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**Dr. Monika Anant**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

**Dr. Khushboo**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

**Dr. Nutan Raj**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

**Dr. Neelu Yadav**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

**Dr. Hemali H Sinha**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

**Corresponding Author:**  
**Dr. Monika Anant**  
AIIMS Patna, Phulwarisharif Near  
Walmi, Patna, Bihar, India

## Evaluation of adnexal masses: A correlation of clinical, ultrasound and histopathological findings

**Dr. Monika Anant, Dr. Khushboo, Dr. Nutan Raj, Dr. Neelu Yadav and Dr. Hemali H Sinha**

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### Abstract

Adnexal mass (arising from ovary, fallopian tube, or surrounding structure) is a commonly encountered gynecologic problem. 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. The study aimed to determine the common and uncommon causes, 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 72% cases, 70% were in 20-49years age group, 88% were operated for benign pathology. The commonest ovarian tumor were 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 parovarian cysts.

**Keywords:** Clinical, ultrasound, histopathological, pathological

### Introduction

Adnexal mass (arising from ovary, fallopian tube, or surrounding structure) is a commonly encountered gynecologic problem. With a wide and extensive differential diagnosis, adnexal masses become a diagnostic dilemma if organ of origin is not clearly identified. Adnexal masses 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<sup>[1]</sup> to elderly are known to have asymptomatic to symptomatic adnexal masses. 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<sup>[2]</sup>.

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.

### Methods

The study design was a retrospective observational study, performed in the Department of Obstetrics and Gynaecology, in a teaching hospital in Eastern India. Operative and demographic details of patients operated for adnexal masses over a period of two years from January 2015 - January 2017 were obtained from case records of patients from medical records department.

Cases of adnexal masses operated in the Gynaecology department in above mentioned period were included in the study while other operative patients were excluded. 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 Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001]. The study was performed in accordance with the approval and guidelines from institutional ethics committee.

**Results**

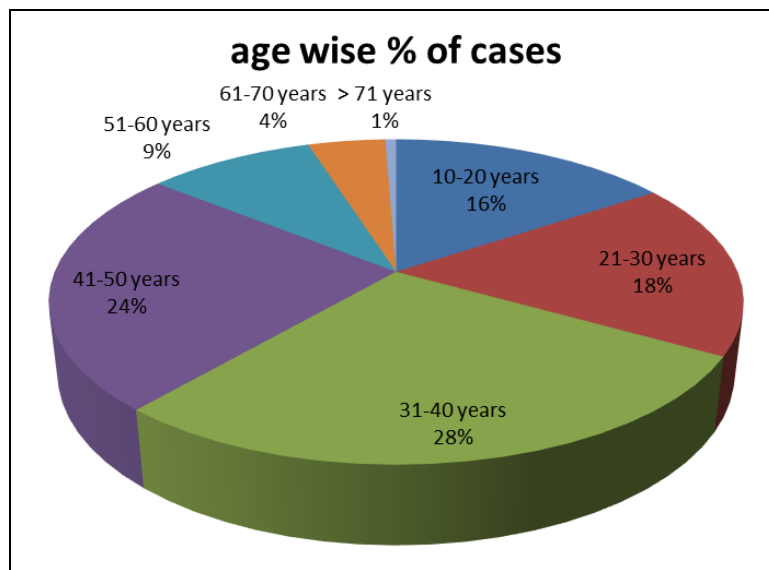
A total of 160(n) cases of adnexal masses reports were extracted from the records of patients operated in the study period of 24 months. The age of patients ranged from 11 years to 70 years.

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)

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

Symptoms	No of cases (160)	Percentage
Pain	117	73.12
Lump	43	26.87
AUB	12	7.5
Dysmenorrhea	31	19.37
Postmenopausal bleeding	5	3.1
Amenorrhea	7	4.3
Infertility	8	5
Vague Gastrointestinal symptoms	15	9.3
Incidental findings	6	3.75

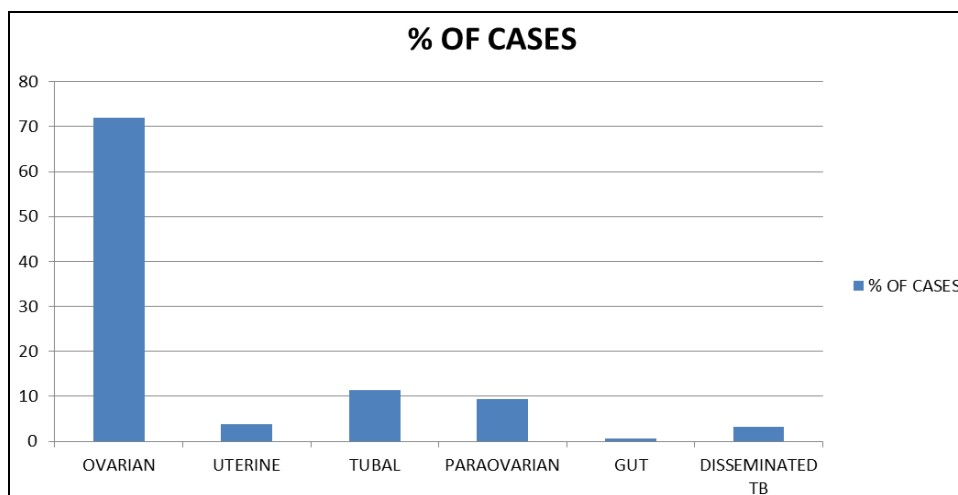
70%(113/160) cases were in women of 20-49 years age group, 15.6% (25/160)of all adenexal masses in adolescent age group, while 13.75%(22/160) in geriatric age group. (figure1).



