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HISTOMORPHOLOGICAL SPECTRUM OF OVARIAN LESIONS IN A TERTIARY CARE HOSPITAL- A RETROSPECTIVE STUDY

Pathology

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ABSTRACT

Background: Ovarian cancers account for 3% of all cancers in females. Variety of lesions can arise from it. Ovarian lesions are generally categorized into non-neoplastic and neoplastic lesions. Age of the patient is one of the important clinical feature. Among neoplastic lesions, about 80% were benign which were seen in reproductive group between the ages of 20 and 45 years. Borderline tumors are seen in slightly older age group. Malignant tumors are seen in perimenopausal and postmenopausal age group (41-50 years).

Objective: The main objective of this study is to analyze the histomorphological spectrum of ovarian lesions and correlate the incidence with particular age group.

Materials and Methods: This study was done in Department of Pathology tertiary care hospital, during the period of two years from June 2018 to May 2020. Total 190 cases were analyzed.

Results: Out of 190 cases, 109 cases were neoplastic and 81 cases were non-neoplastic. The most common non-neoplastic lesion was corpus luteal cyst followed by follicular cyst. Among neoplastic lesions, 83 were benign, 2 were borderline and 24 were malignant lesions. Ovarian lesions were classified according to WHO 2014 classification. The surface epithelial tumors were the most common followed by germ cell tumor, sex cord stromal tumor and metastatic tumor. Serous cystadenoma was the most common benign surface epithelial tumor followed by mucinus cystadenoma. Mature cystic teratoma was the most common germ cell tumor. Among malignant tumors serous cystadenocarcinoma was the most common followed by mucinous carcinoma.

Conclusion: Ovary has a complex architecture with different cell type and has a broad group of lesions from non-neoplastic to neoplastic. Both non-neoplastic and neoplastic lesions often present with similar clinical, surgical and radiological features and for that histopathological examination is essentially important to diagnose and predict the prognosis

KEYWORDS

Ovarian lesions, non-neoplastic, neoplastic, surface epithelial tumors

INTRODUCTION

Ovarian cancer has emerged as one of the most common malignancies affecting women in India and has shown an increase in the incidence rates over the year [1]. Ovarian cancers accounts for 3% of all cancers in females and is fifth most common cause of death due to cancer in women in the United States [2]. Ovary is unique as variety of lesions can arise from it. Age of the patient is one of the important clinical feature as one out of eight ovarian tumors is malignant in patients less than 45 years of age; by contrast, the proportion is one to three in older women[3]. There are numerous types of ovarian tumors. About 80% are benign, and these occur mostly in young women between the ages of 20 and 45 years. Borderline tumors occur at slightly older ages. Malignant tumors are more common in older women, between the ages of 45 and 65 years [2].

Generally ovarian lesions are categorized in non-neoplastic and neoplastic lesions. Classification of ovarian tumors primarily based on morphology, the fundamental premise that the ovary contains four major types of tissue, all of which can give rise to variety of neoplasm. These four tissue types are: Surface or germinal epithelium, Germ cells, Sex cord cells and Ovarian stroma [4].

As there is no screening modalities in ovarian tumors, unknown precursor lesions with no specific clinical feature is often missed or patient present at an advanced stage with nonspecific symptoms which is associated with poor prognosis.

Most ovarian tumors cannot be confidently differentiated from one another by their gross and clinical features alone. These provide diagnostic clue in some cases, but to establish a correct diagnosis and to decide an appropriate treatment modality clinician and the pathologist should share possibly their valuable information [3].

The aims and objectives of this study is to analyze the histomorphological spectrum of ovarian lesions (both non-neoplastic and neoplastic) and correlate the incidence with particular age group.

I. MATERIAL AND METHODS

This retrospective study was carried out in Department of Pathology during the period of two years from June 2018 to May 2020.

A total number of 190 cases of ovarian lesions were studied. Clinical data were available from histopathology requisition forms of the patients presented with ovarian lesions.

