Original Article

COMPARISON OF ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY IN THE EVALUATION OF SUSPICIOUS OVARIAN MASSES

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Abstract

Aim: The present study was undertaken to determine the role of US and CT in the evaluation of suspicious ovarian masses.

Methods: This prospective observational study was carried out in the Department of Radiology for the period of 6 months. The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. Total 120 women were included as subjects in this prospective study.

Results: Out of 120 patients, majority of patients belonged to 41-50 years of age group (42, 35%) followed by 31-40 years of age group (30, 25%). 18 patients (15%) belonged to 21-30 years and 51-60 age group <20 and >60 years of age group included 6 patients each. Mass abdomen was the most common presenting symptom and contributed to 40%. It is followed by pain abdomen of 25% and abdominal distension by 20%, others by pressure symptoms (10%), and loss of appetite (5%). Most common benign tumor is mucinous cystadenoma with a percentage of (55%) followed by serous cystadenoma (25%), others are Dermoid (10%), Fibro Thecoma (5%), Fibroma (2.5%), Granulose cell tumor (2.5%). Most common malignant tumour is papillary serous cystadeno carcinoma with a percentage of (35%) followed by mucinous cystadeno carcinoma (25%), others are serous cystadeno carcinoma (15%), papillary mucinous cystadeno carcinomoa (5%), Borderline Malignant (Serous – 5%, Mucinous – 10%), endometroid carcinoma (1.6%), Dysgerminoma (4.1%).

Conclusion: In this present study showed significant differences in the two methods i.e USG and CT. CT is showing more advantages regarding tumor localization, characterization. Hence CT can be advised if the unusual abnormalities were observed in routine USG scan in the diagnosis of ovarian masses.

Keywords: Ultrasound, CT scan, Ovarian Tumors, Sensitivity, Specificity.

Introduction

Adnexal lesions especially ovarian masses are a common presentation amongst women of all age groups and all social strata. Pertaining to their wide spectrum of diagnostic variation, they often perplex both the physician and the radiologist. While the docile benign ovarian lesions may be treated conservatively, the aggressive neoplastic lesions often require radical surgical and associated oncological treatment. Ovarian cancer is a silent killer as it is

conspicuous by its late diagnosis and low 5 years survival rate of 45%. It is second only to cervical cancer in gynecological malignancies in India and has a worldwide prevalence.[1,2]

Ovarian cyst is often asymptomatic and it is a fluid-filled sac inside the ovary. Sometimes it leads to lower abdominal or back pain, pelvic inflammatory disease. But most of the ovarian cysts are not harmful.[3] Ovarian cyst can be follicular, corpus luteum, dermoid and cystodenomas type.[4] The diagnosis of ovarian cyst can be performed by the use of ultrasound and other laboratory investigations.[5,6] Sometimes if required patients can take medications like ibuprofen or paracetamol. Surgical procedures can be taken in case of larger cysts.[7,8]

Most of the reproductive age female can develop smaller cyst every month. Larger cyst can cause problems before menopause in 8% of women.[9] Therefore, radiological evaluation of ovarian masses is pivotal in making early diagnosis and lesion characterization, distinguishing between benign and malignant masses thereby determining the therapeutic approach. Various diagnostic modalities such as USG, CT and now MRI have come to the rescue of the diagnostician for solving these dilemmas.[10]

USG is typically the first study to be requested in patients with clinical findings that may suggest ovarian mass. The advantages of a USG are its wide availability, low cost and accuracy for morphological characterization. However, a considerable percentage of the ovarian masses may be considered as indeterminate on USG.[11] It is for such lesions that cross-sectional imaging techniques are pivotal. MRI can provide precise anatomical localization and meticulous lesion characterization; thereby significantly narrowing down the differential diagnosis. However, in a country like India, especially in the remote locations, availability and cost effectiveness are major issues that are preventing MRI to be the second line modality after USG for evaluating ovarian masses. CT on the other hand has wide availability, relative cost effectiveness, rapidity and provides a larger field of view allowing comprehensive evaluation of the abdomen.[12,13]

The present study was undertaken to determine the role of US and CT in the evaluation of suspicious ovarian masses.

