

# Evaluation of Adnexal Masses: A Correlation of Clinical, Ultrasound and Histopathological Findings

Dr. Jagruti Sutaria<sup>1</sup>, Dr. Shashi Prakash Verma<sup>2</sup>, Dr. Anjana Trivedi<sup>3</sup>

<sup>1</sup> Additional Professor, Department of Radiology, PDU Govt. Medical College and Civil Hospital, Rajkot, Gujarat, India

<sup>2</sup> Resident Doctor, Department of Radiology, PDU Govt. Medical College and Civil Hospital, Rajkot, Gujarat, India  
Email: reet.spverma[at]gmail.com

<sup>3</sup> Professor & Head, Department of Radiology, PDU Govt. Medical College and Civil Hospital, Rajkot, Gujarat, India

**Abstract:** Adnexal mass is a commonly encountered gynecologic problem. Majority of them are primary diseases of the ovary or fallopian tube, but pathological involvement of structures like the broad ligament, uterus, bowel, or retroperitoneum, or metastatic disease such as the breast or stomach may also present. Pelvic ultrasonography (US) remains the imaging modality most frequently used to detect and characterize adnexal masses. Although evaluation is often aimed at distinguishing benign from malignant masses, the majority of adnexal masses are benign. About 90% of adnexal masses can be adequately characterized with US alone. The study aimed to determine the etiology, varied presentations, and correlation with ultrasonographic, operative and histopathologic findings of the adnexal masses. This study of adnexal masses had most of ovarian origin in 71% cases, 75% were in 20-49 years age group, 86% were operated for benign pathology. The accuracy of preoperative ultrasound in our study was highest in dermoid cysts followed by endometriotic cysts and poorest in paraovarian cysts. The commonest ovarian tumor was benign epithelial tumor, Serous cystadenoma.

**Keywords:** Adnexal, ultrasound, histopathological, clinical

## 1. Introduction

Adnexal masses (arising from ovary, fallopian tube, or surrounding structure) can be gynecological or non-gynecological. It can range from physiologic follicular cysts and normal luteal cysts to ovarian cancer to bowel abscesses. No age in female lifespan is spared from occurrence of adnexal masses, from intrauterine female fetuses [1] to elderly are known to have asymptomatic to symptomatic adnexal masses.

With a wide and extensive differential diagnosis, adnexal masses become a diagnostic dilemma if organ of origin is not clearly identified. The prevalence varies with population and the condition studied.

Majority of the adnexal masses are primary diseases of the ovary or fallopian tube, but pathological enlargements of structures involving the broad ligament, uterus, bowel, or retroperitoneum, or metastatic disease from another site, such as the breast or stomach may also present.

Adnexal masses can be symptomatic or can be an incidental finding. Only some of these can be managed conservatively with regular follow-up but only with a definite benign diagnosis. Majority of adnexal masses however will require surgical management. Hence the goal of evaluation of adnexal masses is to differentiate between benign and malignant conditions [2].

A complete evaluation from the history, physical examination, ultrasound and selected laboratory tests will find the most likely cause of an adnexal mass. Transvaginal ultrasonography remains the gold standard for evaluation of adnexal masses.

The management of these adnexal masses varies according to

age at presentation, whether benign or malignant, acute emergency or chronic presentation. The study aimed to determine the common and uncommon causes, varied presentations, and correlation with ultrasonographic, operative and histopathologic findings of the adnexal masses.

## 2. Methods

This retrospective descriptive study was conducted in Department of Radio diagnosis at P.D.U. Medical College and Civil Hospital (a teaching hospital) from December 2022 to March 2024. Operative and demographic details of patients operated for adnexal masses were obtained from case records of patients from medical records department.

All relevant data, including age, clinical presentation, imaging studies, tumor markers and intra-operative findings, histopathological report were collected and filled in a predesigned proforma and entered into Microsoft excel sheets. The diagnosis made on basis of clinical and imaging findings were then correlated with the final histopathological examination report and the accuracy of ultrasound calculated. The statistical analysis was done as means and percentages of continuous variables. The sensitivity and specificity of ultrasound in diagnosing adnexal masses was then calculated using the online statistical calculator Statistical version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001]. The study was performed in accordance with the approval and guidelines from institutional ethics committee.

