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Research Article

HISTOPATHOLOGICAL ANALYSIS OF OVARIAN LESIONS IN A TERTIARY CARE CENTRE

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Abstract: ***Introduction:*** Ovarian lesions comprise a heterogeneous group of pathological entities ranging from functional cysts and benign neoplasms to highly aggressive malignant tumours. Owing to their diverse histological patterns and nonspecific clinical presentation, ovarian lesions pose significant diagnostic and therapeutic challenges. Histopathological examination remains the definitive diagnostic modality for accurately classifying ovarian lesions and determining their biological behaviour. Studies evaluating the histopathological spectrum of ovarian lesions provide valuable epidemiological information and facilitate better understanding of disease patterns in different populations. **Aim:** To analyse the histopathological spectrum of ovarian lesions received in a tertiary care centre and determine their pathological characteristics. **Objectives:** 1 To study the various histopathological patterns of non-neoplastic and neoplastic ovarian lesions. 2To determine the age-wise distribution and nature (benign, borderline, and malignant) of ovarian lesions and correlate them with the histopathological diagnosis. **Materials and Methods:** A hospital-based retrospective d escriptive study was conducted in the Department of Pathology of a tertiary care teaching hospital over a period of two years. A total of 120 ovarian specimens obtained from oophorectomy, salpingo-oophorectomy, and hysterectomy specimens were included in the study. Gross and microscopic examinations were performed using standard histopathological techniques. Ovarian lesions were classified according to the World Health Organization classification of female genital tumours into non-neoplastic and neoplastic lesions. Statistical analysis was performed using descriptive statistics, Pearson's Chi-square test, and Fisher's exact test wherever appropriate. A p-value of <0.05 was considered statistically significant. **Results**: The majority of ovarian lesions were observed among women aged 31–40 years (31.7%), with a mean age of 36.4 ± 12.8 years. Benign neoplastic lesions constituted 58.3% of all ovarian specimens, followed by non-neoplastic lesions (26.7%), malignant tumours (13.3%), and borderline tumours (1.7%). Serous cystadenoma was the most common histopathological diagnosis (23.3%), followed by functional ovarian cysts (16.7%) and mature cystic teratoma (15%). A statistically significant association was observed between advancing age and the biological behaviour of ovarian lesions (p = 0.003), with malignant lesions occurring more frequently among women older than 40 years. Clinical and histopathological diagnoses demonstrated significant concordance (p = 0.021), highlighting the diagnostic utility of histopathological evaluation.**Conclusion**: The majority of ovarian lesions encountered in tertiary care practice are benign and occur among women in the reproductive age group. Histopathological examination remains indispensable for accurately differentiating benign, borderline, and malignant ovarian lesions and plays a crucial role in determining appropriate clinical management and prognosis. Routine pathological evaluation of ovarian specimens contributes significantly to improving diagnostic accuracy and patient care.

Keywords: Ovarian lesions; Histopathology; Ovarian neoplasms; Serous cystadenoma; Mature cystic teratoma; Ovarian malignancy.

INTRODUCTION

Ovarian lesions constitute a diverse group of pathological entities ranging from functional cysts and benign neoplasms to highly aggressive malignant tumours. The ovary is unique among female reproductive organs owing to its complex embryological origin and its ability to give rise to a wide variety of histological tumour types. Histopathological examination remains the gold standard for the definitive diagnosis and classification of ovarian lesions. Accurate pathological evaluation is essential for determining the biological behaviour of ovarian lesions and guiding appropriate clinical management. [1]

Globally, ovarian lesions represent a significant cause of gynaecological morbidity among women of all age groups. Ovarian tumours account for approximately 3% of all female malignancies but are responsible for a disproportionately high number of gynaecological cancer-related deaths because of their silent clinical presentation and delayed diagnosis. Benign ovarian lesions are considerably more common than malignant lesions and are frequently encountered during the

reproductive years. Nevertheless, ovarian malignancies remain among the most lethal gynaecological cancers worldwide due to the absence of effective screening strategies and the tendency for advanced-stage presentation. [2]

The histopathological spectrum of ovarian lesions is highly heterogeneous and includes non-neoplastic lesions, surface epithelial tumours, germ cell tumours, sex cord-stromal tumours, and metastatic tumours. According to the current World Health Organization (WHO) classification, surface epithelial tumours constitute the majority of ovarian neoplasms, accounting for nearly 60%–70% of all ovarian tumours. Histopathological categorization is crucial because prognosis, treatment modalities, and survival rates vary considerably among different ovarian lesions. [3] Histopathological evaluation therefore plays a pivotal role in distinguishing benign, borderline, and malignant lesions and remains indispensable in gynaecological pathology practice.

