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A five year retrospective study of the histomorphological spectrum of ovarian tumours in an urban population of West Bengal, in the light of WHO classification of Ovarian Tumours (2014)

Authors
Abhisek Lath*, Soumitra Das, Tushar Kanti Das
Department of Pathology, R.G. Kar Medical College & Hospital,
1, Khudiram Bose Sarani, Bidhan Sarani, Shyam Bazar, Kolkata, West Bengal 700004
*Corresponding Author
Abhisek Lath

Abstract
Objectives: *To study the morphological patterns of different benign and malignant ovarian tumours and their distribution in different age groups in urban population of West Bengal. Review and reclassification of old diagnosed cases of last five years in our department according to the latest WHO classification (2014).*
Methods: *A retrospective study of all ovarian neoplasms diagnosed in the Department of Pathology, R.G.Kar Medical College and Hospital, Kolkata over a period of five years (July 2012 to June 2017) was conducted. The tumours were reclassified according to the WHO classification of Ovarian tumours (2014). Immunohistochemistry was done in selected cases posing a dilemma in diagnosis.*
Results: *A total number of 1223 diagnosed cases were studied, 7.11% (n=87) being bilateral. Benign tumours comprised 82.17% (n=1005), borderline tumours 1.07% (n=13) and malignant tumours 16.76% (n=205). Epithelial tumours were the commonest variety accounting for 82.09% (n=1004), followed by germ cell tumours 13.98% (n=171). Serous cystadenoma comprising 46.06% (n=463) and Endometriotic cyst 17.51% (n=176) of the cases were the commonly diagnosed benign tumours. Serous carcinoma and Mucinous carcinoma being the commonest and second most common malignant tumours comprised 64.87% (n=133) and 11.70% (n=24) of the malignant cases respectively. The benign and malignant tumours were most commonly reported in the 3rd and 8th decade of life respectively.*
Conclusion: *As inferred from this study, ovarian neoplasms both benign and malignant can be specifically categorized into histomorphological subtypes in the light of WHO classification (2014).*
Keywords: *WHO classification of ovarian tumours (2014); ovarian neoplasms; serous cystadenoma; Endometriotic cyst.*

Introduction

Worldwide, Ovarian cancer, accounting for 3.4% of all cancers, is the eighth most common cause of cancer related deaths among women.[1] Ovarian cancer is the third most common cause of cancer in India and stands 4th among the cause of cancer related deaths. More than 200,000 new cases of ovarian cancer are diagnosed with approximately 6.1 new cases per 100,000 women per year.

The ovarian neoplasms, both benign as well as malignant have a wide spectrum of histologic features, clinical presentations including age and

malignant potentiality. This is mainly because of the wide spectrum of histogenesis of ovarian tumours, including epithelial tissue, germ cell and connective tissue.[2]

Despite the need of screening tests like ultrasonography and serum CA 125 levels, the hallmark of diagnosis lies with histopathological examination of the ovarian tumours. Though ovarian neoplasms are not easily identified before laparotomy, a proper histologic diagnoses acts as a major aid in the post surgical follow up of the patient as well. Ovaries are deep seated organs, hence causing the late presentation of symptoms. Also because of a wide variety of symptoms, detection of ovarian neoplasms is still a challenge.

Subtypes of epithelial tumours include serous, mucinous, endometrioid, clear cell, and Brenner tumours. Germ cell tumours (GCTs) include mature teratoma, dysgerminoma, malignant teratoma, embryonal carcinoma, and choriocarcinoma. Sex cord stromal tumours include tumours arising from the sex cords, granulosa cells, Sertoli cells, and the specialised stroma of the genital ridge, theca, and Leydig cells.[3]

This study was conducted with an aim to study the morphological patterns of different benign and malignant ovarian tumours and their distribution in different age groups in an urban population of West Bengal. The objectives of study were to determine the nature of various ovarian lesions and to ascertain the frequency and distribution of the various neoplastic lesions. Review and reclassification of old diagnosed cases of the last five years in our department was conducted according to the latest WHO classification (2014).[3]

Materials and Methods

The Study design used was a retrospective study. It was conducted for a time period of 5 years, from 1st July 2012 to 30th June 2017. The study was conducted at Department of Pathology, R.G. Kar Medical College and Hospital, Kolkata.

The data was collected from the departmental record books and the tumours were classified and segregated according to the recent WHO classification. All the cases were identified from the histopathology database and data regarding age and tumour histology were collected from the same. All benign and malignant ovarian tumours as well as metastatic tumours were included in this study. Slides were retrieved from departmental archives and some of them were reclassified according to the WHO classification of ovarian tumours (2014).[3]

The primary ovarian tumours were classified as benign, borderline and malignant tumours. All the ovarian tumour cases diagnosed in the department of pathology, the age of the patients and laterality of tumours were included in the perview of this study. It was a descriptive study depicting the frequency of different ovarian neoplasms encountered in an urban population as well as the age distribution of these ovarian neoplasms.