## 3. Results

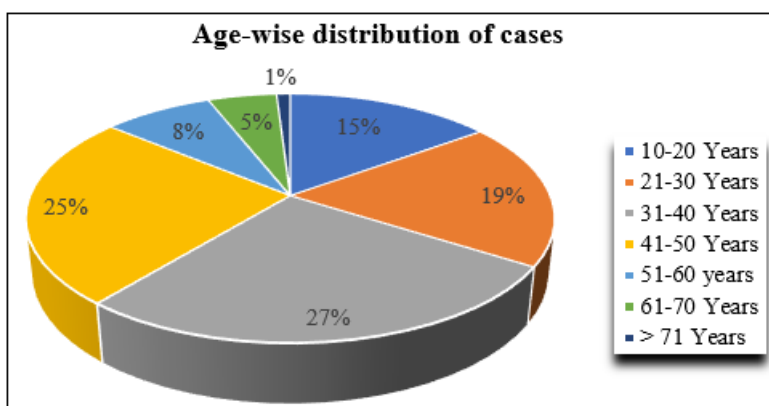
A total of 156 (n) cases of adnexal masses reports were extracted from the records of patients operated in the study period of 14 months. The age of patients ranged from 11 years to 70 years.

Most of the patients presented with pain abdomen (76.12%) followed by lump abdomen (21%). 11 patients (6.9%) were diagnosed incidentally with adnexal masses while imaging studies were prescribed for other disease. (table1)

72.4 % (113/156) cases were in women of 20-49 years age group, 16% (25/156) of all adnexal masses in adolescent age group, while 11.5% (18/156) in geriatric age group. (figure1).

**Table 1:** Presenting complaints (more than one symptom may be present in a patient) (some patients had more than one complaint)

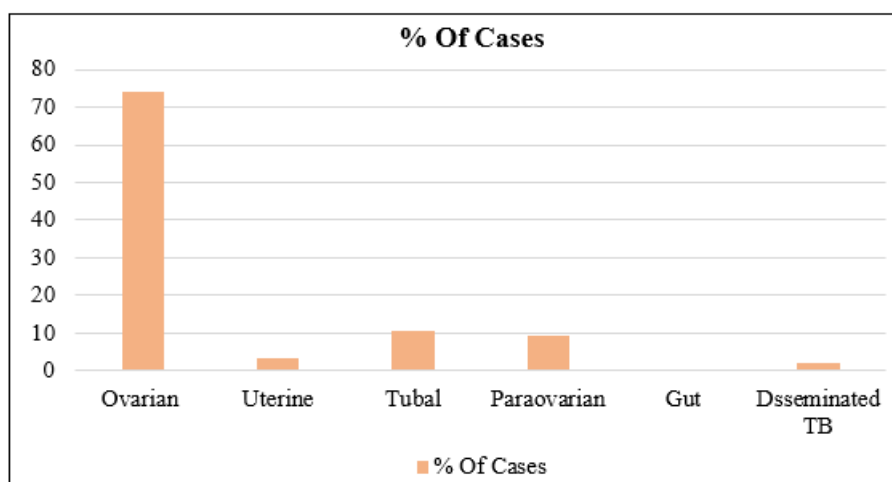
Symptoms	No of cases (156)	Percentage
Pain	117	74.9
Lump	43	27.64
AUB	11	7.1
Dysmenorrhea	34	21.8
Postmenopausal bleeding	7	4.5
Amenorrhea	7	4.5
Infertility	9	5.8
Vague Gastrointestinal symptoms	14	9
Incidental findings	8	5.2



**Figure 1:** Pie chart depicting Age-wise distribution of adnexal masses (n=156)

Among total 156 cases studied, 89.73% were benign, 1.37% borderline and 8.9% malignant. Among these lesions, 134 (86.15%) were unilateral and 22 (13.85%) bilateral.

Ovarian lesions (73.87%) followed by tubal (10.6%), contributed to vast majority of adnexal masses. (figure2)



**Figure 2:** Adnexal mass distribution according to organ of origin

Of the 115 ovarian masses, most common were serous cystadenoma (13.4%), endometriosis cyst (13%) and mature cystic teratoma (12%). Borderline papillary serous tumor, serous adenofibroma and Krukenberg tumor were among the least common types of ovarian origin masses each contributing 0.6% of all cases. (Table 2a & 2b)

**Table 2a:** Types of ovarian masses encountered as adnexal masses-

Ovarian causes	Frequency (115)
Endometriotic cyst	20 (13%)
Corpus luteal cyst	8 (5.1%)
Follicular cyst/ simple cyst	7 (4.5%)
Hemorrhagic cyst	8 (5.1%)
Mature cystic teratoma	19 (12.2%)

Serous cystadenoma	20 (13%)
Mucinous cystadenoma	9 (5.7%)
Germ cell tumors	7 (4.5%)
Serous cystadenocarcinoma	6 (3.8)
Mucinous cystadenocarcinoma	3 (1.9%)
Borderline mucinous tumor	2 (1.25%)
Borderline papillary serous tumor	1
Serous adenofibroma	1
Krukenberg tumor	1

