

# Role of Ultrasonography in Evaluation of Ovarian Lesions and Correlation with Histopathological Findings

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**Abstract:** ***Background:** Ovarian lesions are the most common pathology in gynaecology. They present with pelvic pain, menstrual abnormalities. As a primary imaging modality, ultrasonography 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. Doppler US may allow ovarian masses to be diagnosed as benign or malignant with even greater confidence. **Materials and methods:** The total patients referred to the Department of Radiodiagnosis, Gayatri vidya parishad institute of health care and medical technology, Visakhapatnam with clinically suspected or diagnosed with ovarian lesions in a period from January 2023 to January 2024 were included in the study. All the patients were subjected to transabdominal sonography with full bladder technique using 3.5 - 5.5 MHz curvilinear transducer and 10 MHz linear transducer. TVS was performed whenever required to obtain additional findings. Histopathological findings were correlated with the findings on sonography. **Result:** A total of 46 patients with clinically suspected ovarian pathology were examined by ultrasound and histopathological comparison was done. Out of 39 patients are with benign lesions, 37 patients were correctly diagnosed on ultrasonography (94%). Out of total 9 patient with malignant tumours 7 (87%) patients were correctly diagnosed on ultrasonography. **Conclusion:** Ovarian masses, ranging from benign cysts to malignant tumours, present complex diagnostic challenges in women's healthcare. The present study evaluates ovarian mass by ultrasonography considering histopathological examination of post-operative specimen as gold standard. Diagnostic accuracy increased when USG along with Doppler is combined for evaluation of morphological characteristics of ovarian lesions. USG can be used even by a basic examiner to differentiate benign and malignant ovarian tumour which helps us in making decision regarding further management.*

**Keywords:** ovarian lesions, Ultrasonography, Grey scale, Histopathology, Benign, Malignant. histopathological, ovarian tumour.

## 1. Introduction

Ovarian lesions are the most common pathology in gynaecology. Ovarian cancer is the fifth leading cause of cancer death among women and represents approximately 25% of all gynaecologic malignancies. Patients present with pelvic pain, menstrual abnormalities or can be an incidental finding on pelvic examination or pelvic imaging. Ovaries are subjected to monthly endocrine and traumatic insult during ovulation cycle and are prime site for tumour genesis. Most tumours of the ovary can be placed into three major categories - surface epithelial- stromal tumours, sex cord- stromal tumours and germ cell tumours.

Ultrasonography (USG) is the primary imaging modality for identifying and characterizing ovarian masses. It is a simple and non-invasive diagnostic method. USG can accurately characterize about 90% of adnexal masses and the reported sensitivity and specificity of USG for detecting ovarian malignancies is 88%-96% and 90%-96%, respectively<sup>1,2,3</sup>.

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.<sup>4</sup> Therefore well-defined anechoic lesion are more likely to be benign whereas lesion with irregular walls, thick irregular septation, mural nodes and solids echogenic elements favour malignancy.<sup>5</sup>

The classification of ovarian masses includes benign cysts, endometriomas, teratomas, and various types of ovarian cancer, each with unique clinical features and treatment requirements. Ovarian cancer represents a formidable adversary in women's health, as it is often diagnosed at an advanced stage, resulting in a poor prognosis. Early detection and timely intervention are crucial for improving outcomes and reducing the morbidity and mortality associated with ovarian masses<sup>6</sup>.

## 2. Aims And Objectives

- 1) To detect and evaluate benign and malignant ovarian lesions.
- 2) To evaluate the diagnostic accuracy of ultrasonography imaging in differentiating between benign and malignant ovarian lesions.
- 3) To correlate between ultrasound and histopathological findings

## 3. Materials & Methods

This is a retrospective study which was carried in patients of Department of Radio-diagnosis at, Gayatri vidya parishad institute of health care and medical technology, Visakhapatnam from January 2023 to January 2024. A total 46 adult subjects (only females) were in this study.

**Study Design:** Prospective observational study. This design allows for the comprehensive analysis of existing clinical data, radiological imaging, and histopathological findings to

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identify, analyse, and predict the characteristics and outcomes of ovarian lesions within this population.