Results

A total number of 1223 diagnosed cases were studied, 7.11% (n=87) being bilateral. **(Fig.1)**

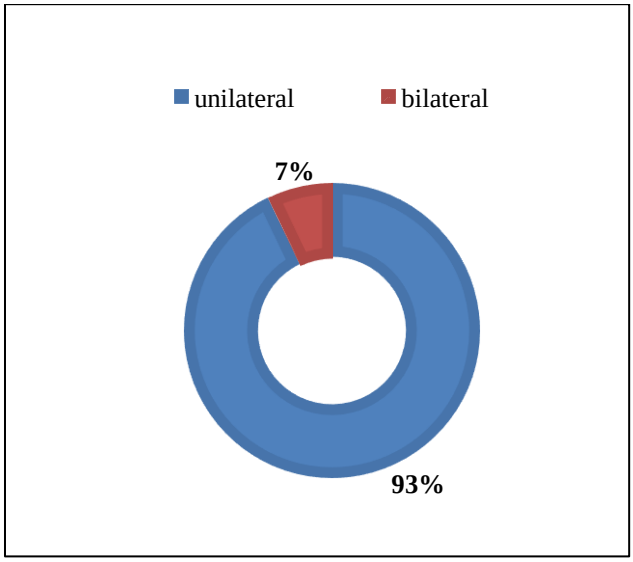


Fig 1: Pie chart comparing the laterality of ovarian tumours

Benign tumours comprised 82.17% (n=1005), borderline tumours 1.07% (n=13) and malignant tumours 16.76% (n=205). **(Fig.2)**

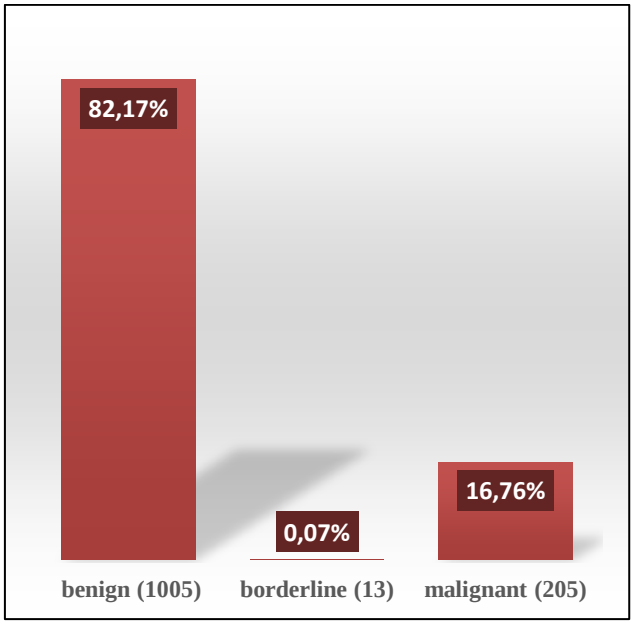


Fig 2: Clustered column chart showing percentages of benign vs borderline vs malignant ovarian tumours

Epithelial tumours were the commonest variety accounting for 82.09% (n=1004), followed by germ cell tumours 13.98% (n=171).
Serous cystadenoma comprising 46.06% (n=463) and Endometriotic cyst 17.51% (n=176) of the cases were the commonly diagnosed benign tumours. **(Fig.3)**

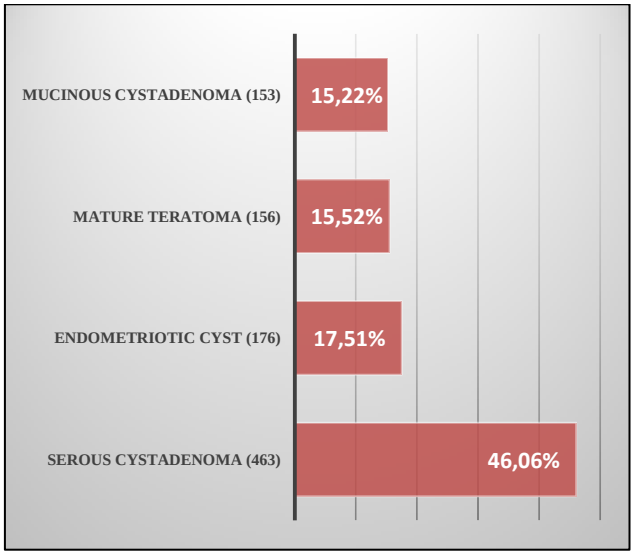


Fig 3: Clustered bar diagram comparing frequencies of common benign ovarian tumours
Serous carcinoma and Mucinous carcinoma being the commonest and second most common malignant tumours comprised 64.87% (n=133) and 11.70% (n=24) of the malignant cases respectively. **(Fig.4)**