**Fig 1:** Pie chart depicting agewise distribution of adnexal masses (n=160)

Among total 160 cases studied, 88.13% were benign, 1.87% borderline and 10% malignant. Among these lesions, 142 (88.75%) were unilateral and 18 (11.25%) bilateral. Ovarian

lesions (71.87%) followed by tubal (10.6%), contributed to vast majority of adnexal masses. (figure2)



**Fig 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

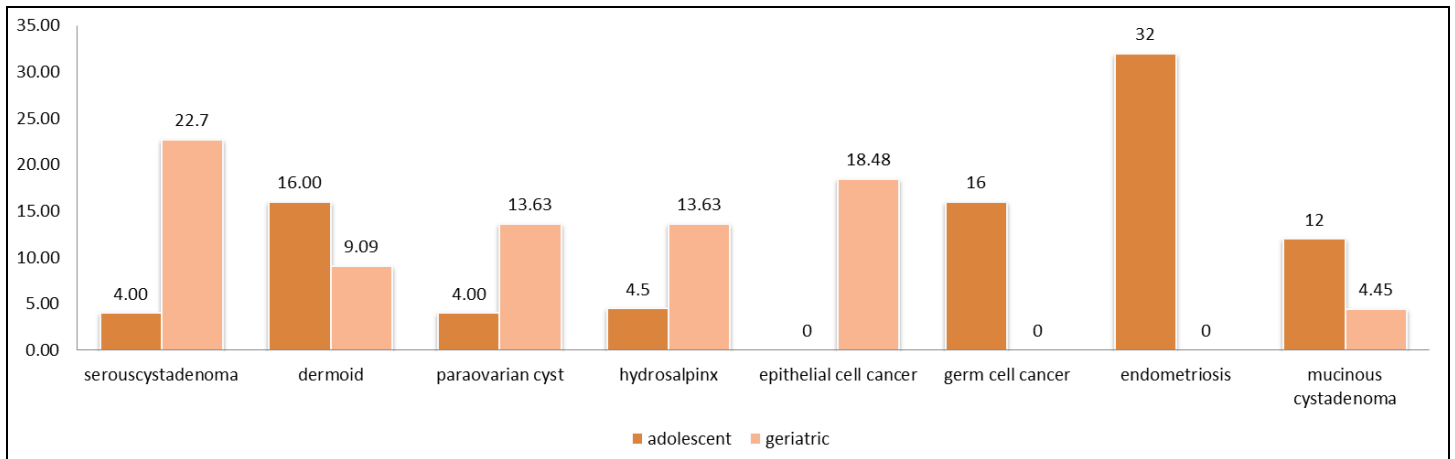
adenofibroma and Krukenberg tumor were among the least common types of ovarian origin masses each contributing 0.6% of all cases. (table 2)

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

Ovarian causes	Frequency N 115	Non ovarian causes	Frequency N 45 (28%)
Endometriotic cyst	21 (13%)	Hydrosalpinx	12 (7.5%)
Corpus luteal cyst	9 (5.6%)	Chronic ectopic	4 (2.5%)
Follicular cyst/ simple cyst	7 (4.4%)	Disseminated tuberculosis	5 (3.1%)
Hemorrhagic cyst	6 (3.75%)	Paraovarian cyst	15 (9.4%)
Mature cystic teratoma	20 (12.5%)	Subserosal fibroid/broad ligament fibroid	4 (2.5%)
Serous cystadenoma	21 (13.1%)	Round ligament fibroid	2 (1.3%)
Mucinous cystadenoma	10 (6.25%)	GIST	1
Germ cell tumors	6 (3.75%)	Metastatic	1
Serous cystadenocarcinoma	7 (4.45)	Salpingitis isthymica nodosa(SIN)	1
Mucinous cystadenocarcinoma	3 (1.9%)		
Borderline mucinous tumor	2 (1.25%)		
Borderline papillary serous tumor	1		
Serous adenofibroma	1		
Krukenberg tumor	1		

As can be seen in figure 3, endometriosis and germ cell tumors are exclusively found in adolescents and epithelial ovarian malignancies in elderly. Benign adenomas, par-ovarian cysts and

hydrosalpinx are distributed in both extremes but more in geriatric age group.