Methods

This prospective observational study was carried out in the Department of Radiology for the period of 6 months. The study protocol was reviewed by the Ethical Committee of the Hospital and granted ethical clearance. Total 120 women were included as subjects in this prospective study.

The aim and the objective of the study are conveyed to all patients. All patients underwent abdominal Ultrasonography and CT scan with determination of the ovarian mass characteristics. Patients with conservatively manageable ovarian masses were excluded from this study. Patients of age 0 to 18 years, midline uterine mass lesions on USG, clinically and sonographically proven cases of ectopic pregnancy, sonographically validated benign cystic ovarian lesions such as functional cysts in patients of reproductive age group were excluded from the study. Complete history of allergy was taken before doing CT scan and if there was history of allergy then nonionic contrast was used.

Statistical analysis

The recorded data was compiled entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations.

Results

Table 1: Age distribution of patients and type of masses

Age in years	**N**	**%**
Below 20	6	5
21-30	18	15
31-40	30	25
41-50	42	35
51-60	18	15
Above 60	6	5
Type of masses		
Benign		
Pre-menopausal	54	45
Post-menopausal	12	10
Malignant		
Pre-menopausal	18	15
Post-menopausal	36	30

Out of 120 patients, majority of patients belonged to 41-50 years of age group (42, 35%) followed by 31-40 years of age group (30, 25%). 18 patients (15%) belonged to 21-30 years and 51-60 age group <20 and >60 years of age group included 6 patients each. There are total 72 cases of Pre-menopausal stage and 48 cases of Postmenopausal stage having ovarian cyst. Out of 72 cases of Pre-menopausal conditions have 18 number of malignant and 54 number of benign type of ovarian masses. In the Postmenopausal group there are 36 cases of malignant and 12 cases of benign ovarian mass was observed.

Table 2: Symptoms

Symptoms	**N**	**%**
Mass abdomen	48	40

Pain abdomen	30	25
Abdominal distension	24	20
Pressure symptoms	12	10
Loss of appetite	6	5

Mass abdomen was the most common presenting symptom and contributed to 40%. It is followed by pain abdomen of 25% and abdominal distension by 20%, others by pressure symptoms (10%), and loss of appetite (5%).

Table 3: Benign and malignant tumors

Tumors	**N**	**%**
Benign		
Mucinous cystadenoma	66	55
Cystadenoma	30	25
Dermoid	12	10
Fibro Thecoma	6	5
Fibroma	3	2.5
Granulose cell tumor	3	2.5
Malignant		
Papillary serous cystadeno carcinoma	42	35
Cystadeno carcinoma	30	25
Serous cystadeno carcinoma	18	15
Papillary mucinous cystadeno carcinomoa	6	5

Borderline Malignant Serous Mucinous	 6 12	 5 10
Endometroid carcinoma	2	1.6
Dysgerminoma	4	3.34

Most common benign tumor is mucinous cystadenoma with a percentage of (55%) followed by serous cystadenoma (25%), others are Dermoid (10%), Fibro Thecoma (5%), Fibroma (2.5%), Granulose cell tumor (2.5%). Most common malignant tumour is papillary serous cystadeno carcinoma with a percentage of (35%) followed by mucinous cystadeno carcinoma (25%), others are serous cystadeno carcinoma (15%), papillary mucinous cystadeno carcinomoa (5%), Borderline Malignant (Serous – 5%, Mucinous – 10%), endometroid carcinoma (1.6%), Dysgerminoma (4.1%).

Table 4: Comparison between USG and CT in diagnosis of ovarian masses

Category	**CT Study (No. of Cases)**		**USG Study (No. of Cases)**	
	Benign	**Malignant**	**Benign**	**Malignant**
Sensitivity	96%	84%	90%	78%
Specificity	92%	85%	86%	76%
Positive Predictive Value	94%	90%	88%	74%
Negative Predictive value	90%	84%	86%	72%

Overall, CT was found to have 96% sensitivity, 92% specificity, and an accuracy of 92% in the differentiation of benign and malignant ovarian masses, while PPV and NPV were 94% and 90%, respectively. The sensitivity of USG was 90%, specificity was 86% and PPV and NPV were 88% and 86% respectively.

