DOI: 10.7860/JCDR/2024/67965.19047

Original Article

Pathology Section

Histopathological Spectrum of Ovarian Tumours in a Tertiary Care Centre in South Kerala, India: A Cross-sectional Study

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ABSTRACT

Introduction: Ovarian tumours are among the most common tumours in females, exhibiting diverse histopathological patterns that remain crucial for early diagnosis. Proper classification of ovarian neoplasms, particularly malignant ones, is essential for accurate treatment. Accurately subclassifying ovarian tumours aids in treatments such as targeted therapy.

Aim: To examine the histopathological spectrum of ovarian tumours and to assess the role of histopathology in accurate diagnosis and treatment.

Materials and Methods: A cross-sectional study on the histopathological spectrum of ovarian tumours was conducted in Department of Pathology, Travancore Medical College, Kollam, Kerala, India, over a five-year period (January 2017 to December 2021). The study included 850 ovarian specimens, and the various histopathological patterns were studied according to the World Health Organisation (WHO) classification of ovarian tumours, 5th edition, 2020. These patterns and age distribution were expressed in frequency and percentage.

Results: Out of the 850 ovarian specimens, 140 were neoplastic and 710 were non neoplastic. Abdominal pain was the most common clinical presentation (30%). Among the 140 neoplastic cases, 115 were benign, 20 were malignant, and five were borderline. The majority of cases, including benign, borderline, and malignant tumours, were seen in the age group of 31-40 years (25.71%). Benign tumours were more common than malignant ones in all age groups. Categorising based on histopathological patterns, epithelial tumours were the most common (88 cases, 62.86%). Serous cystadenoma was the most common benign tumour, constituting 36 out of 115 benign cases (25.71%). Borderline serous tumour was the most common borderline epithelial tumour (3 out of total 5 borderline ovarian neoplasms, 2.14%). Serous cystadenocarcinoma was the most common malignant tumour (5 cases, 03.57%).

Conclusion: The wide spectrum of ovarian tumours presents diagnostic challenges. Effective therapeutic management of ovarian malignant tumours continues to be a challenge for clinicians. Histopathological examination remains crucial in diagnosis. Accurate histopathological diagnosis, combined with clinical staging, facilitates prompt and appropriate treatment and timely patient management.

Keywords: Histopathology, Ovarian lesions, Serous cystadenoma

INTRODUCTION

Ovarian lesions are currently among the most complex problems in gynaecology. The ovaries are complex intrapelvic organs of the female reproductive system and are a common site for both benign and malignant neoplasms in all age groups, from the intrauterine period to the postmenopausal age group [1]. The ovary is the third most common site of primary malignancy in the female genital tract, after the cervix and endometrium, accounting for 30% of all cancers of the female genital tract [2]. However, the mortality rate exceeds the combined mortality of both endometrium and cervical neoplasms. Many of the malignant ovarian tumours have had variable periods of time to grow and often involve the adjacent organs before any symptoms develop [3]. Despite newer imaging techniques and genetic studies, histopathological examination still remains the mainstay in the early diagnosis of ovarian tumours. When combined with clinical staging, it helps in prompt and appropriate treatment and timely management of the patient [4]. The main role of the pathologist lies in distinguishing ovarian neoplasms from the wide spectrum of non neoplastic lesions, such as endometriosis, corpus luteal cysts, and polycystic ovarian disease, which frequently form a pelvic mass and are often associated with abnormal hormonal manifestations. The identification of different histopathological types of ovarian tumours is also important, as their proper recognition in time is essential in guiding the therapy [5]. Early diagnosis and appropriate treatment will improve the survival of ovarian cancer patients, especially those in the younger age groups [6]. The present study was undertaken to study the diverse histomorphological patterns of ovarian tumours and to assess whether these patterns provide beneficial information for their correct diagnosis, thus helping in the timely management of the patients.

MATERIALS AND METHODS

A cross-sectional study on the histopathological spectrum of ovarian tumours was conducted in the Department of Pathology, Travancore Medical College in Kollam, Kerala, India, for five-year study period from January 2017 to December 2021. Clearance from the Institutional Review Board and Ethics Committee (IEC No-111/22) was obtained.

Inclusion criteria: All ovarian neoplasms received as cystectomy, oophorectomy, and hysterectomy with unilateral or bilateral adnexa were included in the study.

Exclusion criteria: Non neoplastic ovarian lesions such as follicular cysts, endometriosis, and corpus luteal cysts were excluded from the study.

