www.jmscr.igmpublication.org
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v7i4.47

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Research Article

Role of ultrasonography to evaluate ovarian masses and its correlation with histopathological findings

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Abstract

Background: *Adnexal masses present a special diagnostic challenge, in part because benign adnexal masses greatly outnumber malignant ones. As a primary imaging modality, ultrasonography (US) can provide diagnostic information for evaluating ovarian masses. This study was to see the morphological characteristics of ovarian masses by USG and correlate with histopathological findings.*

Materials & Methods: *Thirty nine women who were referred to the radiology department for abdomen or pelvis USG from Gynecology OPD with a clinical diagnosis of adenexal mass by per abdomen or per vaginal examination or history of irregular lower abdominal pain or bleeding disorder were included in the study. Transabdominal USG was performed in all cases. After USG patients were planned for surgery. Accordingly then post operated excised tumor were send for histopathology. Thus this study was a correlation of USG finding (including grey scale) in cases of ovarian/adenexal masses considering with histopathology as a gold standard. The age of the patient ranged from 18 to 70, all of them were married.*

Results: *The predominant symptom was lower abdominal mass, pain and bleeding disorders. Among 39 women only 9 women had Hb% between 8-9 gm%. A different variable on USG was used in diagnosis of benign and malignant ovarian tumors in 39 patients. A total of 56 masses were detected in right and left adenexa. Among them 4 (7.14%) are malignant and 24 masses were benign and rest 28 (50%) were physiological cyst/infective process, which showed only cyst increase in size on follow up USG and these masses were not operated and managed conservatively, hence not included in our analysis. Excellent agreement between histopathology and USG (grey scale) was found for the diagnosis of benign and malignant tumor of ovary. Grey scale USG shows necrosis and calcification present in all malignant cases proved histopathologically. Kappa test shows – agreement between radiology and histopathology finding is 100%.*

Conclusion: *Sonographically the grey scale is a sensitive modality in detection of malignant changes in ovarian masses.*

Keywords: *Ovarian mass, Ultrasonography, Grey scale, Histopathology, Benign, Malignant.*

Introduction

Ultrasonography (USG) is the primary imaging modality for identifying and characterizing ovarian masses. USG is a relatively simple and non-invasive diagnostic method that provides clinicians with useful information relevant for determining the optimal management strategy for a given patient. Lots of data have demonstrated that US can accurately characterize about 90% of adnexal masses and the reported sensitivity and specificity of US for detecting ovarian malignancies is 88%-96% and 90%-96%, respectively.[1, 2, 3]

Determination of a degree of suspicion for malignancy in an adnexal mass is the most critical step after identification of the mass. Many different scoring systems exist for discriminating benign from malignant adnexal masses. These scoring systems evaluate masses for solid elements, cyst wall thickness, number, thickness, and irregularity of septations, and the presence of ascitic fluid. Numerical scores are applied and masses that score higher than a certain cutoff are considered potentially malignant.[4, 5]

As recently discussed by Jermy and colleagues, the application of these numerical systems is complex.[6] It is easier to assign the adnexal mass to one of to the five categories described by Osmers and co-workers: cystic, biloculated, multiloculated, complex and solid.[7]

The advent of transvaginal USG marked a revolution in pelvic imaging. The better portrayal of the ovaries allows a detailed morphologic assessment to be made with visualization of structures, as small as 1 to 2 mm, thereby, improving the ability to characterize the masses. Anyhow, transabdominal USG has an advantage, in providing a better overall view thus many workers recommend an initial trasabdominal scan followed by a transvaginal scan.[8, 9]

In order to ensure the availability of explicit criteria for predicting the nature of ovarian tumors, of late, a number of scoring systems have been proposed by using variables such as the presence of nodularity, solid areas, internal echoes, septae, necrosis, calcification and irregularity of borders.[10] Ovaries are sonographically hypoechoiec compared with surrounding structures. Ultrasonographically the volume measurement is based on the formulae for a prolate ellipse (0.523x length x width x height).[11] Therefore well defined anechoic lesion are more likely to be benign where as lesion with irregular walls, thick irregular septation, mural nodes and solids echogenic elements favour malignancy.[12] Many morphological scoring systems on USG have been proposed, based on the wall thickness inner wall structure, septal characteristic, and echogenecity of the lesion. CDUS of ovarian masses helps in differentiating benign and malignant tumor.[13]

Materials & Methods

The study sample comprised of 39 patients having clinically suspected ovarian masses on the basis of a positive history and clinical examination. USG was performed on sonoline G 50 and versa pro machine with 3.5-5.5 MHz trans-abdominal probe. TVS was performed whenever required to obtain additional findings. For transabdominal USG patient was advised to hold urine and examination was performed in supine position. Scanning of lower abdomen and pelvic region was done in different planes using 3.5-5.5 MHz curvilinear transducer.

