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Section: Pathology

# A Study of Morphological Spectrum of Ovarian Tumors over a Period of 5 Years

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## ABSTRACT

**Background:** Ovarian tumors are a heterogenous group of neoplasms with varied clinical, morphological and histological features. Aims and Objectives: To study the frequency, age distribution and the diverse histomorphological spectrum of ovarian tumors with emphasis on rare variants. **Methods:** The present study was a retrospective study done over a period of 5 years. Total number of cases was 363. After the gross examination, representative bits were routinely processed and stained with H & E. Tumors were classified as per WHO classification. Special stains and IHC were done where ever required. **Results:** Out of 363 cases studied, majority were benign tumors (71.07%) followed by malignant (25.34%) and borderline tumors (3.03%). Age ranged from 5-80years. Epithelial tumors were the most common (80.71%) followed by germ cell (12.4%), sex cord stromal tumors (5.23%) and metastatic ovarian tumors (1.37%). Mucinous cystadenoma was the commonest benign tumor and serous cystadenocarcinoma was the commonest malignant tumor. **Conclusion:** Benign Ovarian tumors were more common than malignant tumors. Surface epithelial tumors were the most common histopathological type of ovarian tumors.

***Keywords:*** Ovarian Tumors, Germ Cell Tumors, Mucinous Cystadenoma.

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## INTRODUCTION

Ovarian tumors account for 3% of total cancers in females and are the 5th most common form of cancer related deaths in females. As there are no screening tests for ovarian tumors and these tumors cannot be distinguished from one another on the basis of clinical, radiological or gross characteristics, it is important to determine the histological pattern of ovarian tumors to achieve the optimal treatment response as prognosis depends on degree of differentiation.[1]

## MATERIALS & METHODS

Three hundred and sixty three ovarian tumors were diagnosed in the department of pathology, from 2012-2018. After the gross examination, representative sections were routinely processed and stained with H & E.

Tumors were classified as per WHO classification (2014). Special stains and IHC were done wherever required.

## RESULTS

Out of 363 cases studied, 293 cases were surface epithelial tumors. Of all the tumors, epithelial tumors were the most common (80.7 %), followed by germcell tumors (12.4%), sex cord stromal tumors (5.23%) and metastatic ovarian tumors (1.37%). Mucinous cystadenoma was the commonest benign tumor and the Serous Cystadenocarcinoma was the commonest malignant tumor in the present study.

**Table 1: Depicting the statistics of various categories of ovarian tumors.**

| Type of Ovarian tumor | Number of cases | Common age group affected |
|---|---|---|
| **Surface Epitheial tumors** | | |
| Serous cystadenoma | 59(16.25%) | 20-60yrs |
| Seous cystadenofibroma | 24(6.61%) | 20-70yrs |
| Atypical proliferative serous tumor | 1(0.27%) | 60yrs |
| Micropapillary serous carcinoma non invasive | 2(0.55%) | 25 and 45 yrs |
| Serous carcinoma | 28(7.71%) | 40-60yrs |
| Mucinous Cystadenoma | 75(20.66%) | 25-60yrs |
| Borderline Mucinous tumor | 8(2.2%) | 40-70yrs |
| Mucinous Carcinoma | 22(6%) | 40-70yrs |
| Seromucinous Cystadenoma | 4(1.10%) | 20-55yrs |
| Endometrioid Adenofibroma | 1(0.27%) | |
| Endometrioid Adenocarcinoma | 9(2.47%) | 40-60yrs |
| Benign Brenner tumor | 1(0.27%) | 35yrs |
| Simple cyst | 30(8.26%) | 20-70yrs |
| Twisted ovarian cyst | 27(7.4%) | 20-70yrs |
| **Sex cord stromal tumors** | | |
| Fibroma | 10(2.75%) | 40-70yrs |
| Adult Granulosa cell tumor | 6(1.65%) | 40-50yrs |
| Juvenile granulosa cell tumor | 2(0.55%) | 20 and 25yrs. |
| Steroid cell tumor | 1(0.27%) | 60yrs |
| **Germ cell tumors** | | |
| Dysgerminoma | 6(1.65%) | 15-30yrs |
| Malignant mixed germ cell tumor | 10(2.75%) | 15-30yrs |
| Mature Cystic Teratoma | 20(5.5%) | 20-30yrs |
| Dermoid cyst | 5(1.37%) | 20-30yrs |
| Teratoma with malignant transformation | 3(0.825%) | 20-70yrs |
| Teratoma with areas of carcinoid | 1(0.27%) | 40yrs |

