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Original research article

Study of Ultrasonography (USG) and computed tomography(CT) in the identification and distinction of benign and malignant ovarian masses

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Abstract

Aim: comparison of Ultrasonography (USG) and Computed Tomography (CT) in the evaluation of suspicious Ovarian Masses.

Methods: This prospective observational study was carried out in the Department of Radiology. All patients underwent abdominal Ultrasonography and CT scan with determination of the ovarian mass characteristics.

Results: The Mean age of the patients was 41.94 years. 35.83% belong to 40-50 year age group and followed by 30-40 years 21.67%. There were total 69 cases of Pre-menopausal stage and 51 cases of Post-menopausal stage having ovarian cyst. Out of 69 cases of Pre-menopausal conditions have 15 number of malignant and 54 number of benign type of mass. In the Postmenopausal group there are 37 cases of malignant and 14 cases of benign ovarian mass was observed. Table 3 shows CT and USG comparison for the diagnosis of ovarian masses. Overall, CT was found to have 97.5% sensitivity, 90.83% specificity, and an accuracy of 95% in the differentiation of benign and malignant ovarian masses, while PPV and NPV were 96.67% and 91.67%, respectively. The sensitivity of USG was 87.5%, specificity was 85.83% and PPV and NPV were 86.67% and 82.5% respectively.

Conclusion: Significant differences were in the two methods i.e USG and CT. CT was showed more advantages regarding tumor localization, characterization. Hence CT could advise if the unusual abnormalities were observed in routine USG scan in the diagnosis of ovarian masses.

Keywords: USG, CT, ovarian masses

Introduction

In Indian women, ovarian cancer is one of the most common malignancies.[1] Ovarian cancer struck 239000 women globally in 2012 (including 26834 new cases in India) and killed

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152000 people (GLOBOCAN 2012).[2] Due to delayed detection, ovarian cancer is more deadly than endometrial and cervical cancer combined. The tumour has progressed outside the pelvis in roughly 70% of patients at the time of diagnosis due to a lack of symptoms and early peritoneal spreading. The most important prognostic factor is the stage of the disease at the time of diagnosis.

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.[5-8] Sometimes if required patients can take medications like ibuprofen or paracetamol. Surgical procedures can be taken in case of larger cysts.[9,10] Most of the reproductive age female can develop smaller cyst every month. Larger cyst can cause problems before menopause in 8% of women.[11] 16% of female with ovarian cyst has risk of ovarian cancer. 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 this dilemmas.[12] 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.[13] 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.[14]

Material and Methods

This prospective observational study was carried out in the Department of Radiology ,Icare Institute of Medical Science And Research and Dr. Bidhan Chandra Hospital,Haldia, West

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Bengal, India for one year. After taking informed consent detailed history was taken from the patient or the relatives.

Methodology

Total 120 women were included in this study. 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 non-ionic contrast was used.

Results

We evaluated 120 patients with Mean age of 41.94 years. 35.83% belong to 40-50 year age group and followed by 30-40 years 21.67%. Table1. The table 2 shows the Benign and Malignant Masses on Histopathology in Pre and Post-menopausal patients. There are total 69 cases of Pre-menopausal stage and 51 cases of Post-menopausal stage having ovarian cyst. Out of 69 cases of Pre-menopausal conditions have 15 number of malignant and 54 number of benign type of ovarian masses. In the Postmenopausal group there are 37 cases of malignant and 14 cases of benign ovarian mass was observed. Table 3 shows CT and USG comparison for the diagnosis of ovarian masses. Overall, CT was found to have 97.5% sensitivity, 90.83% specificity, and an accuracy of 95% in the differentiation of benign and malignant ovarian masses, while PPV and NPV were 96.67% and 91.67%, respectively. The sensitivity of USG was 87.5%, specificity was 85.83% and PPV and NPV were 86.67% and 82.5% respectively.

Table 1.Age distribution of patients (n=120)

Age Group (in years)	Number=120	Percentage (%)
Below 20	5	4.17
20-30	21	17.5
30-40	26	21.67
40-50	43	35.83

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50-60	23	19.17
Above 60	2	1.67
Total	120	100

Table-2: The characteristics of different ovarian masses

Category	Pre-menopausal	Post-menopausal
Malignant	15	37
Benign	54	14
Total	69	51

Table-3: The 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	97.5%	85.83%	87.5%	75.83%
Specificity	90.83%	85.83%	85.83%	74.17%
Positive Predictive Value	96.67%	87.5%	86.67%	80%
Negative Predictive value	91.67%	90.83%	82.5%	73.33%

Discussion

Ovarian torsion is a rare but serious gynecologic emergency. Urgent surgical detorsion successfully preserves ovarian function in over 90% of cases, whereas delayed diagnosis may lead to necrosis, rupture, infection, peritonitis, and possibly death. Currently, laparoscopic surgical evaluation of the ovaries remains the gold standard for diagnosis because diagnostic imaging has been considered unreliable.[15]

In day-to-day practice, we come across many cases of ovarian masses. Some of these turn out to be benign, some borderline, and some malignant. 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

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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.[17] 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%.[18-21]

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.[19] Clinical evaluation with regards to site (unilateral or bilateral), fixity, consistency, presence of nodules in Douglas pouch and presence of as cites increase the suspicious of malignancy to certain extent but if combined with other tools as tumor markers and two dimensional ultrasounds, the sensitivity for malignancy increases.[18] 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. [3] 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%).[20] 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.[21]

In our study Overall, CT was found to have 97.5% sensitivity, 90.83% specificity, and an accuracy of 95% in the differentiation of benign and malignant ovarian masses, while PPV and NPV were 96.67% and 91.67%, respectively. The sensitivity of USG was 87.5%, specificity was 85.83% and PPV and NPV were 86.67% and 82.5% respectively. The findings of this study are corresponding to the results of Ahmed A et al.[22] who found Trans

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Abdominal Sonography (TAS) to be 78% sensitive and 88.8% specific and CT to be 91% sensitive and 81.4% specific in evaluating benignity and malignancy in adnexal masses. While we are discordant with the results of USG in the study of Behtash N et al. [23] showing a sensitivity of 91.2% and specificity of 68.3%; there is close similarity in CT results of current study with them, showing 85.3% sensitivity and 56.1% specificity. Verit FF et al.[24] 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

The present study concluded that the significant differences in the two methods i.e USG and CT. CT was showed more advantages regarding tumor localization, characterization. Hence CT could advise if the unusual abnormalities were observed in routine USG scan in the diagnosis of ovarian masses.

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ISSN: 0975-3583, 0976-2833 VOL14, ISSUE 09, 2023

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