positive predictive value as compared to CT scan to diagnose malignant lesions.

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