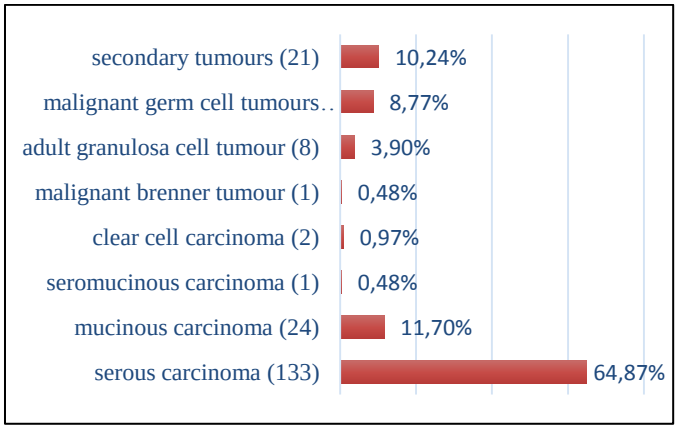


Fig 4: Clustered bar diagram comparing frequency of common malignant ovarian tumours

Among 1223 cases of ovarian neoplasms, 81.84% (n=1004) were epithelial ovarian tumours. Among these 1004 cases, 83.16% (n=835) were benign. Among 219 non-epithelial tumours, 77.62% (n=170) were benign. **(Fig.5)**

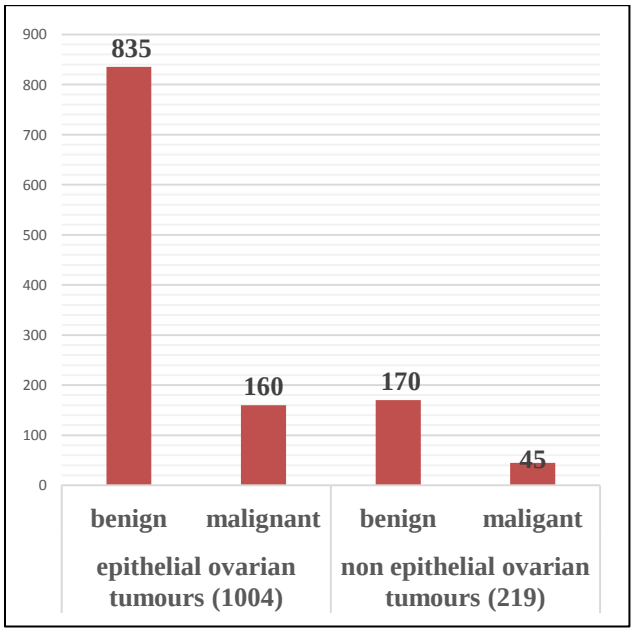


Fig 5: Clustered column chart comparing frequency of benign and malignant epithelial and nonepithelial ovarian tumours

The age of the patients having ovarian tumours were put in groups according to the decade of life.Most of the patients with ovarian tumours belonged to 5th decade of life (n=333), followed by 4th decade (n=291) and 3rd decade(n=267). **(Fig.6)**