Relevant information such as age, clinical features, radiological findings, and tumour marker values like CA-125 (Range 0-35 U/mL) were entered into the proforma. Gross specimen findings and microscopic findings, including the histopathological patterns, were also reviewed and recorded in the proforma. Based on these histopathological patterns, neoplastic lesions were classified into benign, borderline, and malignant ovarian neoplasms according to the WHO classification of ovarian tumours, 2020 [7], and staging of the malignant tumours was performed based on AJCC staging [8].

STATISTICAL ANALYSIS

The collected data was entered into a Microsoft Excel worksheet, and frequencies and percentages were calculated.

RESULTS

During the five years of the study, a total of 850 ovary specimens were received. Out of these 850 ovarian specimens, 140 were neoplastic, and 710 were non neoplastic. The majority of patients with neoplastic lesions (30.00%) presented with abdominal pain, while 20.00% presented with discomfort in the pelvic area. Other clinical symptoms included back pain, increased urinary frequency, constipation, and abdominal mass [Table/Fig-1].

Symptoms	n (%)
Abdominal pain	42 (30)
Discomfort in the pelvic area	28 (20)
Back pain	28 (20)
Increased urinary frequency	21 (15)
Constipation	14 (10)
Abdominal mass	7 (5)

[Table/Fig-1]: Clinical features of neoplastic lesions (n=140).

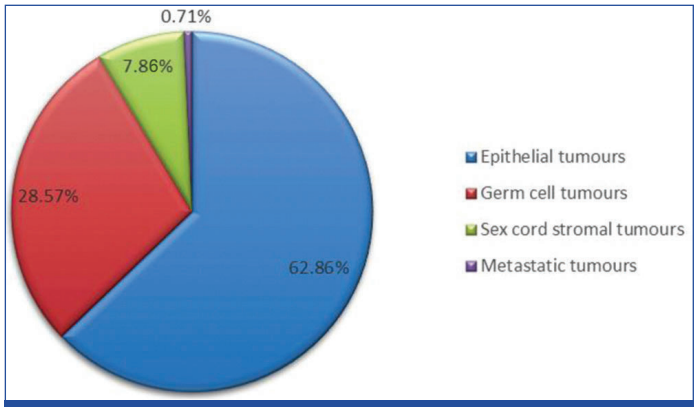
Out of the 140 neoplastic cases, 115 (82.00%) were benign tumours, 20 were malignant (14.50%), and five were borderline tumours (3.50%). The majority of the cases, including benign, borderline, and malignant tumours, were seen in the age group of 31-40 (25.71%). The youngest patient was 13 years of age, a case of immature teratoma. The oldest patient was 70 years old, a case of serous cystadenocarcinoma. Benign tumours were more common than malignant ones in all age groups. Ten out of 20 malignant ovarian tumours were seen in the age group of over 50 (50.00%) [Table/Fig-2].

Age group (years)	Benign	Borderline	Malignant
10-20	13	00	02
21-30	28	00	01
31-40	30	03	03
41-50	26	02	04
51-60	13	00	06
>60	05	00	04

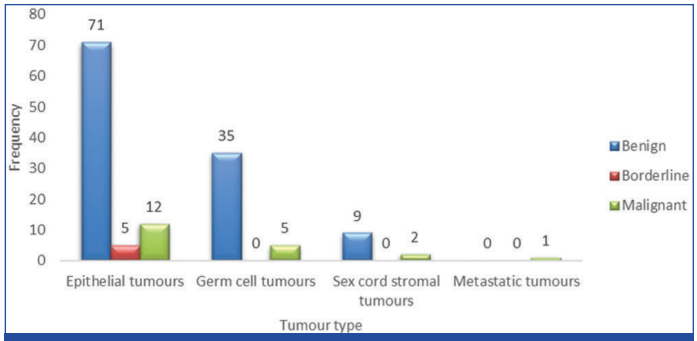
[Table/Fig-2]: Age distribution of ovarian tumours.

On radiological studies, benign tumours like serous cystadenoma and mucinous cystadenoma showed unilocular and multilocular cysts with no solid areas. Borderline tumours showed cysts with small solid and papillary areas. Malignant tumours such as serous carcinoma, mucinous carcinoma, endometrioid carcinoma, clear cell carcinomas, and dysgerminomas showed predominantly solid and focal cystic areas with variable attenuation and ascites. Germ cell tumours showed cysts with enhancement of solid components.

