ORIGINALARTICLE

Histopathological Spectrum of Ovarian Tumors: An Observational study

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Abstract:
Background: Ovarian tumors are a group of neoplasms with a wide range of characteristics and exhibit a diverse spectrum of features depending on the type of tumor. Ovarian cancer accounts for roughly 30% of all cancers of the female genital system. It is the fifth most common cause cancer related deaths in women. *Aim:* The aim was to study the histopathological spectrum of ovarian tumors according to WHO classification2020and to determine frequency as well as other parameters like age, laterality, gross appearance of tumors presenting to a tertiary care centre. *Materials and Methods*: Seventy samples were collected over a period of 2 years. All samples were processed for routine histopathology and immunohistochemistry (IHC) was done wherever required. The cases were reviewed and analysed for histopathological findings along with other parameters. *Results:* The current study included 70 cases, 37 (52.86%) cases were benign, 5 (7.14%) were borderline and 28 (40%) cases were malignant. The most common subtype was surface epithelial tumors comprising of 50 (71.43%)cases. Most tumors were presented in 3th and 4th decade. Around 84% tumors were unilateral while 16% tumors were bilateral.IHC was performed on 9 cases for confirmation of diagnosis. *Conclusions:* Among the histological subtypes surface epithelial tumors were the commonest ovarian tumors. Maximum number of tumors were unilateral and were seen in the age group of 31-40 years.

KeyWords: Histopathological spectrum, Immunohistochemistry, ovarian tumors.

Introduction:

Ovarian tumors are a group of neoplasms with a wide range of characteristics depending on the type of tumor. These tumors are divided into benign, borderline, and malignant subtypes. [1] Ovarian cancer accounts for roughly 30% of all cancers of the female genital system. [1, 2, 3] In women diagnosed with gynecological cancers, ovarian cancer is the leading cause of death. In general, it is the fifth most common cause of cancer related deaths in women. The majority of cases are presented at an advanced stage which results in poor disease outcome. The current screening tests have a low predictive value, which adds to poor outcome. [4, 5] In different area registries in India, the age-standardized incidence rate of ovarian cancer has been steadily increasing, ranging from 0.26 percent to 2.44 percent per year. [2, 6, 7] A cumulative increasing of ovulation cycles number has been linked to an increased risk of ovarian cancer according to epidemiological studies. Decreased ovulation, hormonal influences, multiple pregnancies and the use of oral contraceptives are thought to have a protective effect. [8] In about 90-95 percent of patients, epithelial ovarian carcinoma develops sporadically. It's thought that environmental and dietary factors play a role. Low parity, delayed childbearing, early menarche, and late menopause are all linked to an increased number of ovulation cycles. However, the most important risk factor for ovarian epithelial carcinoma is genetic factors. [8] One of the most difficult areas in the field of surgical gynecology is the accurate diagnosis of ovarian tumors and tumor-like conditions. This is because, in comparison to any other organ, the ovary produces a wide range of tumors in the body. [6] Ovarian tumors are a diverse group of neoplasms involving epithelial tissues, connective tissues, and specialized hormone-secreting germinal and embryonal cells, amongst other histological patterns. [7, 9] High-grade serous carcinoma is the most common histologic subtype of epithelial ovarian cancer. [10] The surface epithelium, germ cells, and sex-cord stromal cells are the three main histologic compartments in the ovary. Each compartment produces non-neoplastic and neoplastic lesions that are distinct.

[7] Because symptoms are vague and insidious in onset, ovarian tumors are often difficult to detect until they are advanced in stage or size. The ability to recognize the various histologic patterns of ovarian tumors is critical for both diagnosis and prognosis. [2] The present study was carried out to determine histopathological subtypes of ovarian tumors, classify them according to WHO classification 2020and to study other parameters like age, laterality, gross appearance. We also studied the IHC and histopathological findings in ovarian tumors wherever required.