**Fig 3:** distribution of adnexal masses in adolescent and geriatric populations

Among the adolescents, 36% adnexal masses were GCT (20% malignant, 16% benign), 32% endometriosis, 20% cystadenomas and rest 14% other benign pathologies. In the elderly group,

cysadenomas were 41%, cystadenocarcinoma was 18% with 1 case of borderline, rest were other benign pathology. (table3)

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

In adolescent population	Frequency n 25 (%)	In geriatric population	Frequency n22 (%)
Endometriosis	8 (32 %)	Serous Cystadenoma	5 (22.7%)
Dermoid	4 (16%)	Serous cystadeno carcinoma	4 (18.2%)
Immature Teratoma	2 (8%)	Paraovarian Cyst	3 (13.6%)
Mixed Germ Cell Tumor	2 (8%)	Hydrosalpinx	3 (13.6%)
Dysgerminoma	1 (4%)	Dermoid	2 (9.1%)
Mucinous Cystadenoma	3 (12%)	Seromucinouscystadenoma	1 (4.5%)
Papillary Cystadenofibroma	1 (4%)	Salpingitisisthmicanodosa	1 (4.5%)
Serous Cystadenoma	1 (4%)	Serous cystadenofibroma	1(4.5%)
Broad Ligament Fibroid	1 (4%)	Krukenberg	1(4.5%)
Paraovarian Cyst	1 (4%)	Boderline mucinous tumor of intestinal type	1(4.5%)
Follicular cyst	1 (4%)		

Some interesting pathologies that presented as adnexal masses in our patients were GIST and Psoas abscess. A young 34 yrs old patient was operated for right adnexal solid tumor which was a case of gastrointestinal stromal tumor (GIST) of ileum which

was positive for CD117. A case of 22 weeks abdominopelvic lump was misdiagnosed as ovarian cyst by ultrasonography but was later diagnosed as psoas abscess on CECT and underwent tuberculosis treatment. Tuberculosis, a common disease in India,

abdominal tuberculosis can present in as an adnexal mass. In our series 5 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, mucinous cystadenoma 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.

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

Histopathology	Number of cases	USG correctly diagnosed	Sensitivity %	Specificity
Dermoid	20	19	95	98%
Endometrioma	21	17	81%	98.6%
Follicular cyst	10	9	90	97.8%
Paraovarian cyst	15	10	66.6%	76.6%
Hydrosalpinx	12	10	83.33	97%
Serous cystadenoma	21	16	76.2	77%
Mucinous cystadenoma	10	8	80	72.5%
Malignancy	19	16	84.9	90.9%

## 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 <sup>[3]</sup> 73% (117/160) patients presented with pain in our study. Menstrual abnormality was reported by lesser number of patients (7.5% AUB, 4% PMB), who went on to be diagnosed with a adnexal mass. In most reported series, abdominal pain remains the most common symptom that the patient presents with <sup>[4]</sup>.

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 (eg, ectopic pregnancy) and to determine whether a mass is benign or malignant <sup>[5]</sup>.

Adnexal masses which are smaller (<5cm) usually are asymptomatic for a longer duration and hence escape detection clinically. Many of these are recognised incidentally on clinical examination or imaging (ultrasound) performed for some unrelated complaints. Many of our patients were referrals also from different specialities 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) have become a part of routine clinical examination in gynaecological practice. Transabdominal and transvaginal routes are preferred for optimal visualisation <sup>[6]</sup> 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

A comparative analysis of clinical and histopathological pre-operative diagnosis to ultrasound diagnosis was done for the cases. The highest sensitivity and specificity was found for dermoid USG (Sensitivity 95%, Specificity 98%) while the poorest USG correlation with pathology was of parovarian cyst where only 10 out of 15 cases were reported correctly as parovarian (Table 3). Endometrioma was correctly identified on USG in 17/21 cases. In 16 out of 19 cases malignancy could be confirmed making USG 84% sensitive and 91% specific test.

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 to 91 percent and the specificity ranged from 68 to 83 percent in a large meta-analysis <sup>[7]</sup>.

The sensitivity of USG in detecting benign masses ranged from 66% 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 <sup>[8]</sup>.

Ultrasound may also fail to characterize about 10% cases of adnexal masses <sup>[9]</sup>. 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 <sup>[10, 11]</sup> 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 <sup>[12]</sup>.

The majority of adnexal masses are benign (88% 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 <sup>[13]</sup>.

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 (32%) 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, BhCG in germ cell tumors. OVA1 and the Risk of Malignancy Algorithm help decide the level of care needed and whether to refer to a gynaecologic 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 par-ovarian c/parafimrial cysts and endometrioma less than 4cm.[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 72% cases, 70% were in 20-49years age group, 88% were operated for benign pathology.

The commonest ovarian tumor were 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 parovarian cysts.

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