Clinically, ovarian lesions often present with nonspecific symptoms such as abdominal pain, abdominal distension, menstrual irregularities, and pelvic masses. Many ovarian tumours remain asymptomatic until they attain considerable size or undergo complications such as torsion or rupture. Imaging modalities and tumour markers aid in preoperative evaluation; however, histopathological examination remains the definitive diagnostic modality. Several studies have demonstrated discrepancies between radiological impressions and final histopathological diagnoses, emphasizing the importance of routine pathological assessment of all surgically excised ovarian specimens. [4]
In India, ovarian lesions constitute a significant proportion of gynaecological surgical specimens encountered in tertiary care centres. Indian studies have consistently reported benign ovarian lesions to be more prevalent than malignant tumours, with serous cystadenoma being the most common benign neoplasm and serous cystadenocarcinoma representing one of the common malignant epithelial tumours. The prevalence and histopathological patterns of ovarian lesions vary across geographical regions and age groups, necessitating institution-specific epidemiological studies. [5] Such studies provide valuable information regarding disease burden and regional pathological trends.

The incidence of ovarian malignancy increases with advancing age, particularly among postmenopausal women. The Global Cancer Observatory estimates that ovarian cancer remains one of the leading causes of cancer-related mortality among women worldwide, accounting for over 300,000 new cases annually. Despite advances in surgical techniques and chemotherapy, the overall survival of ovarian cancer remains suboptimal because nearly 70% of patients present at advanced stages of disease. Histopathological examination contributes significantly to early diagnosis, staging, and prognostication of ovarian malignancies. [6]
Retrospective histopathological studies conducted in tertiary care centres are invaluable for understanding the clinicopathological spectrum of ovarian lesions and evaluating their age-wise distribution and biological behaviour. Such studies also aid in assessing the frequency of benign, borderline, and malignant lesions within the local population and contribute substantially to improving gynaecological healthcare services. [7] Therefore, the present study was undertaken to analyse the histopathological spectrum of ovarian lesions received at a tertiary care centre and to determine their age-wise distribution and pathological characteristics.

AIM

To analyze the histopathological spectrum of ovarian lesions received in a tertiary care centre and determine their pathological characteristics.

OBJECTIVES

1. To study the various histopathological patterns of non-neoplastic and neoplastic ovarian lesions.
2. To determine the age-wise distribution and nature (benign, borderline, and malignant) of ovarian lesions and correlate them with the histopathological diagnosis.

MATERIALS AND METHODS

Study Design

A Hospital-based retrospective descriptive study.

Study Setting

The study was conducted in the Department of Pathology, Basaveshwara Medical College and Hospital, Chitradurga, Karnataka, in collaboration with the Department of Obstetrics and Gynaecology.

Study Population

All ovarian specimens received in the Department of Pathology during the study period, including specimens obtained by oophorectomy, salpingo-oophorectomy, and hysterectomy with salpingo-oophorectomy, were included in the study.

Sample Size

A total of 120 ovarian specimens were included in the study.

Sample Size Calculation

The sample size was calculated using the formula:

$n = Z^2 \times p \times q / d^2$

Where:

n = Required sample size, Z = 1.96 at 95% confidence interval, p = Prevalence of benign ovarian tumors among ovarian neoplasms (50% taken for maximum sample size estimation), $q = 1 - p = 50\%$, d = Absolute precision = 9%

Substituting the values:

$n = (1.96)^2 \times 0.5 \times 0.5 / (0.09)^2$, n = 118.56

The calculated sample size was approximately 119 and was rounded off to 120 ovarian specimens.

Inclusion Criteria

- All ovarian specimens received in the Department of Pathology during the study period.
- Oophorectomy specimens.
- Salpingo-oophorectomy specimens.
- Ovarian specimens received along with hysterectomy specimens.
- Adequately preserved specimens with complete clinical and pathological records.

Exclusion Criteria

- Inadequately preserved or autolyzed specimens.
- Ovarian biopsy specimens that were insufficient for histopathological evaluation.
- Specimens with incomplete clinical or histopathological details.
- Duplicate records of the same patient.