Material and Methods:

A total of 70 cases of ovarian tumors were studied within the span of 2 years retrospectively in the Pathology Department, Bharati Vidyapeeth Deemed to be University Medical College and Bharati Hospital, Pune. Fresh slides were prepared from the paraffin embedded blocks and stained for H and E using standard protocols. Preserved gross specimens from the pathology department were examined for gross findings. Details like age, laterality were retrieved from the test requisition forms from histopathology record section. IHC was performed using the paraffin embedded blocks. IHC were carried out by standard protocols. All the data collected were studied for frequency and percentage were calculate

Results:

Table 1: Age Distribution of Ovarian tumors (In years)

	0-1	11-20	21-30	31-40	41-50	51-60	61-70	71-80	Total
SURFACE EPITHELIAL									
Benign serous cyst adenoma	-	-	-	5	2	1	-	-	8
Benign serous cystadenofibroma	-	-	1	1	1	-	1	-	4
Borderline serous tumor	-	-	1	2	-	-	-	-	3
Serous cystadenocarcinoma- High grade	-	-	-	1	1	5	3	2	12
Serous cystadenocarcinoma- Low grade	-	-	-	-	1	1	-	-	2
Benign mucinous cystadenoma	-	-	3	6	3	1	-	-	13
Benign mucinous cystadenofibroma	-	-	1	-	1	-	-	-	2
Borderline mucinous tumor	-	-	-	1	-	1	-	-	2
Mucinous carcinoma	-	1	-	-	1	-	-	1	3
Malignant Brenner tumor	-	-	-	-	1	-	-	-	1
Total	-	1	6	16	11	9	4	3	50
SEX CORD STROMAL									
Fibrothecoma	-	-	-	-	-	1	-	-	1
Granulose cell tumor	-	-	-	1	2	-	-	-	3
Gynandroblastoma	1	-	-	-	-	-	-	-	1
Juvennilegranuloca cell tumor	1	-	-	-	-	-	-	-	1
Total	2	0	0	1	2	1	0	0	6

GERM CELL									
Dermoid cyst	-	-	-	-	-	1	-	-	1
Dysgerminoma	-	1	-	-	-	-	-	-	1
Mature cystic teratoma	-	-	5	1	2	-	-	-	8
Yolk sac tumor	-	2	-	-	-	-	-	-	2
Total	0	3	5	1	2	1	0	0	12
SECONDARY									
Malignant metastatic	-	-	-	-	2	-	-	-	2
Grand Total	**2**	**4**	**11**	**18**	**17**	**11**	**4**	**3**	**70**

Most cases (18) of tumors were seen in the fourth decade of life (25.17%). Age of presentation ranged from 1-76 years. (Table 1) The patients were divided according to laterality, of total majority i.e., 59 (84.29%) tumors were unilateral while only 11 (15.71%) tumors were bilateral. Out of total 59 unilateral, 28 tumors were on right side, and 31 were on left side. In present study highest number of patients had cystic tumors 30 (42.86%), followed by solid tumors 27 (38.57%) and cystic solid tumors 13 (18.57%).Total 70 cases of ovarian tumors were studied. Out of 70 cases of ovarian lesions, 37 (52.86%) were benign, 5 cases (7.14%) were borderline and 28 cases (40.00%) were malignant.

Table 2: Types of Surface epithelial tumors

Types of Surface epithelial tumors	**N**	**%**
Benign serous cyst adenoma	8	11.42
Benign serous cystadenofibroma	4	5.71
Borderline serous tumor	3	4.28
Serous cystadenocarcinoma- High grade	12	17.14
Serous cystadenocarcinoma- Low grade	2	2.85
Benign mucinous cystadenoma	13	18.57
Benign mucinous cystadenofibroma	2	2.85
Borderline mutinous tumour	2	2.85
Mucinous carcinoma	3	4.28
Malignant Brenner tumor	1	1.42
Total	50	100

Table 3: Types of Germ cell tumors

Germ cell tumors	**N**	**%**
Mature cystic teratoma	9	12.85
Yolk sac tumor	2	2.86
Dysgerminoma	1	1.42