Study Design: Retrospective Study

Study Location: This was a tertiary care teaching hospital based study done in Department of Pathology, at GCS Medical College Hospital and Research Centre, Ahmedabad, Gujarat.

Study Duration: June 2018 to May 2020.

Sample size: 190 patients.

Inclusion criteria:

1. All specimens of ovarian lesion (both non-neoplastic and neoplastic) sent to Department of Pathology.
2. Hysterectomy specimens with ovarian lesions were also included in the study.

Exclusion criteria:

1. Previously treated cases of ovarian lesions with recurrence.
2. Reports which were inconclusive

Procedure methodology

After receiving the specimen in histopathology section, tissue was fixed in 10% formalin for 24 to 48 hours. Gross features of specimen were noted and sections were taken from multiple representative areas for processing. Routine Paraffin blocks were made and sectioned at 3-5 micron thickness, stained with routine Hematoxylin and Eosin (H&E). Special stain like Periodic Acid Schiff (PAS) was done whenever required. The lesions were then classified and studied according to WHO classification (2014) of ovarian tumors [5].

Statistical analysis
Microsoft Office excel 2007

II. RESULT

The present study was done from June 2018 to May 2020. The total number of 190 cases were studied at the Department of Pathology. Of these 109(57.4%) cases were neoplastic lesion whereas 81(42.6%) cases were non -neoplastic lesions.

Morphological distribution of neoplastic ovarian lesions:
Of these 109 cases of neoplastic lesions, 83 cases (76.14%) were benign, 2 cases (1.8%) were borderline and 24 cases (22.01%) were malignant in the present study (Table 1).

Table 1: Morphological distribution of neoplastic ovarian lesions.

Morphological distribution of neoplastic ovarian lesions		
Type	**No of cases**	**Percentage**
Benign	83	76.14
Borderline	02	1.8
Malignant	24	22.01
TOTAL	109	57.4

Age wise distribution of all ovarian lesions:
Table 2 shows age wise distribution of ovarian lesions. According to these majority of lesions were seen in age group of 41-50 years consisting of 51 (26.8%) cases followed by 21-30 years consisting of 48 (25.2%) cases.

Non-neoplastic lesions were seen in almost all age group but majority were seen in the 41-50 years of age group and accounting for 17.3% of occurrence.

Among neoplastic lesions, peak incidence of the benign lesions was seen in the age group of 21-30 years (14.7%) followed by 31-40 years (10.0%). Two cases of borderline lesions were seen, one in 21-30 years age group and other in 41-50 years of age group; that is 1.04% of total occurrence.

Majority of the malignant lesions were found in perimenopausal and postmenopausal age group that is 41-50 years (3.15%) and 51-60 years (4.21%). In our study the youngest age of patient was 15 years old with unilateral mature cystic teratoma while the oldest patient was 76 year old with unilateral papillary serous cystadenoma.

Table 2: Age wise distribution of all ovarian lesions.

Age group (years)	No of non-neoplastic lesion (%)	No of Benign neoplastic lesion (%)	No of Borderline neoplastic lesion (%)	No of Malignant neoplastic lesion (%)	Total no (%)
0-20	3(1.57)	3(1.57)	0(0.0)	0(0.0)	6 (3.15)
21-30	16 (8.42)	28 (14.7)	1(0.52)	3(1.57)	48(25.2)
31-40	24 (12.6)	19 (10.0)	0(0.0)	4(2.10)	47 (24.7)
41-50	33 (17.3)	11 (5.78)	1(0.52)	6(3.15)	51 (26.8)
51-60	6(3.15)	13 (6.84)	0(0.0)	8(4.21)	27 (14.2)
61-70	0(0.0)	5(2.63)	0(0.0)	3(1.57)	8 (4.21)
>70	0(0.0)	3(1.57)	0(0.0)	0(0.0)	3 (1.57)
Total	82 (43.15)	82 (43.15)	2(1.05)	24 (12.6)	190 (100)

Relationship of laterality and size with ovarian lesions:
In present study, out of 190 cases only 20 cases were bilateral. Out of which 7 cases were bilaterally malignant. Most of the non-neoplastic and benign lesions were unilateral.