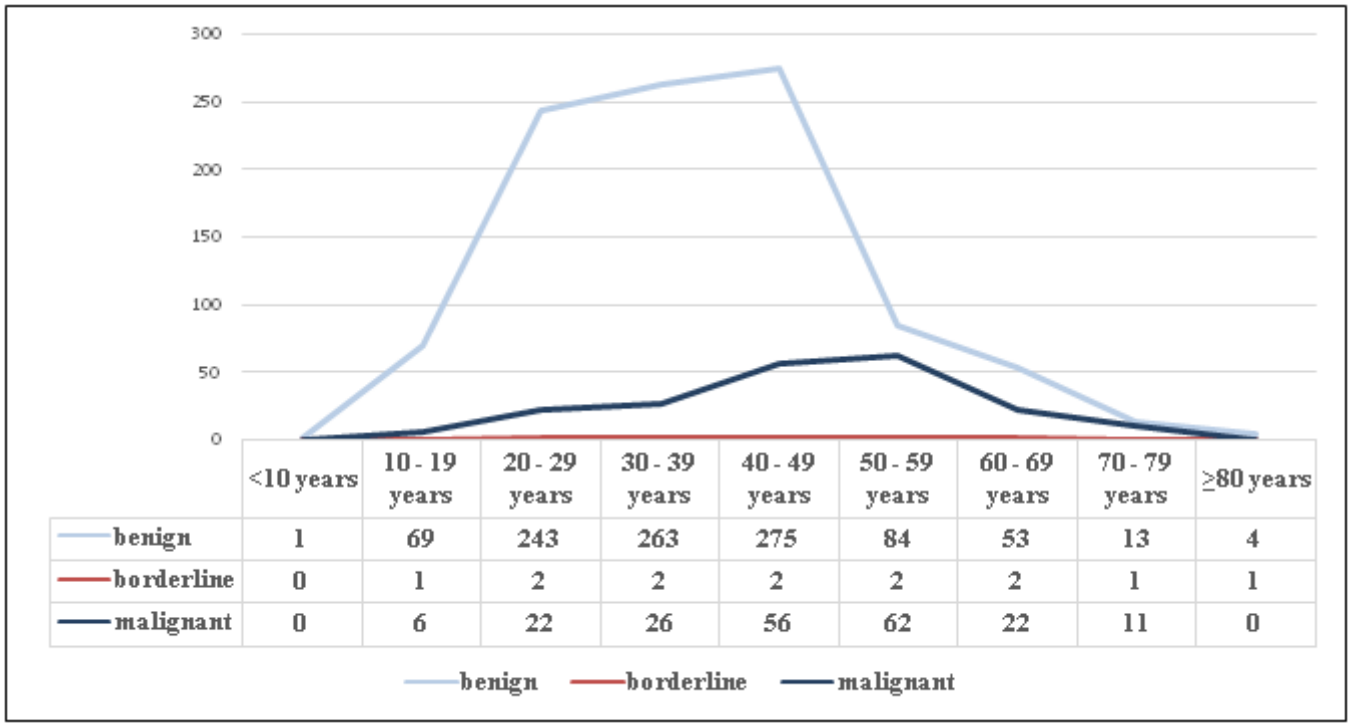
Benign tumours comprise 91% among all tumours in 3rd decade of life and 90.3% in 4th decade of life. While malignant tumours comprise 44% of all tumours in 8th decade of life and 41.9% of all tumours in 6th decade of life. **(Fig.6)**

The age of the patients were further divided in three groups, less than 15 years, 15-45 years and more than 45 years to assess the common ovarian tumours in different phases of life. All the types of ovarian tumours showed a preponderance in 15-45 years of age group except sex cord stromal tumours which in this study were more common in more than 45 years age group. **(Fig.7)**

Most number of cases in less than 15 years age group were germ cell tumours while in more than 45 years age group it was serous tumours. **(Fig.7)**

92% of patients having Endometrioid tumours and 79.5% of patients having germ cell tumours were in 15 to 45 years age group. 66.7% of secondary ovarian tumour patients were in 15-45 years age group. **(Fig.7)**

The photomicrographs of various benign (Fig. 8, 9, 11 and 12), borderline (Fig.13) and malignant (Fig. 10, 14, 15, 16, 17, 18 and 19) ovarian tumours.



	<10 years	10 - 19 years	20 - 29 years	30 - 39 years	40 - 49 years	50 - 59 years	60 - 69 years	70 - 79 years	≥80 years
benign	1	69	243	263	275	84	53	13	4
borderline	0	1	2	2	2	2	2	1	1
malignant	0	6	22	26	56	62	22	11	0

Fig. 6: Line chart comparing age wise distribution of benign, borderline and malignant ovarian tumours