Among the adolescents, 36% adnexal masses were GCT (20% malignant, 16% benign), 30.7% endometriosis, 22.7% cystadenomas and rest 14% other benign pathologies. In the elderly group, cystadenomas were 41%, cystadenocarcinoma was 18% with 1 case of borderline, rest were other benign pathology. (table3)

**Table 2b:** Types of non-ovarian masses encountered as adnexal masses

Non ovarian causes	Frequency (41)
Hydrosalpinx	14 (8.9%)
Chronic ectopic	3 (1.9%)
Disseminated tuberculosis	5 (3.2%)
Paraovarian cyst	15 (9.6%)
Subserosal fibroid/broad ligament fibroid	6 (3.8%)
Round ligament fibroid	3 (1.9%)
GIST	2
Metastatic	2
Salpingitis isthmica nodosa (SIN)	1

**Table 3:** Details of masses found in adolescents and geriatrics

In adolescent population	Frequency n 26 (%)	In geriatric population	Frequency n 22 (%)
Endometriosis	8 (30.7 %)	Serous Cystadenoma	5 (22.7%)
Dermoid	4 (15.4%)	Serouscystadenocarcinoma	4 (18.2%)
Immature Teratoma	3 (11.5%)	Paraovarian Cyst	3 (13.6%)
Mixed Germ Cell Tumor	2 (8.3%)	Hydrosalpinx	3 (13.6%)
Dysgerminoma	1 (3.8%)	Dermoid	2 (9.1%)
Mucinous Cystadenoma	3 (11.5%)	Seromucinouscystadenoma	1 (4.5%)
Papillary Cystadenofibroma	1 (3.8%)	Salpingitisisthmicanodosa	1 (4.5%)
Serous Cystadenoma	1 (3.8%)	Serous cystadenofibroma	1(4.5%)
Broad Ligament Fibroid	1 (3.8%)	Krukenberg	1(4.5%)
Paraovarian Cyst	1 (3.8%)	Borderline mucinous tumor of intestinal type	1(4.5%)
Follicular cyst	1 (3.8%)		

Some interesting pathologies that presented as adnexal masses in our patients were GIST and Psoas abscess. Tuberculosis, a common disease in India, abdominal tuberculosis can present in as an adnexal mass. In our series 3 cases of disseminated tuberculosis were operated with a preoperative diagnosis of adnexal mass, which was found out to be encysted capsulated tubercular collection or tubo-ovarian complexes. Sizes variability of operated adnexal mass was also huge. Serous cystadenoma ranged from 3-20 cm, mucinouscystadenoma 8 cm-25 cm, dermoid cyst 5-15 cm, paraovarian cyst 5-30 cm, hydrosalpinx 4-12 cm in diameter. The largest in the group was of a young 14 years girl with a 30cm par-ovarian cyst.

A comparative analysis of clinical and histopathological pre-operative diagnosis to ultrasound diagnosis was done for the cases. The highest sensitivity and specificity were found for dermoid USG (Sensitivity 95%, Specificity 98.6%) while the poorest USG correlation with pathology was of paraovarian cyst where only 11 out of 15 cases were reported correctly as paraovarian (Table 4). Endometrioma was correctly identified on USG in 17/20 cases. In 16 out of 19 cases malignancy could be confirmed making USG 84% sensitive and 91% specific test.

**Table 4:** Accuracy of Ultrasonography as diagnostic tool in adnexal mass

Histopathology	Number of cases	USG correctly diagnosed	Sensitivity %	Specificity
Dermoid	21	20	95	98
Endometrioma	20	17	85	98
Follicular cyst	12	10	83.33	96.8
Paraovarian cyst	15	11	73.33	78.6
Hydrosalpinx	10	8	80	96
Serous cystadenoma	22	17	77.2	78
Mucinous cystadenoma	7	9	77.8	74.5
Malignancy	19	16	84.9	90.9

#### 4. Discussion

Adnexal mass is a common entity in gynaecologic patients, second only to patients presenting with menstrual abnormalities and vaginal discharges. Masses arising either from ovaries, tubes, uterus or adjacent pelvic organs can present as adnexal masses.

Patients of adnexal mass generally present with abdominal symptoms which can range from vague, non-specific like abdominal fullness or distension to severe pain in acute emergencies. Larger sized masses occupying and extending

above the pelvis causes pelvic pressure, heaviness or palpable lump, urinary or bowel symptoms. Systemic features and menstrual abnormalities are present only rarely [3] 74.9% (117/156) patients presented with pain in our study. Menstrual abnormality was reported by lesser number of patients (7.1% AUB, 4.5% PMB), who went on to be diagnosed with an adnexal mass. In most reported series, abdominal pain remains the most common symptom that the patient presents with [4].