Dimensions of the lesions were taken. Most of the lesions having size <4 cm were non-neoplastic and the largest one (>20cm) belonged to benign mucinous lesion (Table 3).

Table 3: Relationship of laterality and size with ovarian lesions.

Ovarian lesion	Laterality		Size			
	Unilateral	Bilateral	<4.0 cm	5.0-9.0 cm	10.0-19.0 cm	>20 cm
Non-neoplastic	75	06	68	20	03	00
Benign	76	07	15	41	23	08
Borderline	02	00	00	00	01	01
Malignant	17	07	11	07	09	03
Total	170	20	94	68	36	12
	n= 190	n = 210				

Macroscopy of ovarian lesions:
Macroscopically all the lesions were analyzed based on cut section as cystic, solid, partly cystic and partly solid in consistency. In present study, 69.47% of lesions were cystic, 8.42% of lesions were solid and 22.1% cases were partly solid and partly cystic in consistency. Majority of the non-neoplastic and benign lesions were found cystic in consistency whereas majority of malignant lesions were partly solid and partly cystic in consistency followed by solid in consistency (Table 4).

Table 4: Macroscopy of ovarian lesions.

Type of lesion	Cystic	Solid	Cystic + Solid	Total
Non-neoplastic	62	5	14	81
Benign	67	2	14	83
Borderline	1	0	1	2
Malignant	2	9	13	24
Total	132	16	42	190
Percentage	69.47	8.42	22.1	100

Histomorphologic distribution of non-neoplastic lesions:
Table 5 showed frequency of non-neoplastic ovarian lesions. Most common non-neoplastic lesion was corpus luteal cyst (34.5%), followed by follicular cyst (28.3%) and endometriosis (19.7%).

Table 5: Histomorphologic distribution of non-neoplastic lesions.

Non-neoplastic lesion	No. of cases (%)
Corpus luteal cysts	28 (34.5)
Follicular cysts	23 (28.3)
Endometriosis	16 (19.7)
Simple cyst	11 (13.5)
Benign Hemorrhagic cyst	03 (3.7)
Total	81

Histomorphologic distribution of neoplastic ovarian lesions:
In the study, the ovarian lesions were classified according to WHO classification of ovarian tumors 2014 [5]. According to table 6, the surface epithelial tumor was the commonest group of ovarian tumor with 78 cases accounting for 71.55% of all neoplastic lesions followed by germ cell tumor with 25 cases accounting for 22.9% of all neoplastic lesions.

The commonest benign surface epithelial tumor was the serous cystadenoma (39 cases, 35.77%) followed by mucinous cystadenoma (18 cases, 16.5%). Among two cases of borderline tumors, one was serous (0.91%) type whereas other one was mucinous (0.91%) type.

Among malignant surface epithelial tumors, serous cystadenocarcinoma (15 cases, 13.7%) was the commonest tumor followed by mucinous carcinoma (4 cases, 3.66%).

Among germ cell tumors; 24 cases (22.01%) presented as benign mature cystic teratoma or dermoid cyst. One case (0.91%) was reported as immature teratoma of all neoplastic lesions.

Total 5 cases were found as sex cord stromal tumor (SCST), out of which 2 cases were benign fibroma (1.83%) and 3 cases were granulosa cell tumor (2.75%).

There was one case from metastatic tumor (metastasis from carcinoma breast) accounting for 0.91% of all neoplastic lesions.

Table 6: Histomorphologic distribution of neoplastic ovarian lesions.