Table 4: Sex cord stromal tumors

Sex cord stromal	**N**	**%**
Granulosa cell tumor	3	4.29
Fibrothecoma	1	1.43
Gynandroblastoma	1	1.43
Juvenile granulosa cell tumor	1	1.43

There were 2 (2.86%) cases of malignant metastatic tumors.Immunohistochemistry was performed on a total of 8 cases, of which one was confirmed as malignant brennertumor, three were confirmed as adult granulosa cell tumor and one was confirmed as juvenile granulosa cell tumor. Two cases were confirmed as metastatic adenocarcinoma on IHC. In one case differential diagnosis of metastatic adenocarcinoma and malignant sex cord stromal tumor were given on histopathology as vimentin and CD99 was negative while CK20 was positive which confirmed the diagnosis of metastatic adenocarcinoma

Discussion: The ovary is subjected to monthly endocrine and traumatic insults during normal ovulatory cycles and Becomes susceptible to tumor genesis. [11] The most

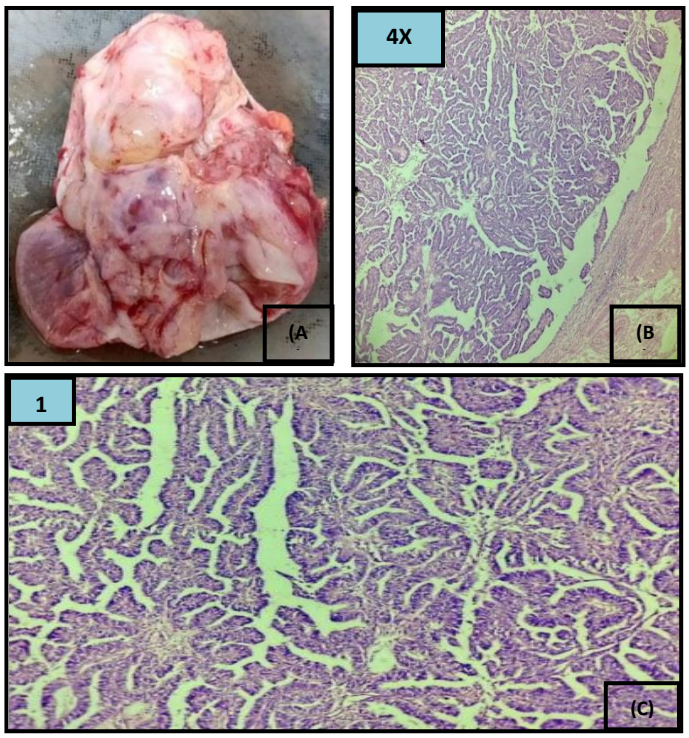

Figure 1: High grade serous carcinoma (A) Gross,(B) and(C) Microscopy

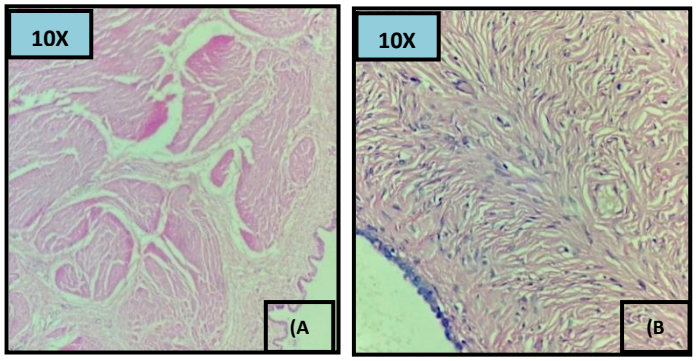

Figure 2: (A) Mucinous cyst adenoma (B) Serous cyst adenoma

fatal form of gynecological cancer is ovarian. Although it affects women of all ages, 55 to 64 years old are the most frequently diagnosed age group. [12, 13] Epithelial ovarian cancer, which affect mainly postmenopausal women, account for about 90% of tumors. Sex cord-stromal tumors, which secrete sex hormones and can develop at any age (most frequently in 5th decade) make up the remaining 5% of tumors, while germ cell

