Original Article

Role of ultrasonography and CT in diagnosing different types of adnexal masses and correlation with histopathological report

Satish Prasad B S[1*], Shama M Shetty[2]

[1]Professor, [2]Junior Resident, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences, Karnataka, INDIA.
Email: satishprasad.bs@gmail.com

Abstract

Aims and objectives: To study the ultrasonography pattern of various adnexal masses and correlate them with histopathological findings. The computed tomography patterns of various adnexal masses and correlate them with histopathological findings. The complementary role and drawbacks of USG and CT modalities in evaluation of adnexal masses. The sensitivity, specificity, PPV, NPV ,diagnostic accuracy of USG and CT in differentiating benign from malignant adnexal masses. The sensitivity, specificity, PPV, NPV, diagnostic accuracy of USG and CT in differentiating solid and cystic adnexal masses. **Methods:** This is a prospective analysis of 50 patients referred from in patient ward as well as outpatient for USG and CT scan in our institute for evaluation of suspected adnexal masses. Findings of USG and CT scan were computed and compiled. **Result:** The results of the study revealed that the ovarian masses constituted 96% and fallopian tube masses ,4% of all adnexal masses. Among the ovarian masses, malignant lesions were 48%,benign lesions were 37.5% and borderline lesions were 14.5%.USG showed sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 96%, 92%, 92%, 95.8% and 94%in determining cystic nature of the lesions.CT was found to have 96% sensitivity, 94% specificity, 96% positive predictive value, 94% negative predictive value and 95% accuracy in differentiating benign from malignant masses. **Conclusion:** CT is a better modality than USG in lesion detection, differentiating benign from malignant lesions, assessing local extension, vascularity of lesions, detection of lymphadenopathy and distant metastasis in both adnexal lesions.USG is a better modality in assessing cystic nature of the lesions. Improved detection and characterization of adnexal masses contribute to better diagnostic accuracy and consequent reduction of false positive findings and invasive procedures which leads to significant reduction in mortality and morbidity.

Key Words: Adnexal masses, Ultrasonography, Computed tomography, Benign, Malignant.

[*]**Address for Correspondence:**
Dr. Satish Prasad B S, Professor, Department of Radiodiagnosis, Adichunchanagiri Institute of Medical Sciences, Karnataka, INDIA.
Email: satishprasad.bs@gmail.com
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INTRODUCTION

Adnexal mass lesions are common among women of all age groups and very common among the reproductive age group. They can vary from benign masses like functional cysts to malignant masses like ovarian cancer. Adnexal masses are usually identified either through clinical examination or through USG examination of the pelvis for symptoms caused by the mass or incidentally. The diagnosis of ovarian masses by clinical examination, sonography and CA-125 is known as triple diagnostic method[1].Adnexal masses commonly involve ovary, because of the propensity of ovary for neoplasia, fewer neoplasms occur in fallopian tubes which is commonly involved in inflammatory process.Ovarian cancer is the commonest cause of death from gynecological malignancy and is the fifth commonest cause of cancer deaths in women[2].

USG is the primary modality used for detection and characterization of adnexal masses[3].The advantages of USG being its wide availability, decreased costs, safety and simplicity of the examination, accuracy in both

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detecting and characterizing adnexal mass. The role of color flow Doppler imaging is now gaining importance and criteria for distinguishing between benign and malignant masses is possible[4].Given the above mentioned advantages, USG is the modality of choice for imaging suspected adnexal masses. CT is the most commonly used primary imaging study for evaluating the extent of adnexal malignancies and for detecting persistent and recurrent tumors. Advantages of CT include oral and rectal contrast opacification of gastrointestinal tract, intravenous contrast enhancement of blood vessels and viscera, fast data acquisition and high spatial resolution. CT of abdomen and pelvis can depict masses as well as probable local or regional invasion. CT scan is used for tumor delineation , characterization and increasing conspicuity of peritoneal implants. While the staging accuracy of CT imaging is only moderate, prediction of tumor resectability is excellent[5].CT can be used to predict the success of primary de-bulking surgery in women with metastatic ovarian carcinoma[6]. This study strives to demonstrate the use of USG and CT together in detecting the lesion, characterizing them, evaluate the findings which can differentiate benign and malignant lesions and assess the complementary role of USG and CT by correlating them with intraoperative and histopathological findings. Malignant neoplasms nearly always require laparotomy, whereas benign neoplasms may be managed laparoscopically[7].