Histological types	No. of cases (%)
Surface epithelial tumor	**78 (71.55)**
Serous Cystadenoma	39 (35.77)
Borderline Serous Tumor	01 (0.91)
Serous Cystadenocarcinoma	15 (13.7)
Mucinous Cystadenoma	18 (16.5)
Borderline Mucinous Tumor	01 (0.91)
Mucinous Carcinoma	04 (3.66)
Germ cell tumor	**25 (22.9)**
Mature Cystic Teratoma	24 (22.01)
Immature Teratoma	01 (0.91)
Sex cord-stromal tumor	**05 (4.58)**
Fibroma	02 (1.83)

Granulosa Cell Tumor	03 (2.75)
Secondary tumor	01 (0.91)
Metastasis	01 (0.91)

III. DISCUSSION

Ovarian lesions form a complex group of lesions and have a broad spectrum of clinical and histopathological features. Because of similar clinical presentations, there is confusion in diagnosis of neoplastic and non-neoplastic lesions of ovary as it is diagnosed as a cystic or a mass lesion on Ultrasonography (USG). In our study, a total 190 cases were evaluated. Age of patients ranged from 15 to 76 years.

Table 7: Comparision of percentage distribution of cases in various age groups with different study and present study.

Author	Age group in years						
	0-20	21-30	31-40	41-50	51-60	61-70	>70
Anugnya P Ranjoalkar [6]	4.34%	13.8%	26.84%	26.08%	15.94%	10.14%	2.89%
R Jha et al [7]	6.8%	20.5%	26.7%	21.1%	14.3%	10.6%	--
Nehal Ahmed et al [8]	5.5%	32.5%	23.0%	24.0%	11.5%	2.0%	1.5%
Dhakal R [9]	8.3%	19.0%	33.4%	31.0%	7.1%	1.0%	--
Gupta et al [10]	14.6%	24.1%	24.1%	20.8%	14.1%	0.9%	1.4%
Present study	3.15%	25.2%	24.7%	26.8%	14.2%	4.21%	1.57%

In our study the most common age group affected was 41-50 years followed by 21-30 and 31-40 years. Both non-neoplastic and neoplastic lesions were common to these age groups and these results were consistent with studies done by Anugnya P Ranjoalkar[6], R Jha et al [7] and Dhakal R[9], whereas studies done by Nehal Ahmed et al[8] and Gupta et al[10] showed most common affected age group between 21 to 30 years. [Table 7]

In our study, out of 190 cases, 170 cases were unilateral (89.47%) and only 20 cases were found bilateral (10.52%). These findings were consistent with studies done by Gupta et al [10] (87.7% unilateral, 12.3% bilateral), Prakash A et al [11] (90.8% unilateral, 9.2% bilateral) and Nehal Ahmed et al [8] (89.5% unilateral,10.5% bilateral) . Kar et al [12] and Dhakal R [9] showed more number of bilateral lesions compared to present study(26.8% and 21.8% respectively).

On gross examination, majority of the lesions had cystic consistency (69.47%) followed by partly cystic and partly solid consistency (22.1%). These results were consistent with studies done by Gupta et al [10] and with Couto F et al [13]. Whereas Amod S[14] showed more number of cases having solid consistency (22.39%) compared to present study (8.42%).

In present study, corpus luteal cyst was the most common non-neoplastic lesion (34.5%) followed by follicular cyst (28.3%) which is in concordant with study done by Fatima et al [16]. These results were contradictory with study done by Gurung P et al [15] which showed endometriosis as most common non-neoplastic lesion (17.0%) followed by follicular and corpus luteal cyst (10.4%,9.6% respectively).

Table 8: Comparison of frequency of Benign, Borderline and Malignant tumors with various studies.