Ectopic, acute PID/ TO abscess and the complications of adnexal masses like torsion, hemorrhage, rupture will present with acute abdomen and these are the conditions which require quick assessment and diagnosis and urgent management. The principal goals of the evaluation must be to diagnose and manage acute conditions (E.g. ectopic pregnancy) and to determine whether a mass is benign or malignant [5].

Adnexal masses which are smaller (<5cm) usually are asymptomatic for a longer duration and hence escape detection clinically. Many of these are recognized incidentally on clinical examination or imaging (ultrasound) performed for some unrelated complaints. Many of our patients were referrals also from different specialties also, where adnexal mass was detected during investigation for non-gynaecological symptom (6.9%).

Almost 80-90% of cases of adnexal masses were diagnosed by clinical examination and relevant history of patient. Pelvic ultrasonography (US) has become a part of routine clinical examination in gynaecological practice. Transabdominal and transvaginal routes are preferred for optimal visualization [6] This leads to detection of even small adnexal masses which do not cause symptoms, are physiological/functional ovarian cysts cause unnecessary concern for patients and clinicians alike.

About 90% of adnexal masses can be adequately characterized with US alone. In our set of patients USG could correctly diagnose 16/19 patient of ovarian cancer with 84% sensitivity and 91% specificity. The sensitivity of pelvic ultrasound for the diagnosis of ovarian cancer ranged from 86-91 % and the specificity ranged from 68-83 % in a large meta-analysis [7].

The sensitivity of USG in detecting benign masses ranged from 73% for par-ovarian cyst to > 90% in follicular cysts. Tubo- ovarian abscess, germ cell tumors, sex cord stromal tumors are difficult to identify by ultrasonography. A complete history with clinical findings is to be correlated with USG findings to make a diagnosis in such cases. An appendiceal mucocele, solid extraovarian masses include neural tumors, lymphadenopathy, and the rudimentary horn of a unicornuate uterus have also been reported as adnexal masses [8].

Ultrasound may also fail to characterize about 10% cases of adnexal masses [9]. In some cases, sonographic features are indeterminate or the ultrasound images maybe suboptimal. Follow-up with other imaging modalities may then be required. This may include repeat ultrasound, magnetic resonance imaging, or serum CA 125.

Computed Tomography scans are better for evaluation of spread of ovarian malignancy and in selected cases of suspected tubo- ovarian abscess due to its superiority in revealing contiguous inflammatory changes and involvement of adjacent organs than ultrasounds [10, 11] Magnetic Resonance Imaging should be considered in larger masses, if the location is superior or lateral in the pelvis, masses having atypical US features, or when organ of origin is not clear [12].

The majority of adnexal masses are benign (84% in our study) and most can be recognized on the basis of simple characteristic features on ultrasound. Malignancy, while infrequent, is likewise usually identifiable by a different set of distinguishing features like bilaterality, thick septa, vascular papillary projection, solid component and ascites [13].

Functional cyst and benign neoplasms are most frequently seen in the adolescent period. 5.6% masses were malignant while among rest 94.6% which were benign, maximum (33%) of all were endometriotic cysts.

In post-menopausal age group, 22.5% had malignancy, 4.5% borderline and rest 73% were benign masses. Malignancy in adolescent group was of germ cell line whereas epithelial cell line was involved in post-menopausal women in our study. In adolescent tumors the main concern should be an operation the preserve future fertility whether the mass is benign or malignant [14].

Laboratory evaluation must include a pregnancy test in all patients of reproductive-age. In presence of clinical findings and imaging clues suggestive of malignancy ovarian tumor markers like CA125, HE4, in epithelial ovarian cancers and AFP, LDH,  $\beta$ -hCG in germ cell tumors. OVA1 and the Risk of Malignancy Algorithm help decide the level of care needed and whether to refer to a gynecologic oncologist [15].

Depending on the adnexal mass diagnosed, there is role of medical management in few cases like simple cysts less than 6 cm size, tubo-ovarian masses and small paraovarian /parafimrial cysts and endometrioma less than 4 cm [16]. Surgical intervention by open or laparoscopic route is necessitated by acute conditions of torsion, rupture or hemorrhage of adnexal masses. Full work up of patient will be required to perform a staging laparotomy for suspected malignancy for the best outcome.

Higher diagnostic accuracy of laparoscopy has been demonstrated, especially in endometriomas, compared to transvaginal scan. Laparoscopic diagnosis appears to be safe and accurate [17] It is estimated that up to 10% of women may require surgery for an ovarian finding in their lifetime [18]. In conclusion this study of adnexal masses had most of ovarian origin in 73% cases, 70% were in 20-49 years age group, 88% were operated for benign pathology.

The commonest ovarian tumor was benign epithelial tumor, Serous cystadenoma. The accuracy of preoperative ultrasound in our study was highest in dermoid cysts followed by endometriotic cysts and poorest in paraovarian cysts.

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