For TVS: informed consent was taken and procedure was explained to the patient. In empty bladder the examination was performed in supine position in the presence of female attendant with knees party flexed and hips slightly elevated resting on a pad. For preparing TVS probe USG jelly was kept inside the tip of transducer and then transducer was covered with lubricated condom. Then taking all aspetic precaution transducer is inserted into vagina. Patients were first scanned transabdominally with a full urinary bladder. This was followed by TVS with an empty bladder. Unmarried patients were scanned only by transabdominal route.

The presence of a mass was first confirmed on gray scale all masses were awarded morphologic scores as per the Sassone's scoring system. The scores could range from a minimum of 4 to maximum 15 points. Following gray scale scanning, color flow signals were superimposed in real time and the regions of intratumoral neovascularisation were identified as the areas of color. All the patients underwent surgical exploration and the post surgical histopathology findings were correlated with the morphologic scorings that had been obtained preoperatively.

Results

Thirty nine women suspected of having ovarian mass referred from Department of Gynaecology over the period of 16th month [Feb 2015 to June 2016], were included in the study subjected for pelvis USG after obtaining detail clinical history as per proforma post operative histopathological reports were obtained. A total of 56 masses were detected in 39 patients. On histopathological examination, 4 masses proved to be malignant and 24 masses were benign and rest were physiological cyst/ infective process, which showed only cyst increase in size on follow up USG and these masses were not operated and managed conservatively [Fig. 1, 2, 3]. Hence they were not included in our analysis. Morphological scores were assigned to all masses and correlated with their histopathologic results.

Table 1: Comparison of menstrual status with histopathological findings

Menstrual status	Benign	Malignant
Premeanrche	-	-
Premenopausal	24	2
Postmenopausal	11	2
Total	35 (89.7%)	4 (10.3%)

Table 2: Type of tumor detected in 39 women by histopathological finding

Type of tumor	No.	Percentage
Mature cystic teratoma	12	30.8%
Mucinous cystadenoma	6	15.5%
Simple cyst	5	13%
Cystic teratoma	9	23.4%
Serous cystadenoma	2	5.2%
Corpus lutel cyst	1	2.6%
Choriocarcinoma	4	10.4%

Majority of cases are of mature cystic teratoma, mucinous cystadenoma, simple cyst and cystic teratoma [Table 2].

Table 3: USG evaluation by grey scale score

Name of the Tumor	Score
Choriocarcinoma	13-14
Mucinous cystadenoma	10-12
Mature cystic teratoma	12
Cystic teratoma	7
Serous cystadenoma	8
Corpous luteal cyst	8
Simple cyst	7
Thecaluteal cyst	7-8
Mature teratoma (dermoid)	8
Fluid filled cystic lesion	6
Unilocated epithelial lining cyst	6
Physiological/infective cyst	5 (normal)

Grey scale/morphological score show maximum value of 14 for malignant lesion for benign one value ranges from 6-12 [Table 3].

Table 4: Calcification and necrosis (by USG) within the tumor

Calcification- Rt	Calcification- Lt
4 (Positive)	3 (Positive)
35 (Negative)	14 (Negative)
39 (Total)	17 (Total)
Necrosis- Rt	Necrosis-Lt
11(Positive)	4 (Positive)
28 (Negative)	13 (Negative)
39 (Total)	17 (Total)

All the cases which were proven as malignant by histopathology contain necrosis and calcification in USG (grey scale) [Table 5/ Fig. 4, 5, 6, 7].

Table 5: USG CA histopathological findings

	Histopathological findings		Total
	Yes	No	
USG (Benign)	0	35	35
USG (Malignant)	4	0	4
Total	4	35	39

Summetric Measures

	Value	Asmp. Std. Error	Approx. T	Approx. Sig.
Measure of agreement Kappa	1.000	0.000	6.245	0.000
N of valid cases	39			

a. Not assuming the null hypothesis
b. Using the asymptotic standard error assuming the null hypothesis

According to Cohen's Kappa when both variables have the same number of categories of a value of 1 indicates prefect agreement between two departments. A value of 0 indicates that agreement is no better than chance.