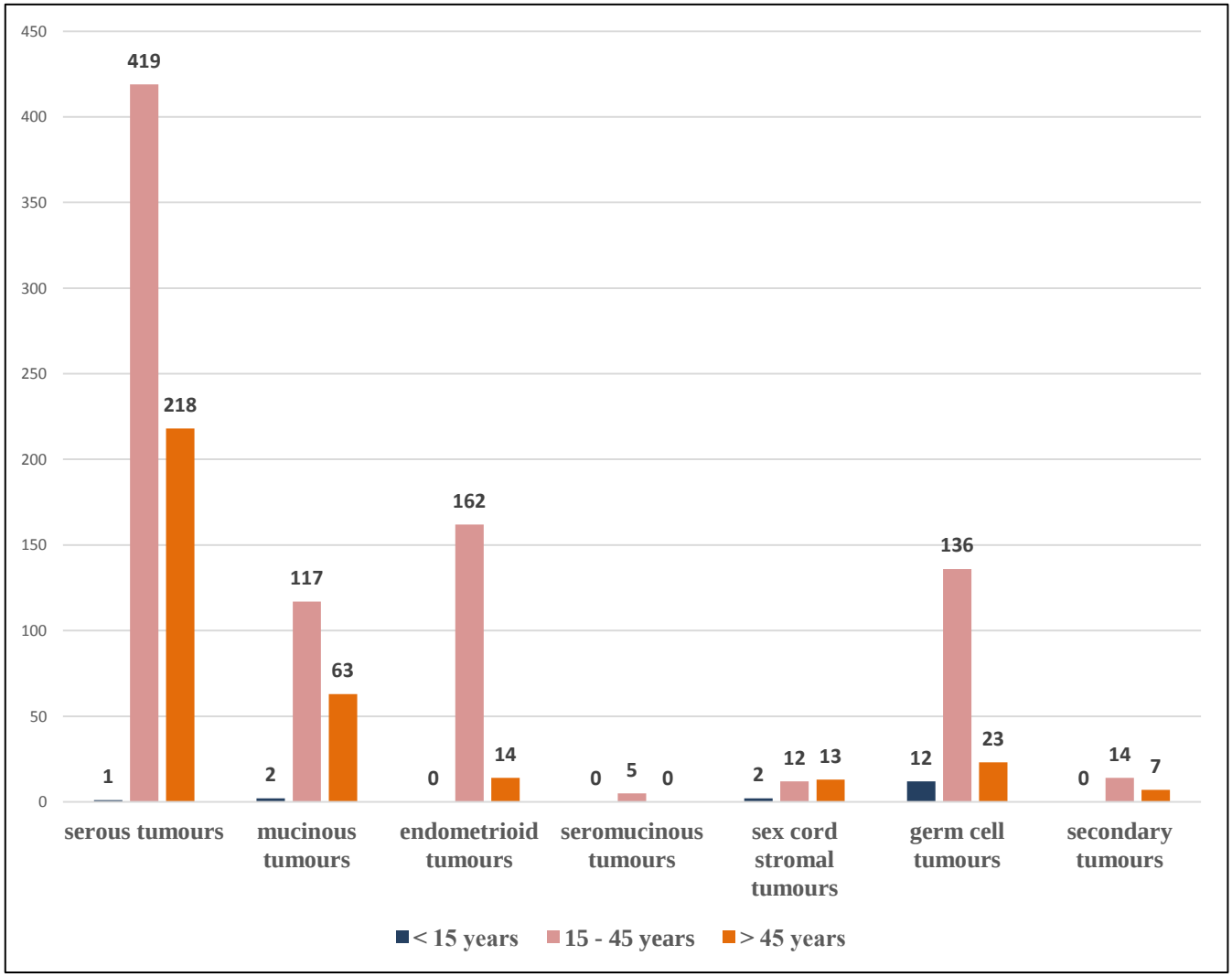


Fig 7: Clustered column chart showing age wise distribution of various types of common ovarian tumours

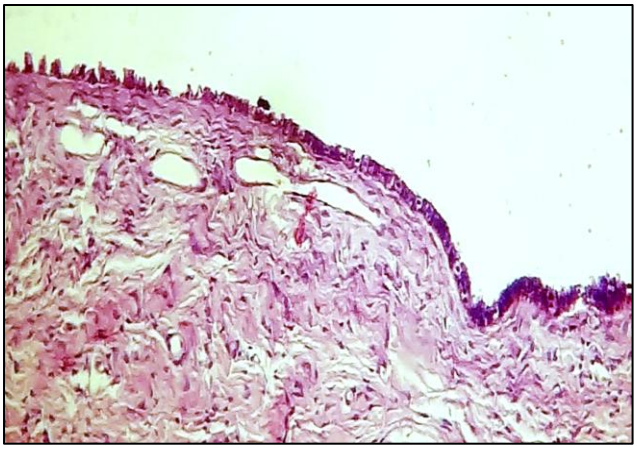


Fig 8: Photomicrograph showing histopathological features of Serous cystadenoma of ovary (H&E, Mag: X100).

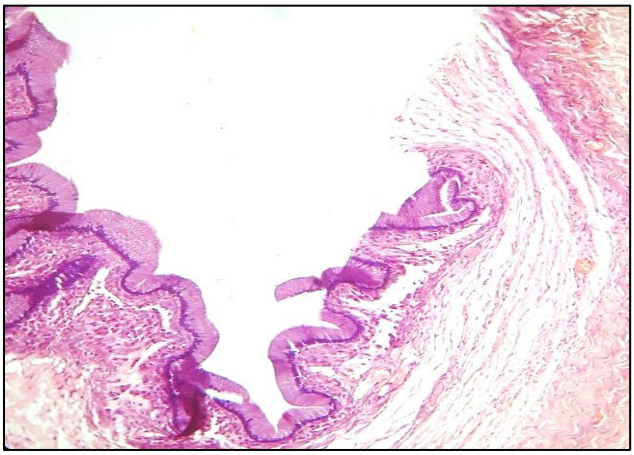


Fig 9: Photomicrograph showing histopathological features of Mucinous cystadenoma of ovary (H&E, Mag: X100**).**

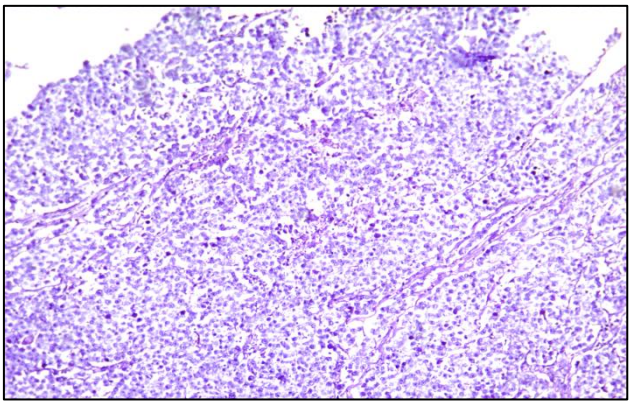


Fig 10: Photomicrograph showing histopathological features of Dysgerminoma of ovary (H&E, Mag: X400).

