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HistopathologicalSpectrum of Ovarian Tumors-A Three Year Retrospective Study

Dr.Beulah Priscilla M[1],Dr.Kusaraju Pyla[2], Dr.Sindhura Manda[3*], Dr.SatyanarayanaraoP[4], Dr.Vijayabhaskar R[5]

[1](Assisstant professor, Department of Pathology, Rangaraya medical college, Dr.NTR University, India)
[2](3rd year postgraduate, Department of Pathology, Rangaraya medical college, Dr.NTR University, India)
[3*](2nd year postgraduate, Department of Pathology, Rangaraya medical college, Dr.NTR University, India)
[4](Associate professor, Department of Pathology, Rangaraya medical college, Dr.NTR University, India)
[5](Professor and HOD, Department of Pathology, Rangaraya medical college, Dr.NTR University, India)
[*]Corresponding author: Dr.Sindhura Manda[3]

Abstract
Context: *Ovarian tumours represent about 30% of all cancers of the female genital system. They manifest in a wide spectrum of clinical, morphological and histological features.*
Aim: *To evaluate the incidence of ovarian tumors with respect to age, laterality, gross features, biological nature and to classify different histological types according to recent WHO classification (2014) in the population attending our hospital.*
Materials and Methods: *This retrospective study included 191 cases of histologically proven ovarian tumours, over a period of three years. These were reclassified according to WHO classification of ovarian tumours 2014.*
Results:*Both benign and malignant tumors were common among 4th to 5th decades. Out of 191 cases studied, Surface epithelial tumors were the commonest tumors (154; 80.6%) followed by germ cell tumors (25; 30.5%). Mucinous cystadenoma was the commonest benign tumour whereas serous cystadenocarcinoma was the commonest malignant ovarian tumour.*
Conclusions: *The prognosis and varying therapeutic strategies of ovarian tumours necessitate an accurate pathological evaluation. Although newer techniques like IHC and molecular analysis have made the diagnosis easier and more precise, in the institutes with provision of limited resources, histopathological study is still the gold standard in diagnosing most of these tumours.*
Key Words: Ovarian tumors, 2014 WHO Classification, Histopathology

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I. Introduction

Ovarian tumors are one of the common neoplasms in women representing about 30% of the cancers of female genital tract .[1]They were the fifth leading cause of cancer related deaths in women.[2] Given the location of these paired organs and the mildness of symptoms associated with them, these lesions usually attain a fairly large size before they are detected and removed. [3]

The complex anatomy of the ovary and its peculiar physiology with the constant endocrine and traumatic insults during normal ovulatory cycles from puberty to menopause give rise to various cell types, each of which is susceptible to tumorogenesis.[4]Tumors of the ovary are diverse pathological entities owing to their respective histogenesis from the multipotent surface (coelomic) covering epithelium , the totipotent germ cells,and the multipotentsexcord/stromal cells which constitutes the normal ovary.80% of the ovarian tumors are benign which occur in third to fifth decade and malignant tumors are common in fourth to sixth decades of life.[1]

Cytology and newer techniques in imaging and genetics has their own limitations and histopathology still remains the mainstay in diagnosing and typing of various entities of ovarian tumours and thus plays a vital role in targeted therapy and prognostication.[2]

II. Material And Methods

Study Design

This retrospective study was conducted over a period of three years from July 2015 to June 2018 in the Department of Pathology, Rangaraya Medical College, Kakinada, Andhrapradesh . All the specimens of ovarian tumors received as oophorectomy, salpingo-ophorectomy and as part of total abdominal hysterectomy with salpingo-ophorectomy (TAH+BSO) were fixed in 10% formalin. Important gross features were noted and care

was taken to include all the possible areas mentioned in Tata memorial grossing protocol followed by routine processing techniques and were stained with hematoxylin and eosin (H&E).

Data collection

Inclusion criteria

All histologically proven primary and secondary ovarian tumors were included in the study

Exclusion criteria

The normal ovaries and non neoplastic findings like follicular cyst, cystic follicles, hemorrhagic inclusion cyst, endometriosis, ectopic pregnancy were excluded from the study.

Statistical Analysis

Final results were analysed and the data was prepared to study the incidence of ovarian tumors with respect to age, laterality, gross features, biological nature and to classify different histological types according to recent WHO classification (2014).