MATERIALS AND METHODS

Study design: This is a prospective study carried out in outpatients and inpatients referred for ultrasound and CT scan to the Department of Radiodiagnosis, Sri Adhichunchanagiri Hospital and Research Centre, B .G. Nagara, Nagamangalataluk, Mandya district from August 2013 to November 2014.

INCLUSION CRITERIA: Patients with clinically suspected adnexal masses. Patients with adnexal masses which are incidentally detected by ultrasound. Patients aged between 14 to 70 yrs.

EXCLUSION CRITERIA: Pregnant women. Any absolute contraindication for CT

STATISTICAL ANALYSIS: All the data were collected and converted into percentages wherever necessary. Sensitivity, specificity, positive predictive value ,negative predictive value and accuracy were analysed.

RESULTS

In our study, 50 cases were included and analysed. In the present study, among all the adnexal masses, ovarian masses were 48(96%), fallopian tube masses were 2(4%). Benign tumours range in age from 19 to 65 years, malignant tumours ranged in age from 19 to 70 years and borderline tumours ranged in age from 23 to 65 years (Table 1). Among the ovarian masses (n=48), malignant lesions were 23(48%), benign lesions were 18(37.5%) and borderline lesions were 7(14.5%)(Table 2). In our study on USG, among 16 malignant solid/cystic and cystic lesions, solid components (papillarities / mural nodules) were seen in 16 patients (89%) among 15 benign solid/cystic and cystic lesions, solid components were seen in 3 patients (20%) and among 7 borderline lesions, it was seen in 5 patients(71%). On CT, among 16 malignant solid/cystic and cystic lesions, solid components were seen in all 16 lesions(100%) and among 11 benign lesions, it was seen in 3 patients(27%) and among 7 borderline lesions,6 lesions(86%) had solid components(Table 3). In our study, septations>3mm thick were seen in 9 (50%) out of 18 solid/cystic and cystic lesions on USG and in 12 out of 16 lesions on CT. Among the borderline lesions, septations>3mm thick were seen in 3 out of 7 lesions (43%)) in USG and 4 out of 6 lesions (67%) in CT(Table 4). Similarly solid components in term of papillarities and irregular nodules with vascularity were seen in 83% and 94% of malignant lesions on USG and CT respectively and only in 9% of benign lesions on CT(Table 5, 6). Among other findings, on USG and CT, ascites was seen in 12 and 13 patients out of 23 patients with malignant lesions; and it was seen in 1 patient out of 18 with benign lesions in both USG and CT. CT showed calcifications in 2 out of 23 malignant lesions and in 3 out of 18 benign lesions. Local extension in terms of bowel adherence was seen in 3 patients with malignant lesions which were not made out on USG. Similarly, CT showed lymphadenopathy in 3 out of 23 patients with malignancy ,which was confirmed as metastatic on pathological correlation and it was not made out on USG.CT showed distant metastasis on surgical and pathological correlation in 6 out of 23 patients with malignancy, and USG could show in only 3 patients out of 23. Many deposits which were seen intra-operatively, could not be made on USG or on CT(Table 7,8). In our study, CT was found to have 96% sensitivity, 94% specificity, 96% positive predictive value, 94% negative predictive value and 95% accuracy in differentiating benign from malignant masses (Table 9).USG was found to have 92% sensitivity,89% specificity and an accuracy of 91% in differentiation of malignant from benign ovarian masses, while positive predictive value and negative predictive value were 92% and 89% respectively(Table 10).