Author	Morphology of lesions		
	Benign	Borderline	Malignant
Pilli et al [17]	75.2%	2.8%	21.9%
Kanthikar S N et al [18]	78.57%	1.42%	20.0%
Gupta et al [10]	63.7%	5.2%	31.1%
Fatima et al [16]	72.0%	2.0%	11.0%
Amod S [14]	75.7%	6.1%	18.2%
Dr Ashok Panchonia et al [19]	58.0%	4.0%	38.0%
Anugnya P Ranjolkar [6]	68.12%	9.42%	22.5%
Present study	**76.14%**	**1.8%**	**22.1%**

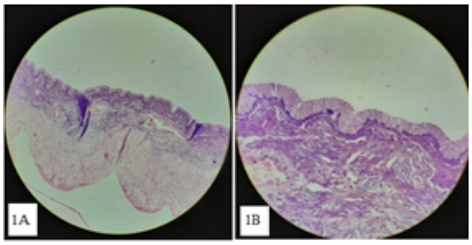
In present study, out of 109 neoplastic cases 76.14% were benign, 1.8% were borderline and 22.1% were malignant lesions.

Comparative analysis done with various studies is shown in Table 8. The results were similar with other studies where benign tumors were more common than malignant tumors. While results were contradictory to studies done by Gupta el al [10] and Dr Ashok Panchonia et al [19] where malignant lesions were comparatively high (31.1% and 38.0% respectively).

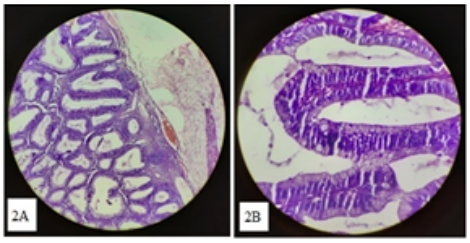
Table 9: Comparison of neoplastic ovarian lesions based on cell of origin with various studies.

Author	Histopathological type			
	Surface epithelial tumor	Germ cell tumor	Sex cord stromal tumor	Metastatic tumor
Pilli et al [17]	70.9%	21.2%	6.7%	0.70%
DrAshok Panchonia et al [19]	68.0%	24.7%	6.1%	1.23%
Gupta et al [10]	71.7%	22.2%	3.8%	2.3%
R Jha et al [7]	52.2%	42.2%	3.1%	2.5%
Garg Neha et al [20]	70.6%	18.8%	8.2%	2.4%
Vinitha [21]	71.4%	23.2%	23.2%	5.3%
Present study	**71.55%**	**22.9%**	**4.58%**	**0.91%**

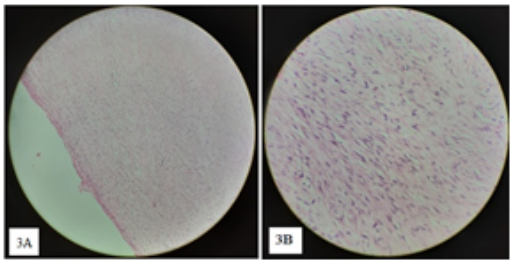
In present study, ovarian lesions were classified according to WHO 2014 classification [5]. The surface epithelial tumor was the most commom (71.55%) followed by germ cell tumor (22.9%), sex-cord stromal tumor (4.58%), metastatic tumor (0.91%). These observations were consistent with studies done by Dr.Ashok Panchonia et al[19], Pilli et al [17] , Gupta et al [10] and Garg Neha et al [20] . Contradictory findings were seen in studies done by R Jha et al [7] which showed more incidence of germ cell tumors (42.2%) and by Vinitha [21] showed more number of sex cord stromal tumor (23.2%) compared to present study [Table 9].



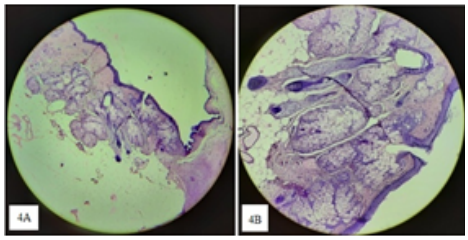
Mucinous cystadenoma of ovary : Low power view(Figure 1A; H&E,10X) and High power view (Figure 1B; H & E,40X) showing cyst lined by tall columnar mucinous epithelium with apical mucin and basally located nuclei.