Symptoms

The chief symptoms in our patients were abdominal pain (99%), abdominal mass (46.66%), and gastrointestinal disturbances (43.33%). Menstrual disturbances (83%) and bleeding disorder in post menopausal women (60%) had reported among study participants. On clinical assessment, per vaginal examination was superior (85%) to per abdominal (60%) and per rectal examination (15%) in palpating the tumor mass. Other clinical findings included anaemia (16.6%), ascites (18.33%), lower limb edema (15%) and palpable lymph nodes (3.3%). Among 39 women blood picture for operation did not show any significant abnormality. Only 9 women had Hb% between 8 to 9 gm.

Discussion

With the introduction of USG, imaging of the female pelvis got revolutionized. The advent of transvaginal transducer and later the incorporation of CDUS marked yet another revolution. USG and CDUS are increasingly being used for the assessment of female pelvis. During the past few years a lot of interest has been generated in the possible characterization of ovarian masses by such techniques.[14] In our study, which comprised of 39 patients having clinically suspected ovarian tumors, 56 masses were detected on USG. The post surgical histopathological results showed 4 masses to be malignant, 24 to be benign and rest were physiological cyst/infective process, which showed only cyst [Fig. 1, 2, 3] increase in size on follow up USG and these masses were not operated and managed conservatively, hence not included in our data analysis.

On USG all masses were assessed on the basis of their morphologic characteristics. Scores were assigned to each mass in accordance with the morphologic scoring system as devised by Sassaone and Colleagues.[4] In the present study the morphologic scores of malignant masses ranged from 13 to 14 with a mean of 13.5. The benign masses had scores ranging from 6 to 12 with a mean of 7.5; and the sensitivity and specificity would be 100% and 80% respectively. Sassone AM et al[4] 1991 study revealed that transvaginal sonographic pelvic images of 143 patients were correlated with surgical findings or histopathology. Of 281 ovaries, 108 had benign lesions (30 endometriomas, 24 teratomas, 21 simple cysts, and 33 other abnormalities) and 20 had malignancies. The scoring system devised was useful in distinguishing benign from malignant masses, with a specificity of 83%, sensitivity of 100%, and positive and negative predictive values of 37 and 100%, respectively.

Eklici E et al[15] proved that dermoid plug, layered line with fat fluid level containing hair, teeth, bone as characteristic USG finding of dermoid cyst and that the concluded sensitivity and specificity in diagnosing dermoid cyst to be 94% and 99% respectively. They also proved that USG has an accuracy of 98% in differentiating dermoid cyst from other adenexal masses with specificity 90%. Sheth S et al[16] studied that USG and CT finding in ovarian teratoma. USG shows echogenic mass, dermoid plug, calcified element in malignant tumor. Athey A et al[17] in their study showed ecogenic mass with septation and calcification in cases of fibroma/thecoma of ovary. However they also suggested that hypoecooic adnexal mass with acoustic shadowing should still be a fibroma/thecoma.

Fishamn DA et al[18], studied about usefulness of USG in the detection of ovarian cancer in asymptomatic women. They showed value of USG as an independent modality for the detection of early stage ovarian cancer in asympatomatic women. Our result also shows USG to be useful an independent modality for the detection of early stage of ovarian cancer.

The comparison of USG findings with that of histopathology shows good correlation in

diagnosing benign and malignant ovarian mass. In overall transabdominal USG with Doppler study is fairly accurate in diagnosing benign and malignant ovarian tumor.