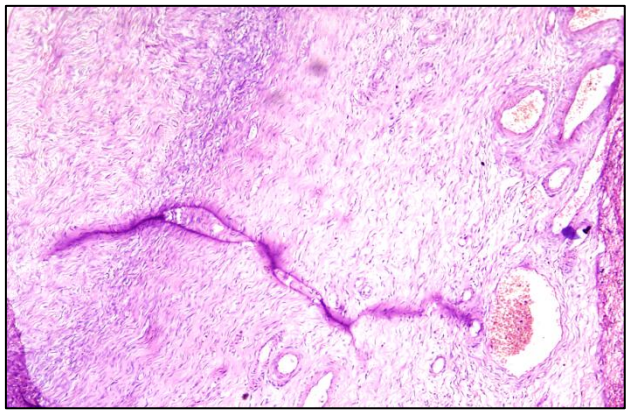


Fig 11: Photomicrograph showing histopathological features of Endometriotic cyst (H&E, X100).

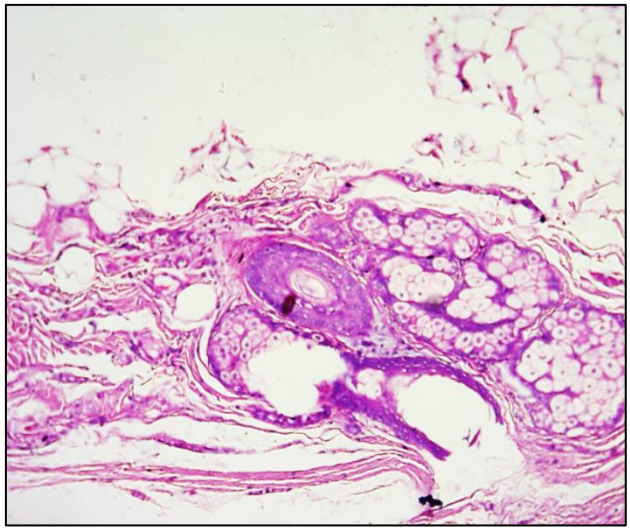


Fig 12: Photomicrograph showing histopathological features of Mature cystic teratoma of ovary (H&E, X100).

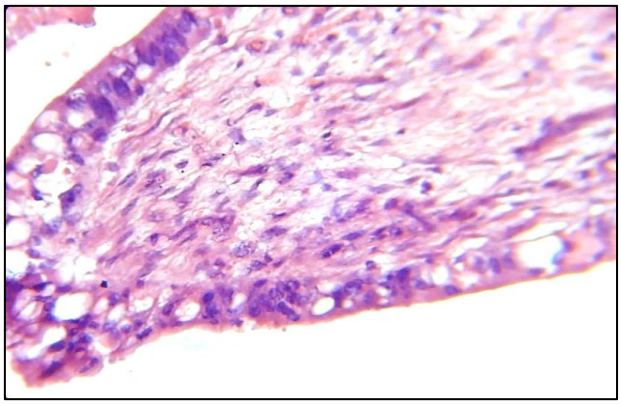


Fig 13: Photomicrograph showing histopathological features of Borderline mucinous cystadenoma of ovary (H&E, Mag: X400).

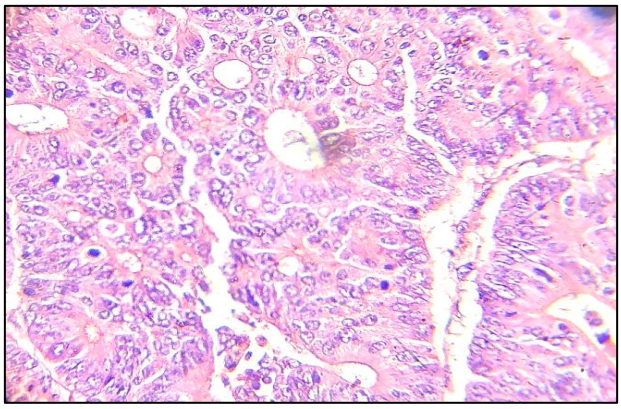


Fig 14: Photomicrograph showing histopathological features of Endometrioid adenocarcinoma of ovary (H&E, X400)