**Study Location:** This was a tertiary care teaching hospital-based study done in Department of Radio-diagnosis at, Gayatri vidya parishad institute of health care and medical technology, Visakhapatnam.

**Study Duration:** January 2023 to January 2024

**Sample size:** 46 patients.

**Sample size calculation:** Patients clinically suspected for ovarian lesions between January 2023 to January 2024 undergoing USG were included in the study.

#### Inclusion criteria:

- 1) Patients of any age group were included.
- 2) Patients with known ovarian lesions are also included.
- 3) Patients referred to the radiology department of Gayatri Vidya Parishad Institute of Healthcare and Medical Technology, Visakhapatnam with clinically suspected ovarian lesions.
- 4) All accidentally diagnosed cases of ovarian lesions were also included in this study.

#### Exclusion criteria:

- 1) Patients not willing for study.
- 2) Pregnant women.

#### Procedure methodology:

After approval of the study protocol by our Institutional research & human ethical committee, patients of age group >30 years with suspected of having ovarian lesions on the basis of history and clinical examination will be enrolled in the study. All the patients will be explained in detail about the procedure and informed consent will be obtained. Study will be done using Samsung HS 70A, colour Doppler equipment with a curvilinear array low frequency (3.5-5.5MHz) transducer and 10 MHz linear transducer. Following grey scale scanning, colour doppler technique was used to assess intralésional vascularity. TVS was performed whenever required to obtain additional findings. For TVS, informed consent was taken, and procedure was explained to the patient. The examination was performed with empty bladder in supine position in the presence of female attendant. Histopathological findings were correlated with the findings on sonography.

#### Statistical analysis:

The data was expressed in number, percentage, mean and standard deviation. Statistical Package for Social Sciences (SPSS 20.0) was used to calculate the mean and standard deviation. Number and percentage were calculated by using MS Excel 2007. Descriptive statistics were employed to summarize the demographic and radiological characteristics of the study population. Chi-square tests were used for categorical data comparison to identify any significant associations between patient characteristics and outcomes.

Ovarian lesions are the most common pathology in gynaecology. They present with pelvic pain, menstrual abnormalities or can be an incidental finding on pelvic

examination or pelvic imaging. Ovarian cancer is the fifth leading cause of cancer death among women and represents approximately 25% of all gynecologic malignancies. Ovarian cancer has the highest mortality rate of all gynecological malignancies. Ovaries are subjected to monthly endocrine and traumatic insult during ovulation cycle and are prime site for tumour genesis. Most tumors of the ovary can be placed into three major categories - surface epithelial- stromal tumors, sex cord- stromal tumors and germ cell tumors

## 4. Results

The study included 46 female patients were included with 36.96% between 35 – 44years, with only 4.35% > 55years. The mean age of presentation is between 35 ± 10years (Table-1).

**Table 1:** Distribution of ovarian lesions based on age groups

Age	Number	Percentage
30-34	9	19.57
35-44	17	36.96
45-49	12	26.09
50-54	6	13.04
>55	2	4.35
Total	46	100.00

In the present study the ovarian lesions are classified based on shape and margins in which majority of lesions have round shape and margins 52 % (Table-2) (Table-3).

**Table 2:** Distribution of ovarian lesions based on shape:

Shape	Number	Percentage
Irregular	18	39.13
Oval	4	8.70
Round	24	52.17
Total	46	100.00

**Table 3:** Distribution of ovarian lesions based on margins:

Margins	Number	Percentage
Irregular	22	47.83
Round	24	52.17
Total	46	100.00

And the ovarian lesions in present study majority of them have complex or cystic internal structure which constitute about 96% of cases (Table - 4).

**Table 4:** Distribution of ovarian lesions based on internal structure:

Internal Structure	Number	Percentage
Complex	22	47.83
Cystic	22	47.83
Solid	2	4.35
Total	46	100.00

In the present study most of lesions are showing mixed echogenicity or hypoechoic which constitute about 66% of cases (Table - 5).