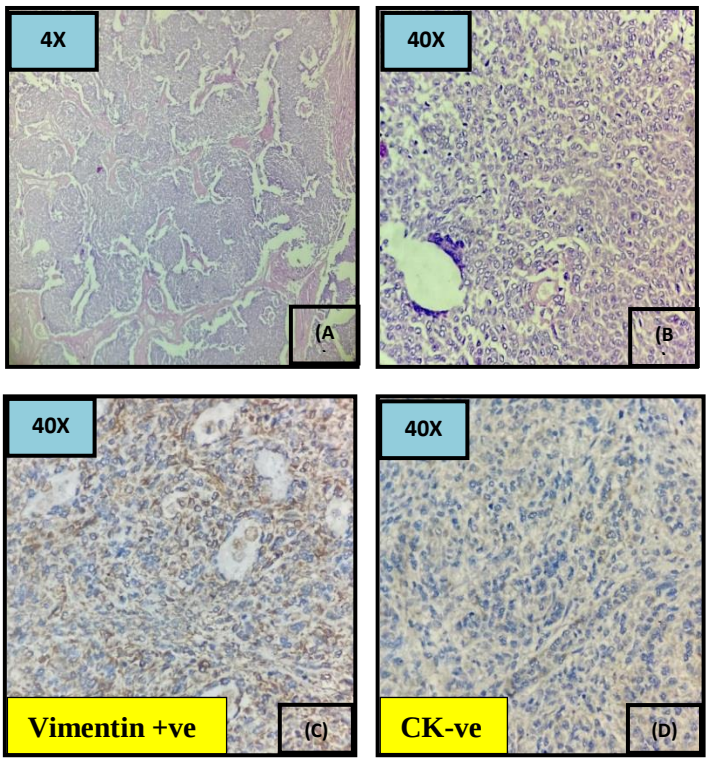

Figure 3: Granulosa cell tumor (A) and (B) Microscopy(C) Vimentin - positive (D) CK -negative

Tumors, which mostly affect women in their early 20s, account for the remaining 4%. [14, 15]

Ovarian cancer is the fifth-leading cause of cancer-related deaths in women,

despite having a lifetime risk of only 1.3% in the general population and only accounting for 1.3% of all new cancers. [16, 17]The present study evaluated the incidence of various types of ovarian cancers among 70 women with ovarian tumors, of which 37 (52.86%) were benign, 5 cases (7.14%) were borderline and 28 cases (40.00%) were malignant.

Although no age group is free from the tumors, different tumors tend to involve different age groups preferentially. In the present study the patients who had surface epithelial type of tumor were in their 30s and 40s. While for other types the distribution was almost uniform within the age groups. According to both the above mentioned studies the peak incidence was in 3rd and 4th decade of life, similar to present study. These findings are also similar to studies reported by Verma

A [21] et al and Jha R [22] et al in which the majority of patients were in the 31 to 40 age group.

Study name	Current study	Patel AS [18] et al	Ranjoalkar AP [19] et al	Sampurna K [20] et al
Total cases	70	162	138	200
Benign	52.9%	93.2%	68.1%	66%
Borderline	7.1%	0.6%	9.4%	3.5%
Malignant	40.0%	6.2%	22.5%	30.5%

The percentage of borderline tumors in the present study was 7.14% which was higher as compared to the study reported by Gupta SC [23] et al (4.1%) and Sampurna K [20] et al (3.5%).