In our study, we determined the role of USG and CT in differentiating solid and cystic masses. CT showed sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 77%, 87.5%, 95.2%,

79% and 81% in determining the cystic nature of the lesions(Table 11). USG showed sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 96%, 92%, 92%, 95.8% and 94%(Table 12).

Table 1: Age distribution of all adnexal masses

Age distribution(years)	Number	Percentage(%)
15-25	6	12
26-35	3	6
36-45	11	22
46-55	6	12
56-65	14	28
66-70	10	20

Table 2: Division of ovarian masses: total n=48

	Number	Percentage(%)
Benign	18	37.5
Malignant	23	48
Borderline	7	14.5

Table 3: Solid components in malignant ovarian masses: total number n=23

Solid components	USG(%)	CT(%)
Present	15(65%)	16(70%)
Absent	8(35%)	7(30%)

Table 4: Septations in malignant ovarian masses: total number (solid/cystic),USG n=18; CT n=16

Septations	USG(%)	CT(%)
<3mm	2(11%)	3(19%)
>3mm	9(50%)	12(78%)
Absent	7(39%)	1(6%)

Table 5: Vascularity in borderline ovarian masses n=7

Vascularity	Number	Percentage(%)
Present	4	57%
Absent	3	43%

Table 6: Contrast enhancement in malignant ovarian masses n=23

Enhancement	Number	Percentage(%)
Present	22	96%
Absent	1	4%

Table 7: Other findings on USG

	Malignant(n=23)	Benign(n=17)	Borderline(n=7)
Ascites	12	1	1
Distant metastasis	3	0	0
Lymphadenopathy	0	0	0
Local extension	0	0	0
Calcification	2	3	0

Table 8: Other findings on CT

	Malignant	Benign	Borderline
Ascites	13	1	0
Distant metastasis	6	0	0
Lymphadenopathy	3	0	0
Local extension	3	0	0
Calcification	4	3	0
Fat	2	4	0

Table 9: Diagnostic accuracy of CT in differentiating benign from malignant lesions

CT diagnosis	Histopathological diagnosis		
	Malignant	Benign	Total
Malignant	24	1	25
Benign	1	17	18
Total	**25**	**18**	**43**

Sensitivity- 96%; Specificity-94.4%; Positive predictive value-96%; Negative predictive value-94%; Accuracy-95%

Table 10: Diagnostic accuracy of USG in differentiating benign from malignant lesions

USG diagnosis	Histopathological diagnosis		
	Malignant	Benign	Total
Malignant	23	2	25
Benign	2	16	18
Total	**25**	**18**	**43**

Sensitivity- 92%; Specificity- 89%; Positive predictive value-92%; Negative predictive value-89%; Accuracy-90.6%

Table 11: Diagnostic accuracy of USG in diagnosing cystic lesions

USG diagnosis	Histopathological diagnosis		
	Cystic	Non-cystic	Total
Cystic	24	2	26
Non cystic	1	23	24
Total	**25**	**25**	**50**

Sensitivity- 96%; Specificity- 92%; Positive predictive value-92.3%; Negative predictive value-95.8%; Accuracy-94%

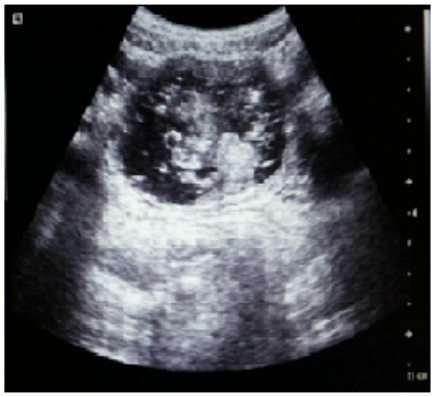
Table 12: Diagnosing accuracy of CT in diagnosing cystic lesions