**Table 5:** Distribution of ovarian lesions based on echogenicity:

Echogenicity	Number	Percentage
Anechoic	5	10.87
Ground Glass	4	8.70
Highly Variable	5	10.87
Hypoechoic	15	32.61
Mixed	17	36.96
Total	46	100.00

In the present study ovarian lesions are classified based on wall thickness and septations in which majority of lesions have no septations and thin walled (Table - 6) (Table - 7).

**Table 6:** Distribution of ovarian lesions based on wall thickness:

Wall Thickness	Number	Percentage
Thick	22	47.83
Thin	19	41.30
Very thin	3	6.52
Total	44	95.65

**Table 7:** Distribution of ovarian lesions based on wall thickness:

Septations	Number	Percentage
Thin	4	8.70
Thick	19	41.30
Multiple Thin	3	6.52
Multiple Thick	3	6.52
Absent	17	36.96
Total	46	100.00

In the present study ovarian lesions are classified based on nodule in which majority of lesions have no nodule (Table - 8).

**Table 7:** Distribution of ovarian lesions based on presence of nodule:

Presence of Nodule	Number	Percentage
Absent	29	63.04
Present	17	36.96
Total	46	100.00

Ultrasonography findings suggesting the diagnosis of benign and malignant ovarian lesions as shown below. Majority of lesions are benign compared to malignant lesions.

**Table 8:** Distribution of benign and malignant ovarian lesions based on ultrasound:

Ovarian Lesions	Number	Percentage
Endometrioma	5	10.87
Fibroma	2	4.35
Haemorrhagic Cyst	5	10.87
Mature Cystic Teratoma	5	10.87
Mucinous Cystadenocarcinoma	2	4.35
Mucinous Cystadenoma	3	6.52
Ovarian Metastasis	1	2.17
Serous Cystadenocarcinoma	4	8.70
Serous Cystadenoma	4	8.70
Simple Cyst	5	10.87
Theca Lutein Cyst	5	10.87
Tubo-Ovarian Abscess	5	10.87
Total	46	100.00

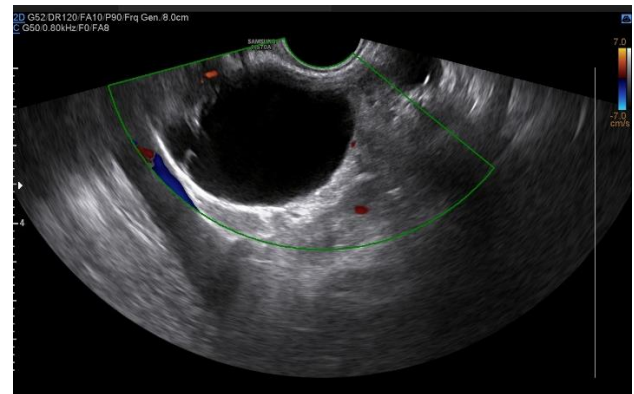
**Comparison of Pathological diagnosis and US findings:**

Histopathological diagnosis	Number of lesions	Correctly diagnosed at USG
Benign	39	37
Malignant	07	07

**5. Discussion**

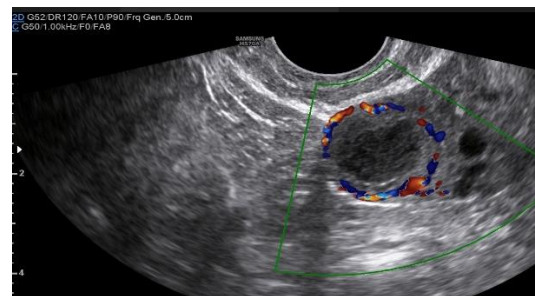
From the above results, the following observations are made.

- USG seems to be a sensitive test for identifying benign features, especially with shapes identified as round, cystic structures, and anechoic echogenicity. (Figure 1)



**Figure 1:** Well-defined anechoic cystic lesion with no evidence of septations or nodule features likely suggestive of benign etiology.