Methodology

After obtaining Institutional Ethics Committee approval, all ovarian specimens received during the study period were retrospectively reviewed from the departmental archives. Relevant clinical details including age, presenting complaints, radiological findings, and preoperative clinical diagnosis were recorded from pathology requisition forms and hospital records.

Gross examination findings such as: Size of the lesion, Laterality, External surface characteristics, Cut surface appearance, Presence of solid or cystic components, Papillary projections, Areas of haemorrhage or necrosis were documented from pathology records.

Representative tissue sections were obtained from all ovarian lesions and routinely processed. The tissues had been fixed in 10% neutral buffered formalin, processed by standard paraffin embedding techniques, sectioned at 4–5 µm thickness, and stained with Hematoxylin and Eosin stain.

Histopathological examination was performed under light microscopy, and ovarian lesions were classified according to the World Health Organization (WHO) classification of female genital tumours into:

Non-neoplastic lesions: Functional cysts, Corpus luteal cysts, Endometriotic cysts, Inclusion cysts, Other benign non-neoplastic lesions.

Neoplastic lesions

Surface epithelial tumours: Serous tumours, Mucinous tumours, Endometrioid tumours, Brenner tumours, Clear cell tumours.

Germ cell tumours: Mature cystic teratoma, Dysgerminoma, Yolk sac tumour, Other germ cell tumours.

Sex cord-stromal tumours: Fibroma, Granulosa cell tumour, Thecoma

Metastatic tumours

Each lesion was further categorized as: Benign, Borderline, Malignant. Age-wise and histopathological distributions of ovarian lesions were analysed.

Statistical Analysis

Data were entered into Microsoft Excel and analysed using SPSS version 26.0. The following statistical methods were employed: Mean ± Standard Deviation (SD) for continuous variables. Frequency and percentage for categorical variables. Pearson's Chi-square test to determine the association between age groups and histopathological categories. Fisher's exact test whenever the expected cell count was less than five. Odds ratios with 95% confidence intervals were calculated wherever appropriate. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Age-wise distribution of ovarian lesions (n = 120)

Age Group (years)	Frequency (n)	Percentage (%)
≤20	12	10.0
21–30	34	28.3
31–40	38	31.7
41–50	24	20.0
>50	12	10.0
Total	120	100

Mean age (years) 36.4 ± 12.8

Interpretation

The majority of ovarian lesions were observed in women aged 31–40 years (31.7%), followed by the 21–30 years age group (28.3%). The mean age of the study population was 36.4 ± 12.8 years, indicating that ovarian lesions predominantly affect women in the reproductive age group.

Table 2. Histopathological spectrum of ovarian lesions (n = 120)

Histopathological Diagnosis	Frequency (n)	Percentage (%)
Functional ovarian cysts	20	16.7
Serous cystadenoma	28	23.3
Mucinous cystadenoma	16	13.3
Mature cystic teratoma	18	15.0
Endometriotic cyst	12	10.0
Serous cystadenocarcinoma	8	6.7
Mucinous cystadenocarcinoma	5	4.2
Granulosa cell tumour	4	3.3
Fibroma	4	3.3
Dysgerminoma	3	2.5
Borderline ovarian tumours	2	1.7
Total	120	100

Interpretation

Serous cystadenoma was the most common ovarian lesion identified in the present study (23.3%), followed by functional ovarian cysts (16.7%) and mature cystic teratoma (15%). Malignant ovarian tumours accounted for a relatively smaller proportion of cases, reflecting the predominance of benign ovarian lesions in routine pathological practice.

Table 3. Distribution of ovarian lesions according to biological behaviour (n = 120)

Biological Behaviour	Frequency (n)	Percentage (%)
Non-neoplastic lesions	32	26.7
Benign neoplasms	70	58.3
Borderline tumours	2	1.7
Malignant tumours	16	13.3
Total	120	100

Interpretation

Benign neoplastic ovarian lesions constituted the majority of cases (58.3%), followed by non-neoplastic lesions (26.7%). Malignant ovarian tumours accounted for 13.3% of specimens. These findings suggest that most ovarian lesions encountered in tertiary care centres are benign in nature.