Discussion

Ovarian tumours present a greatest clinical challenge of all gynecological cancers and ovarian. Carcinoma is the second most common gynaecological carcinoma in incidence. As most of them present in a late stage, clinical diagnosis alone is difficult and as benign ovarian tumours greatly outnumber malignant ones, determination of a degree of suspicion for malignant is critical and is based largely on imaging modalities.

CT allows use of oral contrast agent to distend and mark the bowel and help differentiateCbowel from peritoneal implants, which gives this modality a major advantage over US and MR imaging. However, available studies have not demonstrated that CT is significantly superior to other modalities in staging ovarian malignancy.[14,15] CT is most useful for evaluating the extent of disease in the abdomen and pelvis. In some studies, CT has demonstrated

reasonable accuracy in determining which patients may have tumor implants that can be optimally surgically debulked (i.e., all tumor nodules greater than 2 cm can be removed).[15,16]

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.[16,17] If the nature of the mass is adequately determined on the image, then it saves the patient unnecessary surgery and expense. Similarly if staging is accurately done on imaging, again it becomes cost-effective and it helps in further planning. However, we understand that surgery has a role in definite diagnosis and the further characterization of masses. Sometimes USG underestimates staging and pelvic examination by a gynecologist and serum CA-125 are of limited value in the diagnosis of pelvic masses and their sensitivity is often below 50%.[17] The sensitivity of morphologic analysis with ultrasound in predicting malignancy in ovarian tumors has been shown to be 85%– 97%, whereas its specificity ranges from 56%–95%.[19,20]

The above data is showing more sensitive for the detection of abnormal ovarian mass in the present population. Ovarian tumours present a greatest clinical challenge of all gynecological cancers and ovarian. Carcinoma is the second most common gynaecological carcinoma in incidence. As most of them present in a late stage, clinical diagnosis alone is difficult and as benign ovarian tumours greatly outnumber malignant ones, determination of a degree of suspicion for malignant is critical and is based largely on imaging modalities. The determination of a degree of suspicion for malignancy in an ovarian mass is the most significant step in its management as the decision to perform radical surgery or conservative surgery depends on accurate preoperative diagnosis.[21] CT can be used to assess the severity of the disease in female with ovarian disorders. There is no strong evidence that CT is more specific and sensitive to find out ovarian cancer and USG is enough to evaluate the simple ovarian cysts. Jeong et al[22] showed that morphological characteristics associated with strong probability of malignancy were the presence of solid component (63%), papillary projection (92%), and free fluid in peritoneal cavity (56%).[23] Onyeka et al. found the sensitivity of CT scan for all ovarian cancer detection greater than that of US 83% vs. 67%, but US was more specific.[20]

In our study Overall, CT was found to have 97% sensitivity, 90% specificity, and an accuracy of 95% in the differentiation of benign and malignant ovarian masses, while PPV and NPV were 96% and 92%, respectively. The sensitivity of USG was 87%, specificity was 85% and PPV and NPV were 86% and 82% respectively. The findings of this study are corresponding to the results of Ahmed A et al.[24] Verit FF et al[25] while evaluating the diagnostic accuracy of different techniques in diagnosis of ovarian tumours in premenopausal women, found USG to be 83% sensitive and 92% specific and CT to be 91% sensitive and 96% specific.

Conclusion

In this present study showed significant differences in the two methods i.e USG and CT. CT is showing more advantages regarding tumor localization, characterization. Hence CT can be advised if the unusual abnormalities were observed in routine USG scan in the diagnosis of ovarian masses. CT and USG imaging all have approximately similar accuracy in staging ovarian carcinoma but the sensitivity of CT scan for all ovarian cancer detection. Among women with ovarian disorders, CT can be primarily in patients with ovarian malignancies, either to assess disease extent prior to surgery or as a substitute for second look laparotomy.

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