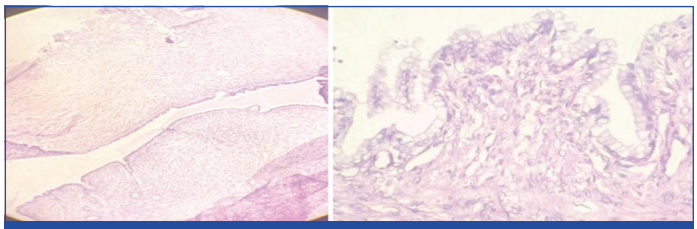
Upon categorisation based on histopathological patterns, epithelial tumours were the most common (62.86%), [Table/Fig-3,4]. Among the benign epithelial tumours, serous cystadenoma [Table/Fig-5] was the most common, constituting 36 out of 115 benign cases (25.71% of total tumours), followed by mucinous cystadenoma (30 cases, 21.42%) [Table/Fig-6] and Brenner tumour (03.57%). Borderline serous tumour was the most common borderline epithelial tumour (3 out of total 5 borderline ovarian neoplasms, 2.14% of total tumours). Serous cystadenocarcinoma was the most common malignant tumour (5 cases, 03.57% of the total neoplasms), followed closely by Endometrioid carcinoma (3 cases, 02.14%) [Table/Fig-7,8]. CA-125 levels were elevated in the malignant neoplasms, especially serous carcinomas, with a mean level of 100 U/mL. Mature cystic teratoma [Table/Fig-9,10] was the most common germ cell tumour (35 cases, 25% of total tumours), and fibrothecoma was the most common sex cord stromal tumour (8 cases, 5.71%). One case of breast carcinoma metastasis to the ovary was also reported during this study period [Table/Fig-11].



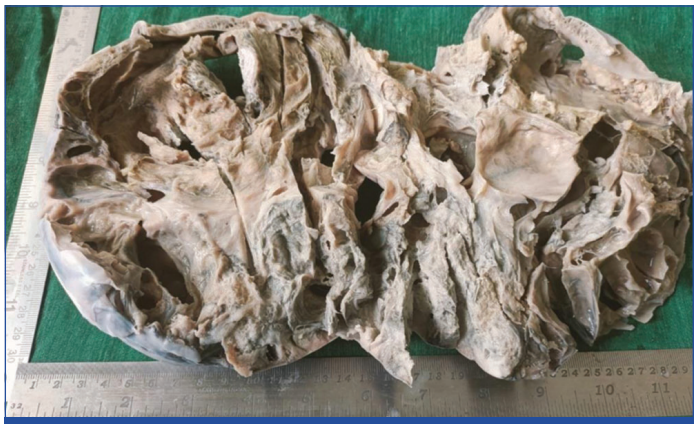
[Table/Fig-3]: Frequency and types of ovarian tumours.



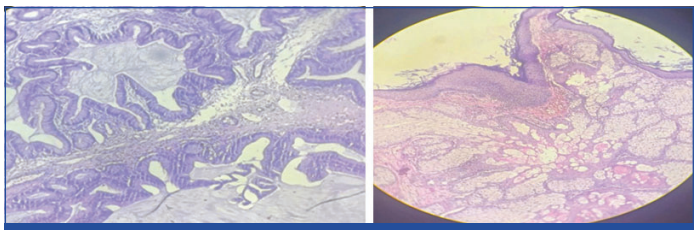
[Table/Fig-4]: Distribution of histological types of ovarian tumours.



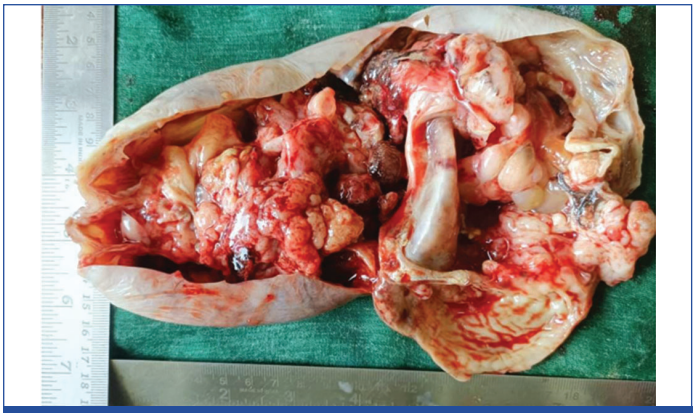
[Table/Fig-5]: Serous cystadenoma (H&E, 20X).
[Table/Fig-6]: Mucinous cystadenoma (H&E, 40X). (Images from left to right)