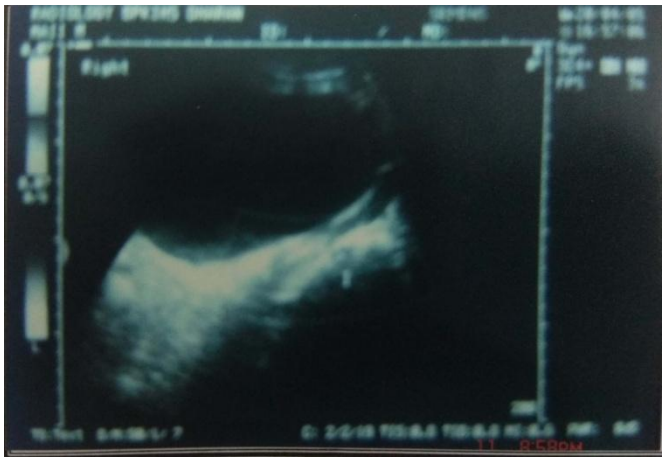

Figure 1: USG showing simple cystic tumor

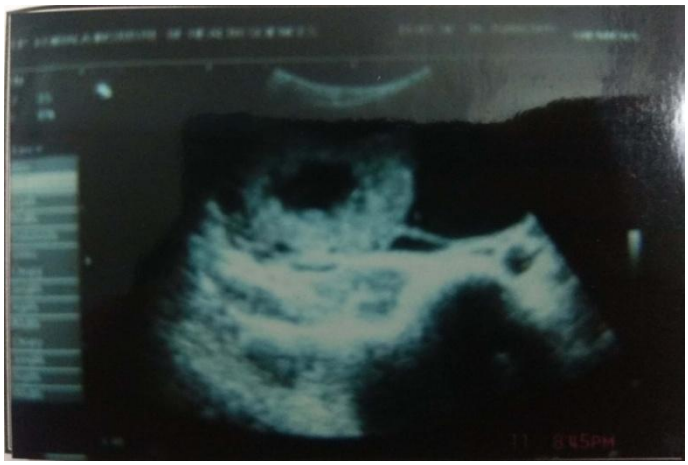

Figure 2: USG showing mature cystic teratoma with solid and cystic component

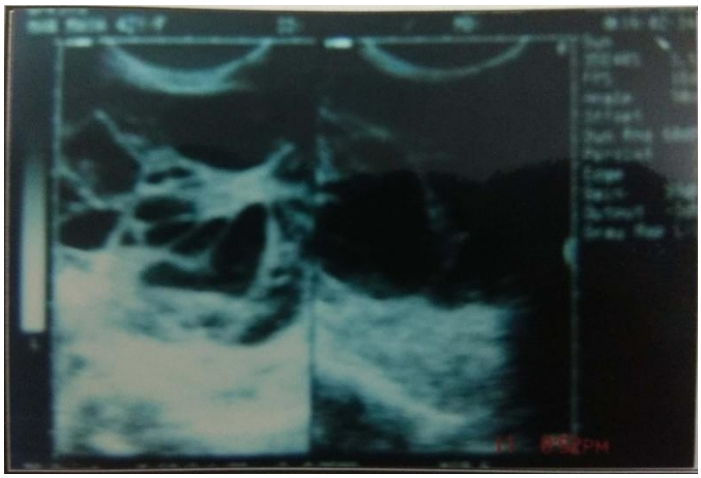

Figure 3: USG showing mature cystic teratoma with internal septation and solid component

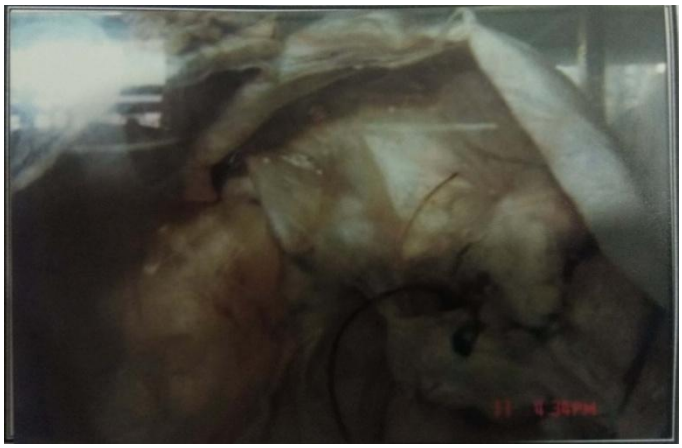

Figure 4: Post operative specimen of cystic teratoma

Figure 5: Post operative specimen of mature cystic teratoma

Figure 6: Histopathological slide of mature cystic teratoma [showing bronchial epithelial cells along with mature cartilage]

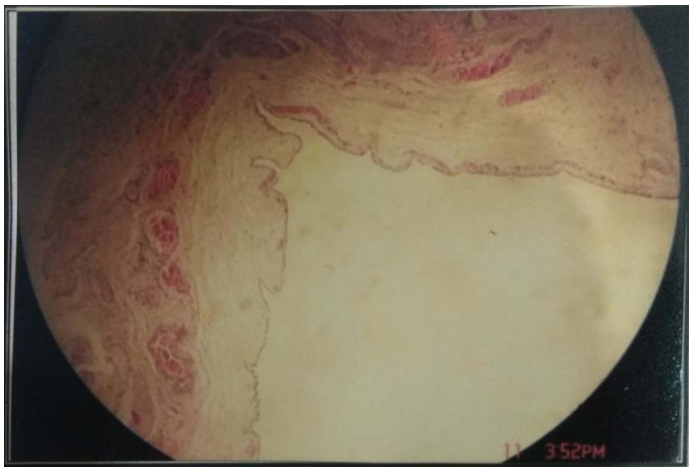

Figure 7: Histopathological slide of serous cystadenoma (showing cystic space lined by flattened epithelium)