III. Results

A total of 191 cases of ovarian tumors were analysed over a period of three years. ovariantumors showed a wide range from 8 -70 yrs. Both benign and malignant tumors were common among 4th to 5th decades of life.
[Fig 1].

Most of the cases in our study were unilateral (181; 94.7%) and few were bilateral (10; 5.23%). [Fig 2]. These included 189 cases of primary ovarian tumors and two cases of metastases to ovary.

Surface epithelial tumors (80.6%) were the most common histological type followed by germ cell tumors (13.1%) and sex cord stromal tumors (4.7%) [Fig 3].

Most of the cases were benign in Surface epithelial (83.7%), germ cell (72%) and sexcord stromal tumors(66.7%). Mucinous Borderline tumors were more common than serous borderline tumors in our study. Malignant tumors were most common in Sex cord stromal tumors (33.3%) followed by germ cell (28%) and epithelial cell tumors (11%). [Fig 4]

Figure 1: Age distribution

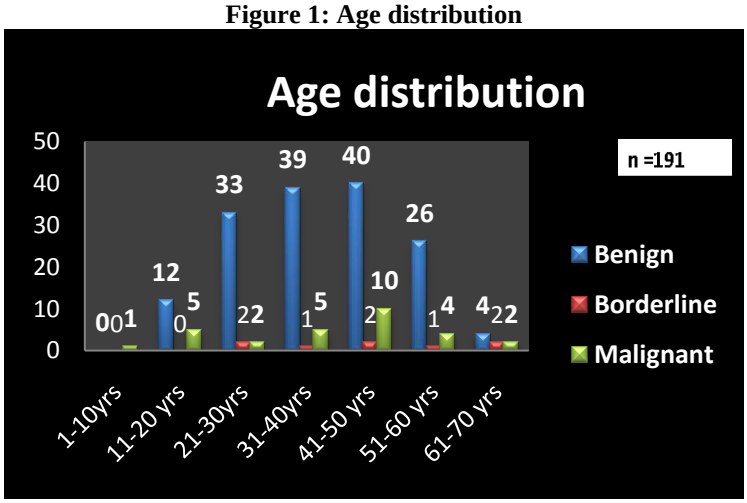


Figure 2: Frequency of ovarian tumors based on laterality

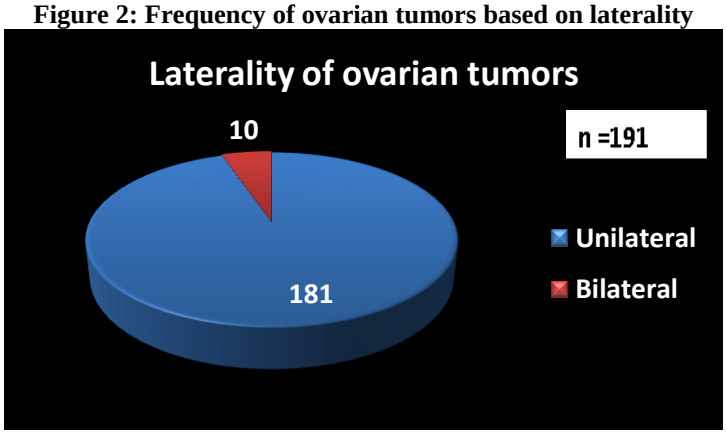


Figure 3: Frequency of histological types of ovarian tumors based on cell of origin