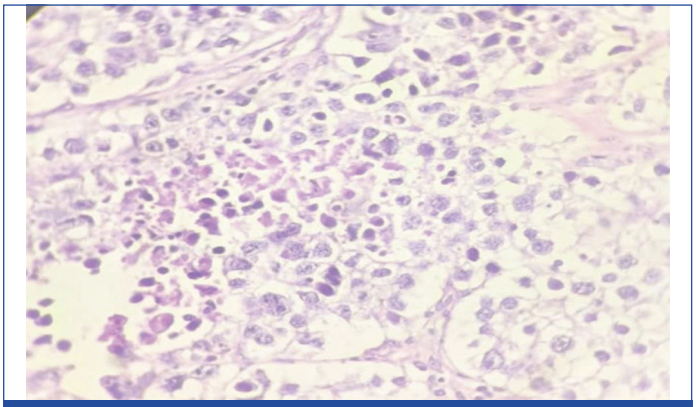
[Table/Fig-7]: Gross specimen of serous carcinoma.



[Table/Fig-8]: Mucinous carcinoma (H&E, 20X).
[Table/Fig-9]: Mature cystic teratoma with skin and appendages (H&E, 20X). (Images from left to right)



[Table/Fig-10]: Gross specimen of teratoma.



[Table/Fig-11]: Breast carcinoma metastasis to ovary with necrosis (H&E, 40X).

Regarding AJCC staging [8] of the 20 malignant neoplasms in present study, eight were Stage-I tumours where the tumour is limited to one ovary with an intact capsule. Six were Stage-II with the tumour involving both ovaries with extension to fallopian tubes and uterus. Four were Stage-III with pelvic lymph node metastasis. Two cases were Stage-IV with distant metastasis.

DISCUSSION

The ovary is a female genital organ with complex anatomy and physiology influenced by various hormones. The different cell types in the ovary are capable of giving rise to different groups of tumours [9]. Ovarian cancer is one of the leading causes of death in females. In the case of ovarian tumours, benign tumours outnumber malignant tumours. Almost 80% of ovarian neoplasms are benign, and it is also a common site for primary malignancy; metastasis to the ovaries can also occur. Nulliparity, a family history of cancer, and genetic mutations are some of the risk factors associated with the development of ovarian neoplasms [10]. The high death rates are due to advanced malignancy at the time of diagnosis in the majority of the cases. Ovarian tumours are thus a group of neoplasms with a diverse spectrum of features. The WHO classified this wide spectrum of ovarian tumours into surface epithelial tumours, sex cord-stromal tumours, giant cell tumours, metastatic, and miscellaneous tumours [11]. The present study was conducted to study the frequency of various histological types of ovarian tumours based on the WHO classification [7], the age distribution of these tumours, and the importance of these histological patterns in diagnosis and treatment.

A total of 850 ovarian cases were evaluated. Out of these 850 cases, 140 were neoplastic, and 710 were non neoplastic. Of the 140 neoplastic cases, 115 were benign (82.00%), 20 were malignant (14.50%), and five were borderline tumours (3.50%). The results were similar to the findings by Couto F et al., (80.76% benign tumours, 2.33% borderline tumours, and 16.91% malignant tumours) [12], Pilli GS et al., (76.00% benign tumours, 2.80% borderline tumours, and 21.20% malignant tumours), and Phukan A et al., (75.00% benign tumours, 3.60% borderline tumours, and 21.40% malignant tumours) [13,14]. Abdominal pain was the common clinical presentation 42 (30%) cases, followed by discomfort in the pelvic area 28 (20%) cases and back pain 28 (20%) cases [Table/Fig-1], which was similar to the study conducted by Phukan A et al., where abdominal pain was the common presentation (33 cases, 39.00%) [14]. Panchonia A et al., in their study mentioned that many of the malignant ovarian tumours had variable periods of time to grow and often involve the adjacent organs before any symptoms develop [2]. The maximum number of ovarian tumours was seen in the age group of 31-40 years, similar to the study conducted by Gupta N et al., where 51 out of a total of 212 cases studied were in the age range of 31-40 years (24.1%) [15]. Benign tumours were found to be more common than malignant ones in all age groups [Table/Fig-3]. Malignant ovarian tumours were most common in the age group of more than 50 in our study (50.00%, 10 out of 20 cases). This finding was similar to the study conducted by Panchonia A et al., where malignant tumours were more common in the menopausal age group of 46 to 60 years of age, while benign tumours were more common in the reproductive age group of 31 to 45 years of age [2].