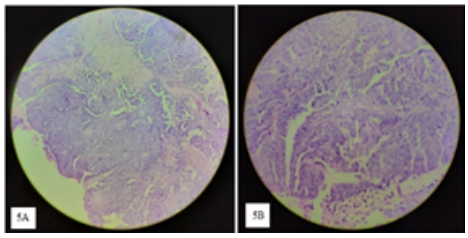
Mucinous carcinoma Ovary: Low power view (Figure 2A; H&E,10X) showing crowded gland with little stroma. High power view (Figure 2B; H & E,40X) showing cyst lined by cells with abundant mucin and highly stratified; nuclei highly atypical.



Fibroma, Ovary: Low power view (Figure 3A; H&E,10X) and High power view (Figure 3B; H & E,40X) showing spindle cell with bland nuclei & scant cytoplasm arranged in intersecting bundles.



Mature cystic teratoma, Ovary: Low power view (Figure 4A; H&E,10X) and High power view (Figure 4B; H & E,40X); showing cyst wall lined with keratin material & sebaceous gland.



Serous Cystadenocarcinoma: Low power view (Figure 5A; H&E,10X) and High power view (Figure 5B; H & E,40X) showing tumour cells infiltrating into stroma.

In our study, among individual lesions benign serous cystadenoma was the most common surface epithelial tumor accounting for 35.77% followed by mucinous cystadenoma (Figure 1A & 1B) accounting for 16.5% of all neoplastic lesions. Similar findings were seen in studies done by Pilli et al [17] , Kanthikar et al [18] , and Gupta N et al [10] .

Most common germ cell tumor in our study was mature cystic teratoma (Figure 4A & 4B), consisting 22.01% of all neoplastic lesions which is comparable to studies done by Kanthikar et al [18] and Pilli et al [17] .

Borderline tumors have favorable prognosis because of low malignant potential. In present study two (1.8%) cases of borderline tumors were found.

In present study serous cystadenocarcinoma (Figure 5A & 5B) was the most common malignant tumor accounting for 13.7% followed by mucinous cystadenocarcinoma (Figure 2A & 2B) accounting for 3.66% of all neoplastic lesions. The result was close to the study done by Kanthikar et al [18] who reported serous cystadenocarcinoma 8.51% and mucinous cystadenocarcinoma 4.28%. The result contradicts with the study done by Gupta et al [10] who showed higher percentage of serous cystadenocarcinoma (31.8%) and mucinous cystadenocarcinoma (19.7%) compared to present study.

Metastases to ovary are relatively frequent and derived from tumors of mullerian origin: the uterus, fallopian tube, contralateral ovary or pelvic peritoneum. The most common extra-mullerian tumors metastatic to ovary are carcinoma of breast and gastrointestinal tract including colon, stomach, biliary tract and pancreas [2].

In our study metastatic tumor consisting of 0.91% of all neoplastic lesions and the results were consistent with the studies done by Dr Ashok panchonia et al [19] and Pilli et al [17] which showed 1.23% and 0.7% of metastatic tumors respectively. Among sex-cord stromal tumors, two cases of fibroma (Figure 3A & 3B) and three cases of granulosa cell tumor were diagnosed.

IV. CONCLUSION

In our study we have compared these lesions with parameters like patient's age, laterality of the lesion, gross findings like size and consistency of the lesions and different histological subtypes which are comparable to various studies.

It is concluded from the study that benign tumors occur in all age groups whereas malignant tumors were more common above 40 years of age. Most common non-neoplastic lesion was corpus luteal cyst. The most common type of ovarian lesion was surface epithelial tumor. On considering the individual lesions, most common ovarian tumor as well as overall most common benign ovarian lesion was serous cyastadenoma. Most common malignant tumor was serous cystadenocarcinoma.

Differentiation of non-neoplastic and neoplastic as well as benign neoplastic lesions from malignant neoplastic lesions is important for determining management and prognosis. This would help to plan the line of treatment and also have prognostic significance. Diagnosis may be supplemented by using newer diagnostic modalities like immunohistochemistry (IHC).

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