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**Table 2: Depicting the distribution of various rare cases in the present study.**

| S. No | Type of Tumor | No of cases |
|---|---|---|
| 1 | Sertoliform variant of Endometrioid adenocarcinoma of Ovary | 1 |
| 2 | Bilateral small cell carcuinoma of Ovary | 1 |
| 3 | Malignant mixed mullerian tumor of ovary | 1 |
| 4 | Transitional cell carcinoma of ovary | 2 |
| 5 | Female Adnexal tumor of probable Wolffian origin | 1 |

Majority of the tumors occurred in reproductive age group. Youngest patient was 5 years old and the oldest patient was 80yrs. epithelial tumors had their peak between 20-60yrs, Germ cell tumors (15-30yrs), and sex cord stromal tumors (40-60yrs) except juvenile granulosa cell tumors (20-25yrs), Metastatic tumors had their peak at 38 and 40yrs.

The most common benign tumor was mucinous cystadenoma (20.66%), followed by serous cystadenoma (16.25%) and matures cystic teratoma (5.5%). Most common malignant tumor was serous cystadenocarcinoma (27.71%) followed by Mucinous carcinoma (22-6%), malignant germ cell tumors (5.5%), Endometrioid adenocarcinomas (2.47%) and malignant sex cord stromal tumors (2.47%). Atypical proliferative serous tumor and MPSC (Micropapillary Serous Carcinoma) non-invasive type were one case each. Eight cases were borderline mucinous tumors out of which 3 were disseminated peritoneal adenomucinosis. There was one case of Female Adnexal tumor of Probable Wolffian Origin, ,one case of bilateral small cell carcinoma of ovary, two cases of Transitional cell carcinoma, two cases of metastatic tumors, one case of leiomyoma and one case of malignant mixed mullerian tumor (MMMT).

## DISCUSSION

In the present study 98.6% of cases were primary ovarian tumors while only 1.4% cases were metastatic ovarian tumors which is in concordance with the study of Neha garg et al,[1] where the primary tumors were (97.6%) and secondary tumors were (2.4%). Majority were epithelial tumors (80.71%) followed by Germ cell (12.4%), Sex cord stromal (5.23%) and metastatic tumors (1.37%) which were similar to the findings of Nehagarg et al, and Krishna and maurya et al.[2] The present study showed a predominance of Benign tumors (71.07%) followed by malignant (25.34) and borderline tumors (3.03%). The study of Neha garg et al1,[1] and Sheema sheikh et al,[3] showed similar findings. Benign tumors were common in the age group of 20-60yrs, Borderline tumors in the age group of 40-70yrs and malignant tumors in the age group of 40-70yrs in the present study. Narang sanjeev et al,[4] showed Benign tumors in the age group of 21-40yrs, Borderline tumors-21-50yrs and malignant tumors->50yrs of age. Serous tumors (51.68%) were the majority followed by Mucinous (28.86%) and Endometrioid tumors (2.74%) which is in concordance with the study of Neha garg et al,[1] Sheema Sheikh et al,[3] and Narang Sanjeev et al,[4] study, while Arpita et al,[5] study showed a predominance of Mucinous tumors.

Mucinous Cystadenoma was the most common followed by serous cystadenoma in the present study which is in concordance with the study of Deepthi vijay mankar et al,[6] in which mucinous cystadenomas were (32.69%) followed by Serous cystadenomas (31.13%).