Taylor EC et al., in their study discussed that the imaging appearance of ovarian tumours is often non specific; it closely parallels the gross pathologic appearance, and radiologic-pathologic correlation is helpful to aid in a deeper understanding of the subtypes [16]. A pelvic ultrasound is the most common radiologic tool used, but Computed Tomography (CT)/ Magnetic Resonance Imaging (MRI) scans are also very useful. Findings that raise concern for malignancy are larger size, growth within the mass, enlarged lymph nodes, and growth into nearby organs. The radiological findings of present study were similar to the study conducted by Taylor EC et al., [16]. On analysing the histopathological patterns, epithelial tumours were the most common neoplasms (88 cases, 62.86%), which was similar to the study conducted by Phukan A et al., (56 cases, 66.70%) [14]. Serous cystadenoma was the most common benign tumour, constituting 36 out of 115 benign cases (31.30%). Serous cystadenocarcinoma was the commonest malignant tumour (25.00% of the malignant neoplasms). Mature cystic teratoma was the most common germ cell tumour (35 cases, 25% of total tumours). These results were similar to the studies conducted by Gupta N and Bisht D and Bukhari U et al., [17,18].

In present study, CA-125 levels were found to be elevated in malignant neoplasms, particularly in serous carcinomas, with a mean level of 100 U/mL. However, increased CA-125 levels are not specific to ovarian malignancy; they are also observed in physiological and benign conditions such as endometriosis, pregnancy, ovarian cysts, and inflammatory diseases of the peritoneum. Therefore, a combination of biomarkers such as CA-125 and human epididymis protein 4 (HE4) levels, which are more specific, was thought to be more predictive of malignant ovarian tumours [19]. Ovarian carcinomas are one of the leading causes of death in gynecological malignancies, even after surgery and chemotherapy treatments. This therapeutic challenge arises due to the advanced disease stage at the time of presentation, highlighting the need for targeted therapy in ovarian malignancy to improve the clinical outcome in ovarian carcinoma patients [20]. In their study, Chakrabarti PR et al., concluded that the proper interpretation of cellular morphology is important for categorisation and correct treatment planning of ovarian cancers [21]. Among the 20 malignant neoplasms in present study, eight were AJCC Stage-I tumours, where the tumour is limited to one ovary with an intact capsule. Six were Stage-II tumours with the tumour involving both ovaries with extension to fallopian tubes and uterus. Four were Stage-III tumours with pelvic lymph node metastasis. Two cases were Stage-IV with distant metastasis [8]. The prognosis of ovarian cancer depends on the stage of the disease at the time of diagnosis. The median survival of ovarian cancer is approximately 40-50% at 10 years, with stage-related

survival for Stage-I between 70-92% compared to less than 6% for Stage-IV [22]. The recurrence risk of ovarian malignancies also strongly correlates with the stage at diagnosis. Fewer than 10% of women with Stage-I disease will have a recurrence, whereas 90% of women with Stage-IV disease will have recurrent malignancies [23]. Malignant ovarian tumours are known for high mortality, and the prognosis depends on categorisation and staging, which will help the clinician to plan timely management, especially with targeted therapy.

Limitation(s)

The limitation of present study was that it was a cross-sectional, record-based study using data from a prescreened population in a single tertiary care centre. Therefore, the data may not be generalisable to a community setting.

CONCLUSION(S)

The wide spectrum of ovarian tumours poses diagnostic challenges. Benign tumours were found to be more common than malignant ones in all age groups. Malignant ovarian tumours were most common in the age group of over 50. Surface epithelial tumours were the commonest ovarian tumours, followed by germ cell tumours, as observed in other studies. Effective therapeutic management of ovarian malignant tumours continues to be a challenge for the clinician. Histopathological examination still remains the mainstay in the diagnosis. An accurate histopathological diagnosis, combined with clinical staging, helps in prompt and appropriate treatment and timely management of the patient.

Acknowledgement

The authors would like to acknowledge faculty members and non teaching staff of the Department of Pathology and faculty members of Department of Gynaecology who helped us by providing the valuable insights. Authors also thank our statistician Mr. Sony Simon who facilitated this study.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Oct 10, 2023
- Manual Googling: Jan 13, 2024
- iThenticate Software: Jan 15, 2024 (14%)

ETYMOLOGY: Author Origin

EMENDATIONS: 8

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Oct 09, 2023**
Date of Peer Review: **Nov 07, 2023**
Date of Acceptance: **Jan 17, 2024**
Date of Publishing: **Feb 01, 2024**