	Histopathological diagnosis		
	Cystic	Non cystic	Total
Cystic	20	1	21
Non cystic	6	23	29
Total	**26**	**24**	**50**

Sensitivity- 77%; Specificity- 87.5%; Positive predictive value-95.2%; Negative predictive value-79%; Accuracy-81%

Figures 1

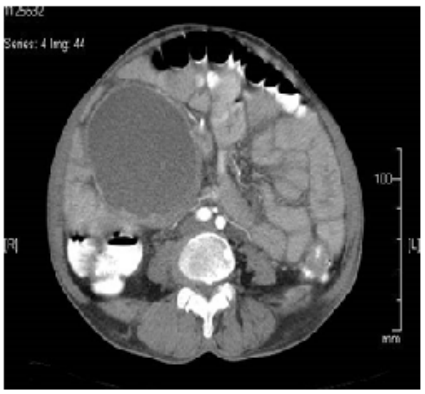
Figures 2



Figures 3

Figures 4

Figures 5

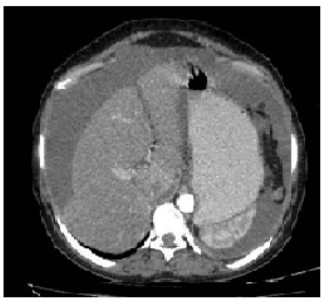


Figures 6

Figures 7

Figures 8

Figures 9



Figures 10

Legend

Figures 1 and 2: USG and CECT images showing bilateral ovarian mass lesions showing solid and cystic components-B/L SEROUS CYSTADENOCARCINOMAS.

Figure 3: USG pelvis shows cystic lesion with echogenic solid component.

Figure 4: CECT pelvis reveals a cystic lesion with solid component showing fat and calcification s/o Rokitansky nodule-DERMOID CYST

Figures 5 and 6: USG reveals a cystic lesion with irregular wall and internal echoes. CECT reveals a cystic lesion with thick irregular wall arising from right adnexa-BORDERLINE MUCINOUS TUMOR OF RIGHT OVARY

Figure 7: USG reveals solid cystic lesions in bilateral adnexa.

Figure 8: CECT shows solid cystic lesions with enhancing solid components in bilateral adnexa.

Figure 9 and 10: CECT shows hepatic metastasis with omental caking and peritoneal deposits associated with moderate ascites-KRUKENBERG TUMORS TO BILATERAL OVARIES.

DISCUSSION

In the present study, an attempt has been made to study the characteristics of adnexal masses which we came across with ultrasonography and CT .Special emphasis has been made on the findings which were present more often in both benign and malignant lesions of ovarian

origin. In the present study, among all the adnexal masses, ovarian masses were 48(%), fallopian tube masses were 2(4%). Benign tumors ranged in age from 19 to 65 years, malignant tumors ranged in age from 19 to 70 years. Similar age incidence was found in a study done by Jean-Noel Buy *et al*[8]. In the present study, bilaterality was seen in 35%,11% and 14% of malignant, benign and borderline ovarian lesions which correlated with study done by Jean-Noel Buy *et al*[8]. In our study, on USG among 23 malignant lesions,10 were mixed solid/cystic,8 were cystic and 5 were solid. In the present study, we had 1 adult granulosa cell tumour which was solid/cystic .This correlates with findings by Ko *et al*[9]. In our study, contrast enhancement was seen in 22 among 23 malignant lesions and in 3 out of 18 benign lesions. In the present study, USG was found to have 92% sensitivity,89% specificity and an accuracy of 91% in differentiation of malignant and benign ovarian masses while positive predictive value and negative predictive values were 92%and 89% respectively. CT was found to have 96% sensitivity,94% specificity ,96% positive predictive value and 95% accuracy in differentiating benign from malignant masses. These results showed higher sensitivity of CT scan and higher specificity of ultrasonography. These findings correlated with the study done by Mubarak F *et al*[10] and FatemehGatreh-Samani *et al*[11]. In the present study, USG showed sensitivity, specificity, positive predictive value, negative predictive value and accuracy of 96%,92%,92%,95.8% and 94% whereas CT showed corresponding values of 77%,87.5%,95.2%,79% and 81% in determining cystic nature of lesions.These findings correlated with the study done by Tarek R Abbas[12].