Majority of the Germ cell tumors were benign (55.55%) and include mature cystic teratoma and dermoid cyst. These resuts were closer to the studies of Nehagarg et al,[1] Agarwal et al,[7] where benign Germ cell tumors predominated the malignant tumors. Malignant tumors were Dysgerminoma, mixed germ cell tumors and teratomas with malignant transformation. Germ cell tumors showed maximum cases in between 15-20yrs age group. These findings were concurring with the study of Nehagarg et al,[1] where the maximum cases were below 30yrs of age. Majority of the Sex cord stromal tumors were benign (52.6%) in the present study in contrast to the study of Neha garg et al,[1] where Malignant tumors were more. Badge S et al,[8] showed mostly benign Sexcord stromal tumors against malignant ones. The age range was 20-70yrs and constituted (1.65%) while in the study of Nehagarg et al1 it was 31-70yrs. Adult granulosa cell tumors constituted (1.65%) of all the tumors while in the study of Nehagarg et al,[1] and Gupta et al,[9] they constituted (4.7%) and (4.4%) respectively.

**Rare variants**

**Case 1:** A 35 old multiparous woman presented with unilateral adnexal mass. The tumor is predominantly solid with few cystic areas. Microscopically the main architecture of the tumor was anastomosing cords and trabeculae, tightly packed nests and few solid and glandular patterns with Pleomorphic vesicular rounded nuclei and prominent nucleoli. Hemorrhage and necrosis were also detected. Considering morphological features, it was provisionally diagnosed as sertoli cell tumor. Immunohistochemical studies showed the epithelial nature of this sex cord like cells with EMA positivity and inhibin and calretinin negativity. The final diagnosis was Sertoliform variant of Endometrioid Adenocarcinoma. [Figure 2]

**Case 2:** A 46 years female was found a bilateral irregular solid and cystic ovarian tumor. Histological examination showed a diffuse proliferation of small round cells which are monomorphic. Individual cells are around 10-12 microns with scanty cytoplasm and hyperchromatic nucleus in many areas. Some areas show prominent nucleoli. Omental fibrofatty tissue

shows evidence of secondary deposit. The differential diagnosis is primarily with the Granulosa cell tumor, lymphoma, small cell carcinoma and metastases of melanoma.[12] In the immunohistochemical study, the cells expressed AE1-AE3, CD45 and synaptophysin was negative. The final diagnosis was bilateral small cell Carcinoma of ovary. In two thirds of the cases, the tumor is associated with hypercalcemia. In the present study we had no information about serum calcium levels.

**Case 3:** A 50 years old postmenopausal woman underwent Total hysterectomy and bilateral salpingooopherectomy. We received entire uterus with cervix, left and right ovary in multiple fragmented piecesand omentum. The right ovary was collectively 13x10x6cm. The cut surface showed grey white to grey brown areas with necrosis. The left ovary measured 3x2x1. Cut section is grey white. On microscopic examination the right ovary showed a biphasic malignant neoplasm intermixed with epithelial (carcinomatous) and mesenchymal (sarcomatous) components. Carcinomatous component showed glands, sheets and papillae. Individual cells were pleomorphic, high nucleocytoplasmic ratio, round to oval vesicular nuclei and scant to moderate cytoplasm. The sarcomatous component showed spindle cells arranged in storiform and fascicular pattern. Individual tumor cells are oval to spindle shaped. Carcinomatous differentiation was also noted in left ovary. The differential diagnoses were MMMT, high grade serous/endometrioid adenocarcinoma and granulosa cell tumor. Immunohistochemical examination showed cytokeratin positivity in carcinomatous areas and vimentin positivity in sarcomatous areas and inhibin negativity. The final diagnosis was Malignant Mixed Mullerian tumor.