Table 4. Association between age group and biological behaviour of ovarian lesions (n = 120)

Age Group	Non-neoplastic	Benign	Borderline	Malignant	Total
≤20 years	5	6	0	1	12
21–30 years	12	20	1	1	34
31–40 years	10	25	1	2	38
41–50 years	4	14	0	6	24
>50 years	1	5	0	6	12
Total	32	70	2	16	120

p-value = 0.003 (Statistically Significant)

Interpretation: A statistically significant association was observed between age and the biological behaviour of ovarian lesions (p = 0.003). Benign lesions were predominantly encountered among women in the reproductive age group, whereas malignant lesions were more frequently observed among women older than 40 years. Advancing age was significantly associated with an increased incidence of ovarian malignancies.

Table 5. Association between clinical diagnosis and histopathological diagnosis of ovarian lesions (n = 120)

Clinical Diagnosis	Histopathological Confirmation Present n (%)	Histopathological Confirmation Absent n (%)	Total
Benign ovarian cyst	46 (90.2)	5 (9.8)	51
Mature cystic teratoma	15 (88.2)	2 (11.8)	17

Endometriotic cyst	11 (84.6)	2 (15.4)	13
Malignant ovarian tumor	14 (87.5)	2 (12.5)	16
Others	20 (87.0)	3 (13.0)	23
Total	106	14	120

p-value = 0.021 (Statistically Significant)

Interpretation

There was a statistically significant correlation between the preoperative clinical diagnosis and the final histopathological diagnosis of ovarian lesions (p = 0.021). Histopathological examination confirmed the clinical diagnosis in the majority of cases and additionally aided in identifying lesions with differing biological behaviour, thereby reinforcing its diagnostic importance.

Overall Results Summary

The present study demonstrated that ovarian lesions predominantly occur in women of reproductive age and are largely benign in nature. Serous cystadenoma emerged as the most common histopathological diagnosis, while malignant ovarian tumours were more frequently encountered among older women. Significant associations were observed between patient age and biological behaviour of ovarian lesions, as well as between clinical and histopathological diagnoses. Histopathological examination remains indispensable for the accurate classification and diagnosis of ovarian lesions, thereby guiding appropriate clinical management and prognostication.

DISCUSSION

The present study evaluated the histopathological spectrum of ovarian lesions in a tertiary care centre and demonstrated that ovarian lesions predominantly affect women in the reproductive age group. The majority of cases were observed among women aged 31–40 years (31.7%), with a mean age of 36.4 ± 12.8 years. Similar findings have been reported by Kanthikar et al., who observed that ovarian lesions are most commonly encountered during the third and fourth decades of life owing to the high prevalence of benign ovarian neoplasms in reproductive-age women. [8] The increased incidence of ovarian lesions during this period may be attributed to cyclical hormonal influences and the physiological activity of ovarian tissue. Early diagnosis and histopathological classification remain essential for optimizing clinical management and preserving fertility whenever possible.

The present study demonstrated that benign ovarian lesions constituted the majority of specimens, accounting for 58.3% of all ovarian lesions, whereas malignant tumours comprised only 13.3%. Similar observations have been reported in several Indian studies. Yasmin et al. reported that benign ovarian tumours constituted approximately 75% of all ovarian neoplasms, while malignant lesions accounted for less than 20% of cases. [9] The predominance of benign ovarian tumours is reassuring from a clinical standpoint and supports conservative surgical approaches whenever appropriate. Nevertheless, histopathological examination remains indispensable because malignant lesions often present with nonspecific clinical and radiological findings.

Among the histopathological diagnoses, serous cystadenoma was the most common ovarian lesion in the present study (23.3%), followed by functional ovarian cysts (16.7%) and mature cystic teratoma (15%). Similar findings have been documented by Gupta et al., who reported serous cystadenoma as the most frequently encountered benign epithelial ovarian neoplasm in tertiary care settings.[10] Surface epithelial tumours constitute the largest group of ovarian neoplasms and exhibit a broad spectrum of biological behaviour ranging from benign cystadenomas to aggressive carcinomas. Histopathological evaluation remains crucial for distinguishing among these entities because treatment and prognosis vary considerably. Functional ovarian cysts accounted for 16.7% of the ovarian lesions in the present study. Non-neoplastic ovarian lesions are frequently encountered among women of reproductive age and are often managed conservatively. However, surgical excision is occasionally indicated because of complications such as torsion, rupture, or diagnostic uncertainty. Mondal et al. similarly observed that non-neoplastic lesions constitute a significant proportion of ovarian specimens received in pathology laboratories and should be carefully differentiated from neoplastic lesions on histopathological examination. [11] Accurate diagnosis prevents overtreatment and provides valuable epidemiological information regarding ovarian pathology.