CONCLUSION

The present study was carried out on 50 patients with suspected adnexal masses.The aim of the study was to evaluate the efficacy of ultrasonography and CT in patients with adnexal masses and to correlate the results of ultrasound and CT with operative and histopathological findings. The present study shows that majority of benign ovarian tumours are serous cystadenoma and majority of malignant tumors are serous cystadenocarcinomas. Bilaterality among ovarian tumours is more common in malignant lesions than in benign and borderline ovarian tumours. Presence of combination of solid components, septations (>3mm in thickness), vascularity in mixed solid/cystic and cystic ovarian masses increases the probability of lesion being malignant rather than presence of individual finding. It was concluded that USG was more sensitive and specific in determining the cystic nature of lesions whereas CECT was more sensitive and specific in differentiating benign and malignant ovarian masses. In the light of our study, we recommended use of USG as an initial technique in routine evaluation and characterisation of an ovarian mass .USG gives more information of ovarian mass and gives better overall view of the pelvis and is easy to perform without any radiation. CT is a good modality in assessing local extension, assessing vascularity of lesions, detection of lymphadenopathy and distant metastasis in adnexal lesions.

REFERENCES

1. Anuradha K Shweta G, Shukla R C, Mohan K. Evaluation of Sassonesonographic scoring system in various adnexal masses. Ultrasound International Dec 2001;72:148-52.
2. Landis SH, Murray T, Bolden S. Cancer Statistics. CA Cancer J Clin 1998;48:6.
3. F.V. Coakley. Staging ovarian cancer: Role of imaging.RadiolClin N Am 2002;40:609-36.
4. Mukund Joshi, Ganesan K, Munshi HH, Ganesan S, Lawande A. Ultrasound of adnexal masses. Seminar Ultrasound CT, MRI 2008;29:72-97.
5. Forstner R, Hricak H, Occhipinti KA, Powell CB, Frankel SD, Stern JL. Ovarian cancer: staging with CT and MR imaging. Radiology 1995;197:619-26.
6. Meyer JI, Kennedy AW, Friedman R. Ovarian carcinoma: value of CT in predicting success of debulking surgery. AJR Am J Roentgenol1995;165:875-8.
7. Wagner BJ, Buck JL, Seidman JD, McCabe KM. Ovarian epithelial neoplasms: radiologic-pathologic correlation. Radiographics1994; 14(6):1351-74.
8. J.N. Buy, M A Ghossain. Epithelial tumours of the ovary: CT findings and correlation with US. Radiology 199;178(2):289-93.
9. Ko SF, Wan YL. Adult Ovarian Granulosa Cell Tumours: Spectrum Of Sonographic and CT findings with pathological correlation. Am J Roentgenol 1999;172:1227-33.
10. Mubarak F, Alam MS, Akhtar W, Hafeez S. Role of MDCT in patients with ovarian masses. Int J Women's Health 2011;3:123-6.
11. FatemehGatreh, Mohammad Kazem Tarzamni, Elaheh Sahebmadarek, Ali Dastranj. Accuracy of 64-multidetector computed tomography in diagnosis of adnexal tumors. Journal of Ovarian Research 2011;4:15.
12. Tarek R.Abbas, Hosam Al-Din G Mohammed, Emadeldin R Matar. Comparative study between diagnostic value of ultrasonography and computed tomography of suspicious ovarian masses. Med J Cairo Univ 2014;82(1):671-6.

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