

Evaluation of suspicious Ovarian Masses: comparative study**Manish Kumar Jha¹, Arif Faizan²**¹*Consultant, Dept. of Radiology, Narayana Superspeciality Hospital, Howrah, West Bengal, India.*²*Consultant, Dept. of Radiology, Narayana Superspeciality Hospital, Howrah, West Bengal, India***Received: 27-06-2020 / Revised: 20-07-2020 / Accepted: 26-08-2020****Abstract****Aim:** Comparison of Ultrasonography (USG) and Computed Tomography (CT) in the evaluation of suspicious Ovarian Masses.**Materials and Methods:** This prospective observational study was carried out in the Department of Radiology, Narayana Superspeciality Hospital, Howrah, West Bengal, India from December 2016 to November 2017. All patients underwent abdominal Ultrasonography and CT scan with determination of the ovarian mass characteristics.**Results:** We evaluated 100 patients with Mean age of 42.88 years. Most patients belong to 40-50 year age group and followed by 30-40 years. There are total 61 cases of Pre-menopausal stage and 39 cases of Post-menopausal stage having ovarian cyst. 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.**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:** Ultrasonography, Computed Tomography, PPV and NPV

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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 cystadenomas 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 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 dilemma.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

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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.^{14,15}

Material and Methods

This prospective observational study was carried out in the Department of Radiology, Narayana Superspeciality Hospital, Howrah, West Bengal, India from December 2016 to November 2017.

Methodology

Total 100 women were included as subjects in this prospective 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, mid-line 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

Age Group (in years)	Number=100	Percentage (%)
Below 20	4	4
20-30	18	18
30-40	22	22
40-50	36	36
50-60	19	19
Above 60	1	1
Total	100	100.00

Table 2: The characteristics of different ovarian masses

Category	Pre-menopausal	Post-menopausal
Malignant	12	28
Benign	49	11
Total	61	39

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%	86%	87%	76%
Specificity	90%	85%	85%	74%
Positive Predictive Value	96%	88%	86%	79%
Negative Predictive value	92%	89%	82%	74%

Discussion

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 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 gynaecological 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 ascites 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. Jeonget 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% 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.²² who found Trans-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

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.

Reference

1. Parkin DM, Bray F, Ferlay J, Pisani P. Global cancer statistics, 2002. CA: a Cancer Journal for Clinicians. 2005;55(2):74-108.
2. Nand KA. Consolidated report of population based Cancer Registeries. Indian council of Medical Research. 2001;1:212.
3. Jeong YY, Outwater EK, Kang HK. Imaging evaluation of ovarian masses. Radiographics. 2000;20(1):1445–1470.
4. Aziz Z, Sana S, Saeed S, Akram M. Institution based tumor registry from Punjab: five year data based analysis. J Pak Med Assoc. 2003;53(2):350–353.
5. Tanwani AK. Prevalence and patterns of ovarian lesions. Ann Pak Inst Med Sci. 2005;1(4):211–214.
6. Pérez-López FR, Chedraui P, Troyano-Luque JM. Periand post-menopausal incidental adnexal masses and the risk of sporadic ovarian malignancy: new insights and clinical

- management. *GynecolEndocrinol.* 2010;26 (6):631–643.
7. Woodward PJ, Hosseinzadeh K, Saenger JS. Radiologic staging of ovarian carcinoma with pathologic correlation. *Radiographics.* 2004;24 (4):225–246.
 8. Nam E, Kim Y, Kim J, et al. Kim. Diagnosis and staging of ovarian cancer: comparative values of PET/CT, Doppler US, CT, and MRI correlated with histopathologic analysis. *J ClinOncol.* 2008;26(15S):5567.
 9. Kinkel K, Lu Y, Mehdizade A, Pelte MF, Hricak H. Indeterminate ovarian mass at ultrasound: incremental value of second imaging test for characterization-meta analysis and Bayesian analysis. *Radiology.* 2005;236 (2):85–94.
 10. Tsili AC, Tsampoulas C, Charisiadi A, et al. Adnexal masses: accuracy of detection and differentiation with multidetector computed tomography. *GynecolOncol.* 2008;110 (4):22–31.
 11. Ovarian cysts. Office on Women's Health. November 19, 2014. Archived from the original on 29 June 2015. Retrieved, 2015
 12. Joshi M, Ganesan K, Munshi HN, Ganesan S, Lawande A. Ultrasound of adnexal masses. In *Seminars in Ultrasound, CT and MRI.* WB Saunders. 2008;29(2):72-97.
 13. Funt SA, Hann LE. Detection and characterization of adnexal masses. *Radiologic Clinics of North America.* 2002;40(3):591- 608.
 14. Devine C, Szklaruk J, Tamm EP. Magnetic resonance imaging in the characterization of pelvic masses. In *Seminars in Ultrasound, CT and MRI.* WB Saunders. 2005;26(3):172-204.
 15. Bennett GL, Slywotzky CM, Giovanniello G. Gynecologic causes of acute pelvic pain: spectrum of CT findings. *Radiographics.* 2002;22(4):785-801.
 16. Mimoun C , Fritel X , Fauconnier A , Deffieux X , Dumont A , Huchon C. Epidemiology of presumed benign ovarian tumors. *Journal de gynecologie, obstetrique et biologie de la reproduction,* 2013; 42(8):722 -9.
 17. Helm William. Ovarian Cysts. Archived from the original on 7 September 2013. Retrieved, 2013.
 18. Levine D , Brown DL , Andreotti RF , Benacerraf B , Benson CB , Brewster WR , Coleman B , Depriest P , Doubilet PM , Goldstein SR , Hamper UM , Hecht JL , Horrow M , Hur HC , Marnach M , Patel MD , Platt LD , Puscheck E, Smith -Bindman, R. Management of asymptomatic ovarian and other adnexal cysts imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement. *Radiology.* 2010; 256(3):943 -54.
 19. HE, Nguyen HN. The role of prophylactic oophrectomy in cancer prevention. *Gynecologic Oncology.* 2001 -2010; 55(3):38 -41. 7.
 20. Liu J, Xu Y, Wang J. Ultrasonography, computed tomography and magnetic resonance imaging for diagnosis of ovarian carcinoma. *Eur. J. Radiol.* 2007; 62(2):328 -334.
 21. Onyeka BA, Attalla A, Deemer H. Comparative diagnostic values of greyn scale USS versus CT scan in primary management of gynaecological pelvic mass with emphasis on ovarian detection and staging. *J. Obstet. Gynaecol.* 2001; 21(6):516 -9
 22. Ahmed A, Zamir S, Saghir NJ. Characterization of adnexal masses on transabdominal ultrasonography and CT scan. *Ann Pak Inst Med Sci.* 2013;9(1):48–51.
 23. Behtash N, Rahmani M, Ghotbizadeh F, Karimi M, Zarchi AM. Ultrasonography and computed tomography for management of adnexal masses in Iranian patients with suspected ovarian cancer: results of a prospective study. *Asian Pacific Journal of Cancer Prevention.* 2009;10:201-04.
 24. Verit FF, Pehlivan M. Transvaginal ultrasound and computed tomography combined with CA–125 determinations in preoperative evaluation of ovarian masses in premenopausal women. *Harran Üniversitesi Tıp Fakültesi Dergisi.* 2007;4(2): 50–54.

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