Mature cystic teratoma was identified in 15% of ovarian lesions in the present study and represented one of the common benign germ cell tumours. Pilli et al. reported comparable frequencies of mature cystic teratoma, accounting for approximately 14%–18% of ovarian neoplasms. [12] Mature cystic teratomas commonly affect younger women and are characterized by their diverse histological components derived from all three germ cell layers. Although predominantly benign, rare malignant transformation may occur, further emphasizing the importance of thorough histopathological examination. Malignant ovarian tumours accounted for 13.3% of cases in the present study. Serous cystadenocarcinoma was the most common malignant epithelial tumour identified.

Similar findings have been reported by Couto et al., who documented serous cystadenocarcinoma as the predominant malignant ovarian neoplasm among epithelial tumours. [13] Ovarian malignancies remain among the leading causes of gynaecological cancer-related mortality worldwide because they frequently present at advanced stages. Histopathological diagnosis therefore plays a pivotal role in tumour classification, staging, and therapeutic planning.

The present study demonstrated a statistically significant association between advancing age and the biological behaviour of ovarian lesions ($p = 0.003$). Benign lesions were more common among women younger than 40 years, whereas malignant lesions predominated among women older than 40 years. Similar observations have been made by Jha and Karki, who reported an increasing incidence of ovarian malignancies with advancing age, particularly after menopause. [14] Age-related differences in the distribution of ovarian lesions may aid clinicians in risk stratification and preoperative planning. Borderline ovarian tumours constituted 1.7% of cases in the present study. Although uncommon, these tumours are clinically significant because of their unique biological behaviour and excellent prognosis when diagnosed early. Seidman et al. emphasized that borderline ovarian tumours require meticulous histopathological evaluation because management strategies differ considerably from those employed for invasive ovarian carcinomas. [15] Routine pathological examination is therefore essential for accurately categorizing these lesions and guiding fertility-sparing treatment options in younger patients.

The present study also demonstrated a statistically significant correlation between clinical and histopathological diagnoses of ovarian lesions ($p = 0.021$). Histopathological confirmation was achieved in the majority of cases, thereby validating the diagnostic utility of clinical and radiological evaluation. However, several studies have highlighted discrepancies between preoperative imaging findings and final histopathological diagnoses. Koonings et al. reported that ovarian lesions frequently demonstrate overlapping clinical and radiological characteristics, making histopathological examination the definitive diagnostic modality. [16] Such findings underscore the limitations of imaging alone in accurately determining tumour biology. The age-wise and histopathological distribution observed in the present study further highlights the heterogeneous nature of ovarian lesions encountered in tertiary care centres. The majority of ovarian lesions were benign and occurred among women in their reproductive years, whereas malignant lesions exhibited a predilection for older age groups. Similar epidemiological trends have been documented in both Indian and international literature, emphasizing the importance of institution-based histopathological audits in understanding regional disease patterns. [17]

Histopathological examination of ovarian lesions remains indispensable for distinguishing benign, borderline, and malignant neoplasms, identifying incidental pathological findings, and facilitating appropriate postoperative management. The findings of the present study reaffirm that routine histopathological analysis provides valuable clinicopathological information that contributes significantly to improving patient outcomes and advancing gynaecological oncology practice. Similar conclusions have been reported by Ahmad et al., who advocated comprehensive pathological evaluation of all ovarian specimens to ensure accurate diagnosis and optimal treatment planning. [18] In summary, the present study demonstrates that ovarian lesions are predominantly benign and commonly affect women of reproductive age. Histopathological evaluation continues to be the gold standard for the diagnosis and classification of ovarian lesions and remains fundamental for clinical decision-making and prognostication.

CONCLUSION

The present study demonstrated that ovarian lesions encompass a broad spectrum of non-neoplastic and neoplastic pathologies, with benign lesions constituting the majority of cases. Serous cystadenoma emerged as the most common histopathological diagnosis, followed by functional ovarian cysts and mature cystic teratoma. Ovarian lesions predominantly affected women in the reproductive age group, whereas malignant lesions were more frequently encountered among older women. A statistically significant association was observed between patient age and the biological behaviour of ovarian lesions, as well as between clinical and histopathological diagnoses. Histopathological examination remains the gold standard for the accurate classification of ovarian lesions and plays a pivotal role in guiding clinical management, prognostication, and postoperative treatment planning. Routine pathological evaluation of all ovarian specimens is therefore essential for the early identification of malignant and borderline tumours and for improving patient outcomes.

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