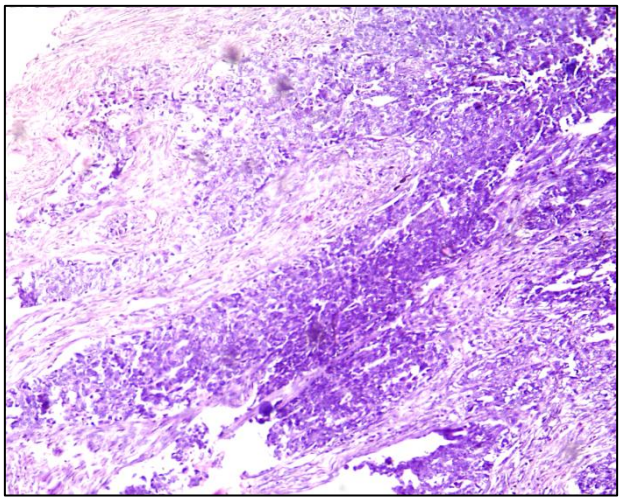


Fig 15: Photomicrograph showing histopathological features of High grade serous carcinoma of ovary (H&E, X100).

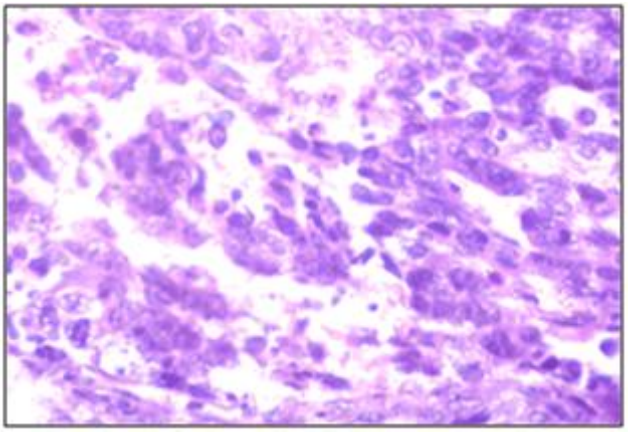


Fig 16: Photomicrograph showing pleomorphic nuclear features in High grade serous carcinoma (H & E, x400)

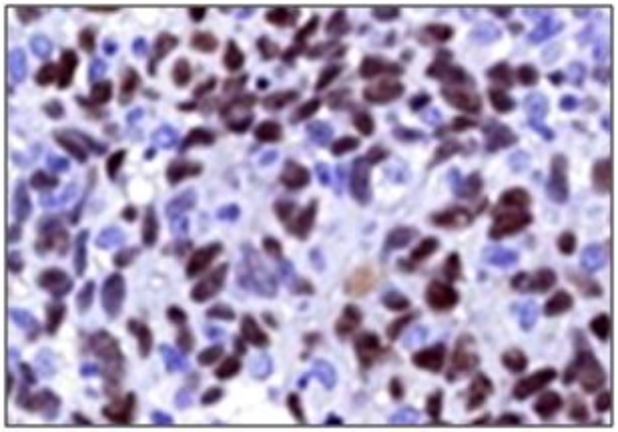


Fig 17: Photomicrograph showing pleomorphic nuclear features in High grade serous carcinoma (H & E,x400)

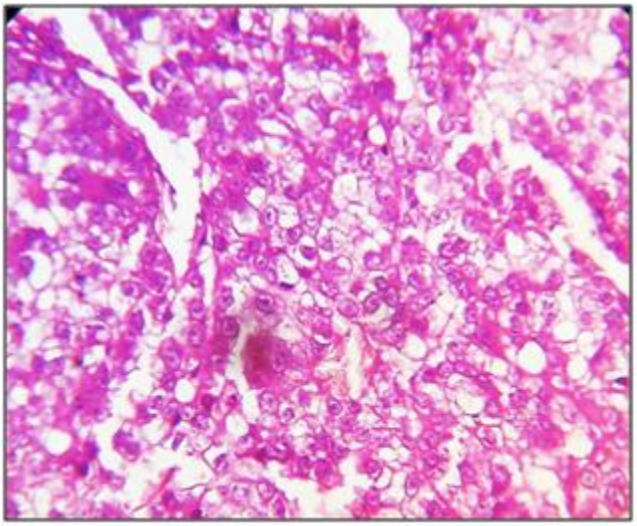


Fig 18: Photomicrograph showing histopathological features of Clear cell carcinoma of ovary (H&E, X400).