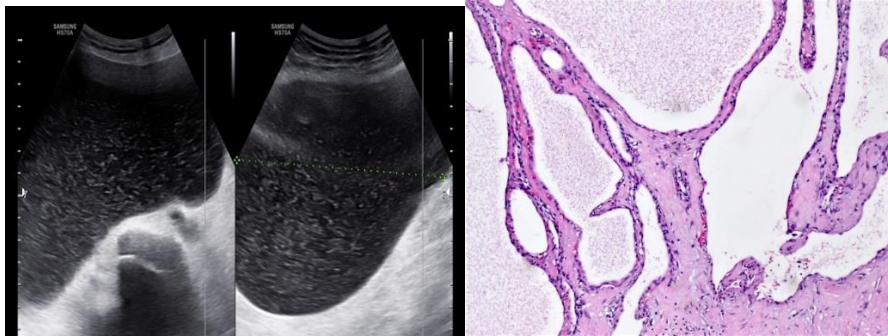
- FNAC appears to be more specific in identifying malignant features, particularly in cases where USG findings are not definitive, such as with oval shapes and thin septations. (Figure 2)



**Figure 2:** well, defined anechoic thick-walled cystic lesion with internal fish net pattern.

- Both tests show good agreement on the malignant nature of solid structures, mixed echogenicity, and the presence of a nodule.





**Figure 3:** Serous cystadenoma

- There are some discrepancies between USG and FNAC in the assessment of oval shapes, smooth margins, low echogenicity, thin wall thickness, and absence of a nodule, where FNAC diagnoses more malignancies.
- Discrepancies may suggest that FNAC, being a cytological examination, may reveal cellular details that USG cannot, leading to a more definitive diagnosis of malignancy in cases where USG may suggest a benign condition.

For clinical practice, these findings highlight the importance of using both imaging and cytological tests in tandem when assessing lesions for malignancy, as they complement each other's diagnostic strengths and limitations. Ultrasonography has a high positive predictive value in detecting benign and malignant lesions. Out of 39 patients with benign lesions, 37 patients were correctly diagnosed on ultrasonography (94%). Out of total 9 patients with malignant tumours 7 (87%) patients were correctly diagnosed on ultrasonography.

Sivaji and Hiremath (2016) carried out a retrospective study at SVMCH and RC, Ariyur, Pondicherry, over a two-year span from 2011 to 2013. Upon retrospective analysis of these 123 cases, it was found that 59 (47.96%) of the cases were benign cystic ovarian tumours, with serous cystadenoma, accounting for 23 (18.69%) cases, being the most frequent type identified in this study.

Prakash et al (2017) analysed the pathology patterns of ovarian mass lesions submitted for histopathological examination at a tertiary care hospital in Hyderabad, Telangana, India, from January 2012 to December 2016. Findings revealed that the predominant share of ovarian lesions evaluated were benign and presented unilaterally. The age range of most patients spanned from their thirties to sixties.

Lamiaa et al (2020) examined 156 ovarian lesions, of which 53 were malignant and 103 were benign. It was observed that malignant ovarian lesions predominantly occurred in older individuals compared to those with benign lesions.

Kashyap, Poonam. (2021) made a review on Ovarian tumour and presented that Ovarian cancer ranks as the seventh most prevalent cancer among women, with a higher incidence observed in the elderly age group.

Dhonde et al (2021) conducted a study between June 2014 and May 2017, on 150 cases, examining their age, clinical symptoms, and histopathological outcomes. Findings

revealed that among the 150 ovarian tumour cases analyzed, 119 (79.3%) were benign, 9 (6.0%) were borderline, and 22 (14.6%) were malignant. The age of participants varied from 9 to 80 years.

## 6. Conclusions

The present study evaluates ovarian mass by USG considering histopathological examination of post-operative specimen as gold standard. Diagnostic accuracy increased when USG along with Doppler is combined for evaluation of morphological characteristics of ovarian lesions. USG can be used even by a basic examiner to differentiate benign and malignant ovarian tumour which helps us in making decisions regarding further management. The limitations of our study were the small sample size and the inability to compare our values on the large scale.

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