The ovarian neoplasms typically manifest at stage III or stage IV and have poor prognosis. The USG, CT, and MRI findings can occasionally be deceptive, and cytology has its own limitations. Additionally, the prognosis is correlated with the histopathological type of the ovarian tumor. Therefore, Histopathological diagnosis has a deep impact on deciding possible treatment options.[1, 24]WHO classification of the ovarian tumors is based on the tissue of origin of the tumors which have been found to arise from one of the three ovarian components- (1) epithelium, (2) the germ cells and (3) the stoma of the ovary. Both primary and secondary tumors of the ovary are relatively frequent showing a variety of histopathological patterns. [25] followed by germ cell tumors and sex cord stromal

Further, Patel AS [18] et al and Bandla S [25] et al reported similar distribution of surface epithelial tumors, with majority having serous tumors followed by mucinous tumors, and as opposed to present study there was 1 case of transitional cell tumor reported by Patel AS [18] et al, while they also reported single case

al comprising 29.5% cases as opposed to 11.42% cases in the present study, while even higher incidence was reported by Pilli G [26] et al i.e. 31.2% and 39.5% by Tyagi SP [27] et al. Our findings were also similar to alcomprising29.5% cases as opposed to 11.42% cases in the present study, while even higher incidence was of Brenner tumor and 2 cases of Brenner tumor reported by Bandla S [25] et al. The distribution of germ cell tumor was also similar, but the proportions of sex stromal tumor were inverse, with fibroma being highest followed by granulosa cell tumor. tumors, with no metastatic tumors as reported by Patel AS [18] et al.

The primary objective of the present study was to analyse the incidences of various types of ovarian cancers as per WHO classification, of which surface epithelial tumors were reported to be most prevalence followed by germ cell tumors, sex cord stromal and secondary tumors. Among the total 50 ovarian tumors detected to be surface epithelial tumors, most (29 cases) were serous type, of which most (12 cases) were high grade-serous cystadenocarcinoma, followed by benign serous cyst adenoma, benign serous cystadenofibroma and borderline serous tumors. The mucinous type of tumors were followed by serous tumors, among which benign mucinous cyst adenoma was predominant (13 cases), followed by benign mucinous cystadenofibroma, borderline mucinous tumors and mucinous carcinoma. While there was only 1 case of malignant Brenner tumor.Out of 12 patients reported with germ cell tumors, 9 were diagnosed as mature cystic teratoma, other 2 were yolk sac tumor and the remaining 1 case diagnosed as dysgerminoma. There were 6 patients who had sex cord stromal tumors, of which gramulosa cell tumors being the commonest. There were 2 cases reported to have secondary i.e. malignant metastatic tumors.(metastatic adenocarcinoma colon).Immunohistochemistry with different markers was performed on total of 9 cases, and the IHC diagnosis was correlated with the histopathological diagnosis. Similar to findings of present study, Patel AS [18] et al and Bandla S [25] et al also concurred that majority of ovarian neoplasms being surface epithelial tum

Reported by Pilli G [26] et al i.e. 31.2% and 39.5% by Tyagi SP [27] et al. Our findings were also similar to that of studies by Shaikh NA [31] et al and Mode Palli N[29] et al.The gross features of ovarian tumors, indicated highest number of patients having cystic tumors, followed bysolid tumors and cystic solid

tumors. According to laterality (28- right side, and 31- left side), majority tumors were unilateral while only 15.71% were bilateral. While Sampurna K [20] et al reported similar unilateral distribution at right and left side tumors, with 12% being bilateral. The majority of tumors (nearly 60%) in their study were cystic and only 8% were solid and rest were solid and cystic.

The benign and borderline tumors in a study of Ranjoalkar AP [19] et al were unilateral, however whereas malignant tumors presented with nearly equal number of unilateral and bilateral cases.

Conclusion:

Our study demonstrated a wide range of ovarian tumors. In present study ovarian tumors were classified according to WHO classification. Benign tumors were more common than malignant. Surface epithelial tumors were the commonest (52.86%)followed by germ cell tumors. Most of the tumors were seen in the fourth and fifth decade. Bilateral tumors were uncommon. In current study immunohistochemistry was helpful in some cases where differentials were given on histopathologic study and diagnosis confirmed on IHC. Accurate histopathological diagnosis along with clinical staging can help in prompt and appropriate treatment of ovarian tumors

Conflict of Interest - Nil

Sources of Support- Nil

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