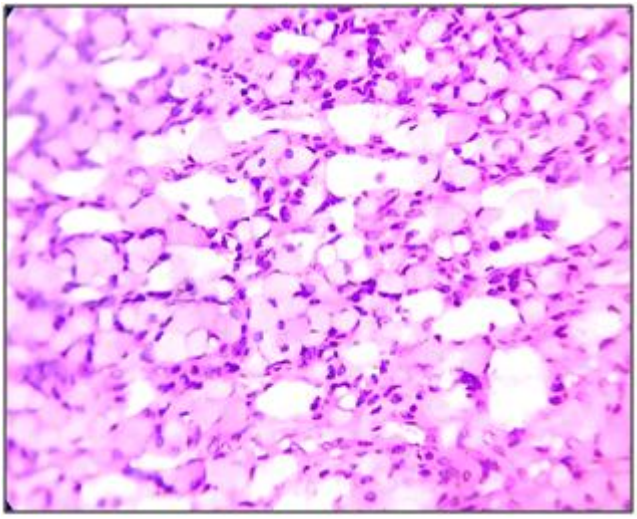


Fig 19: Photomicrograph showing histopathological features of Krukenberg tumour (H&E, X400).

Discussion

Of the 1223 cases of ovarian tumours, most ovarian neoplasms were unilateral (93%). Among all neoplasms 82.17% were benign, 0.07% were borderline, and 16.76% were malignant. Histo-logically, epithelial tumours were the most common (82.09%) followed by germ cell tumours (13.98%), sex cord– stromal tumours (2.2%), and metastatic tumours (1.71%).

In this study, the most common ovarian tumours were epithelial tumours (82.09%), followed by germ cell tumours (13.98%) and sex cord–stromal tumours (2.2%). Metastatic tumours were found to occur in 1.71% of the cases. Similar observations were made by Swamy and Satyanarayana[4], Gupta et al[5] and Pilli et al[6].

Most of the specimens received for histology of ovarian tumour were found to have benign neoplastic lesion (82.17%). As inferred from this study Serous Cystadenoma was found to be the most common benign ovarian tumour in this population. These were followed by endometriotic cysts in incidence. The most common germ cell tumour was benign mature cystic teratoma (156 cases). Similar results were reported by Yasmin et al[7] and Jindal[8].

In this study, 87 cases (7%) of bilateral ovarian tumours were seen. This incidence is lower than

21.8% and 13.04% reported by Kanthikar et al.[9] and Jha and Karki.[10]

The majority of the benign tumours occurred in the 20–49 years age group in the present study, and overall the carcinoma was more common at an older age than the benign tumours, present findings concurred with the similar observation made by Pilli et al.[6], Jha and Karki[10] and Shah and Hishikar.[11]

Serous tumours were the most common tumours encountered in the study accounting for 638 cases (52.16%), which is comparable to 50% as reported by Kanthikar et al.[9]

Mucinous tumours were seen in 14.88% (n=182) cases of all ovarian tumours, which is lower than the studies conducted by Kanthikar et al.[9] and Jha and Karki.[10]

In this study, 10 cases (0.8%) of granulosa cell tumours were seen, which was non concurrent to the study conducted by Zaman et al.[12]

Teratoma was the most common germ cell tumour found in this study constituting 13.32% (n=163) of all ovarian tumours, which is concurrent to the results observed by Ahmad et al.[13]

Serous carcinoma and Mucinous carcinoma being the commonest and second most common malignant tumours comprised 64.87% (n=133) and 11.70% (n=24) of the malignant cases respectively. This was found to be concurrent with Swamy and Satyanarayana[4] but non concurrent with a study by Rose et al.[14]

Tumours in the borderline category are characterized by epithelial proliferation greater than that of the benign tumour more than two layers and less than four layers stratification but an absence of destructive invasion of the stroma.[15] In our series of patients we encountered 13 cases of borderline ovarian tumours.

Metastases to the ovaries are relatively frequent with the most common being from the endometrium, breast, colon, stomach, and cervix. However, in present study we noted 12 cases of Krukenberg tumour and 8 cases of metastases from other sites.

Immunohistochemistry is an important diagnostic tool in evaluation of ovarian tumours.[16] It is especially useful in diagnosing tumours with follicles or other patterns which bring a sex-cord stromal tumour into differential.[17] We performed different immunohistochemical markers for proper diagnosis in some difficult cases.

The main strength of this study is the number of cases which give a most comprehensive picture of the current state of ovarian tumour incidence and histopathological pattern in urban population of West Bengal. The limitation of this retrospective study was that the clinical presentation of the patients and follow up status could not be ascertained due to limited availability of documentation.

Conclusion

It is concluded from this study that on morphological grounds, surface epithelium tumours are the most common variant of ovarian tumours. Benign ovarian tumours are commoner in reproductive age group patients, however with increasing age chances of malignant tumours increases. Therefore, suggested that efforts must be made to identify the risk factors for malignancy. As inferred from this study, ovarian neoplasms both benign and malignant can be specifically categorized into histomorphological subtypes in the light of WHO classification (2014).

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