Conclusion

The present study evaluates ovarian mass by USG considering histopathological examination of post operative specimen as gold standard. The purpose of this work was to study the morphological characteristic of ovarian masses by USG and differentiate them in to benign and malignant lesions with a correlation of histopathological finding. The morphologic scores of benign masses are comparatively lower than that of malignant masses. The limitations of our study were the small sample size and the inability to compare our values in the large scale.

References

1. Timmerman D, Schwarzler P, Collins WP, Claerhout F, Coenen M, Amant F, et al. Subjective assessment of adnexal masses with the use of ultrasonography: an analysis of inter-observer variability and experience. Ultrasound Obstet Gynecol 1999;13:11-16.
2. Valentin L. Prospective cross-validation of Doppler ultrasound examination and gray-scale ultrasound imaging for discrimination of benign and malignant pelvic masses. Ultrasound Obstet Gynecol 1999; 14:273-283.
3. Valentin L. Pattern recognition of pelvic masses by gray-scale ultrasound imaging: the contribution of Doppler ultrasound. Ultrasound Obstet Gynecol 1999; 14:338-347.
4. Sassone AM, Timor-Tritsch IE, Artner A, et al. Transvaginal sonographic characterization of ovarian disease: Evaluation of a new scoring system to predict malignancy. Obstet Gynecol 1991; 78:70.
5. Lerner JP, Timor-Tritsch IE, Federman A, et al. Transvaginal ultrasonographic characterization of ovarian masses with an improved, weighted score. Am J Obstet Gynecol 1994; 170: 81.
6. Ferrazzi E, Zanetta G, Dordoni D, et al. Transvaginal ultrasonographic characterization of ovarian masses: A comparison of five is scoring systems in a multicenter trial. Ultrasound Obstet Gynecol 1997; 10: 192.
7. Osmers R, Osmers M, von Maydell B, et al. Preoperative evaluation of ovarian tumors in the premenopause by transvaginosonography. Am J Obstet Gynecol 1996; 175: 428.
8. Debnath J, Satija L, Suri A, et al. Follicular monitoring: comparison of transabdominal and transvaginal sonography. Med J Armed Forces India. 2017; 56(1):3–6.
9. Nazário AC, Nicolau SM, Nishimura CM. Comparison between pelvic endovaginal and transabdominal sonography in the measurement of the uterus and ovaries. Rev Paul Med. 1991 Mar-Apr; 109(2):51-4.
10. Sayasneh A, Ekechi C, Ferrara L, et al. The characteristic ultrasound features of specific types of ovarian pathology (review). Int J Oncol. 2014;46(2):445–458.
11. Phillips JF, Goodwin OW. Thomason SB, et al. The volume of the uterus in normal and abnormal pregnancy. J Clin Ultrasound 1977; 5:107.

12. Wasnik AP, Menias CO, Platt JF, Lalchandani UR, Bedi DG, Elsayes KM. Multimodality imaging of ovarian cystic lesions: Review with an imaging based algorithmic approach. World J Radiol. 2013; 5(3):113–125.
13. Jung SI. Ultrasonography of ovarian masses using a pattern recognition approach. Ultrasonography. 2015; 34(3):173–182.
14. Moorthy RS. Transvaginal sonography. Med J Armed Forces India. 2017; 56(3):181–183.
15. Ekici E, Soysal M, Kara S, Dogan M, Gokmen O. The efficiency of ultrasonography in the diagnosis of dermoid cysts. Zentralbl Gynakol. 1996; 118(3):136-41.
16. Sheth S, Fishman EK, Buck JL, Hamper UM, Sanders RC. The variable sonographic appearances of ovarian teratomas: correlation with CT. AJR. 1988;151(2):331-4.
17. Athey PA, Malone RS. Sonography of ovarian fibromas/thecomas. J Ultrasound Med. 1987 Aug;6(8):431-6.
18. Fishman DA, Cohen L, Blank SV, Shulman L, Singh D, Bozorgi K. The role of ultrasound evaluation in the detection of early-stage epithelial ovarian cancer. Am J Obstet Gynecol. 2005 Apr;192(4):1214-21; discussion 1221-2.