**Case 4:** The present two cases were 46 and 70 years old. In both the cases the ovaries measured 15cm in its longest diameter. Cut section was predominantly solid with cystic with necrotic areas. Microscopy from both the cases showed an infiltrating malignant neoplasm, composed of pleomorphic transitional type epithelium lining the thick blunt papillae. The cells were also seen arranged with high N/C ratio, coarse chromatin and prominent nucleoli. There was no Brenner component. The final diagnosis was Transitional Cell Carcinoma of Ovary.

**Case 5:** A 36 year had a mass on the right side with probable origin from fallopian tube or broad ligament. No abnormality was detected in right ovary or left adnexa. Right salpingoopherectomy was performed. Macroscopically the tumor was a yellow solid to cystic mass. Microscopically the tumor was well demarcated with cells arranged in tubuar and solid fashions with a slit or fern leaf like pattern. The nuclei of these cells were round with fine chromatin and the cells were round, and spindle shaped with indistinct cytoplasm. Mitotic figures were 2/10HPF and no atypical mitotic figures were identified. The differential diagnoses were granulosa cell tumor, thecofibroma, serous carcinoma, Lymphoma, metastatic tumors, fallopian tube cancer and broad ligament leiomyoma.[10] The tumor was positive for vimentin, calretinin and negative for EMA, ER and PR. The final diagnosis was Female Adnexal tumor of Probable Wolffian Origin. [Figure 1]

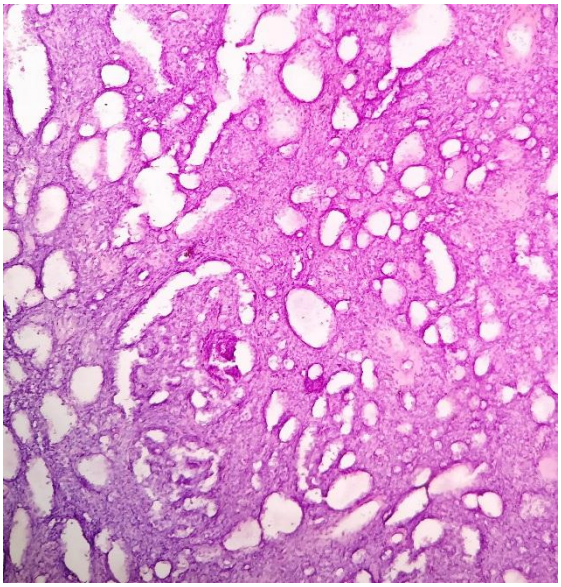

**Figure 1: (H&E stain, 10x) Female adnexal tumor of Wolffian orifin(FATWO) Sieve-like pattern**

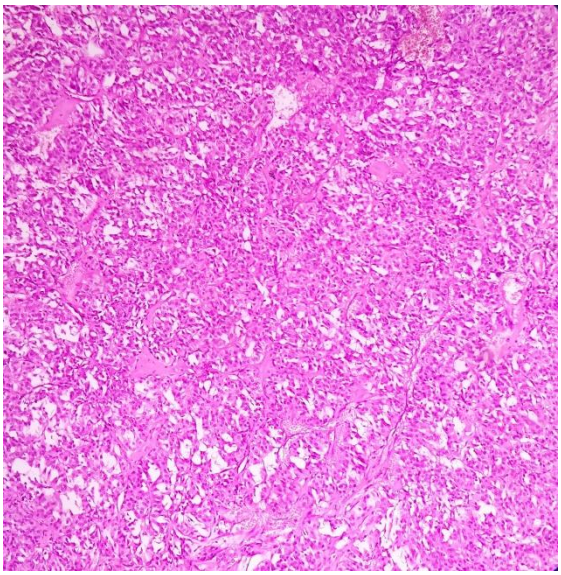

**Figure 2: (H & E, 10x) Sertoliform variant of endometrioid adenocarcinoma-tubular glands, anastoosing cords and trabeculae of tumor cells**

## CONCLUSION

Because preliminary screening tests were not available to diagnose ovarian tumors, it is imperative to study the histological patterns of ovarian tumors to achieve optimal treatment.

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