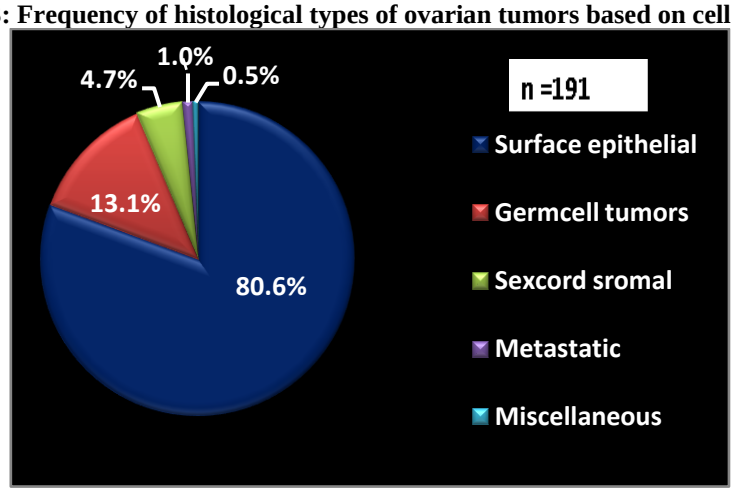
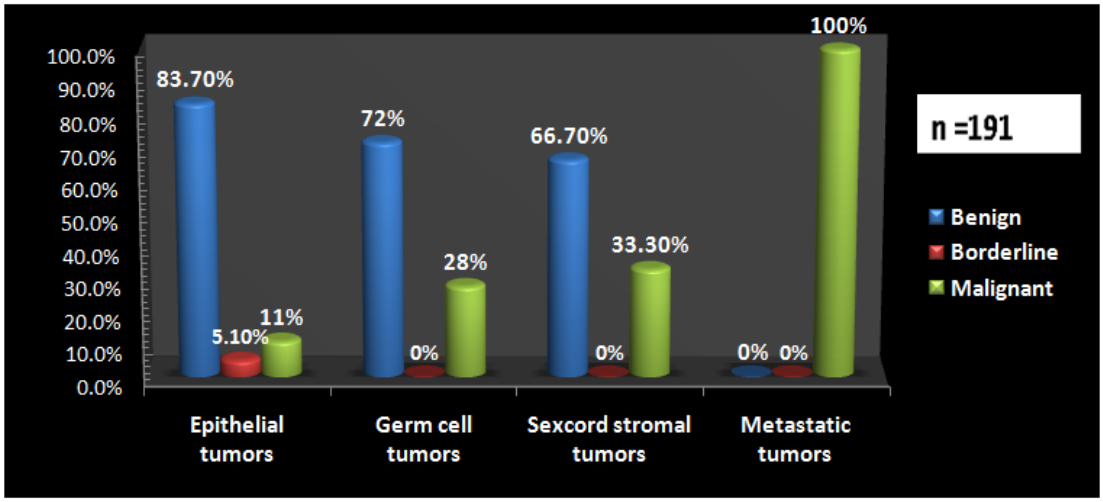


Figure 4: Frequency of benign, borderline and malignant tumors among the histological types



Out of 154 Epithelial tumours, 95.5% (147/154) were cystic in nature, followed by those with solid & cystic components (6; 3.89%) and with solid component (1;0.6%); whereas most of Germ cell tumours were cystic in nature (14;56%), followed by solid & cystic tumors (11;44%). Majority of Sex cord stromal tumours (8; 88.8%) and all of the metastatic tumours (2;100%) were solid in nature.

Table 1: Distribution of ovarian tumors based on gross morphological features

	Cystic	Solid	Solid & Cystic
Surface epithelial tumors (n=154)	147	1	6
Germ cell tumors (n=25)	14	-	11
Sex cord stromal tumors (n=9)	-	8	1
Metastatic tumors(n=2)	-	2	-
Others (Leiomyoma) (n=1)	-	1	-

Table 2: Distribution of histopathological entities of Ovariantumors according to WHO classification, 2014

Histological entities based on WHO classification (2014)	No. of cases[n=191]	Percentage
A.Seroustumors	53	27.7 %
Benign	*41*	21.4%
Serous cystadenoma	35	18.3 %
Serous adenofibroma	6	3.1 %
Borderline	*1*	
Serous borderline tumor / Atypical proliferative serous tumor	1	0.5%
Malignant	*11*	
High grade serous carcinoma	11	5.75%
B. Mucinous tumors	92	48.2%
Benign	*83*	

Mucinous cystadenoma	80	41.9%
Mucinous adenofibroma	3	1.5%
Borderline	***6***	
Mucinous borderline tumor / Atypical proliferative mucinous tumor	6	3%
Malignant	***3***	
Mucinous carcinoma	3	1.5%
C. Endometrioidtumors	**3**	**1.5%**
Benign	***1***	
Endometrioidadenofibroma	1	0.5%
Borderline	**0**	**0%**
Malignant	***2***	
Endometrioid carcinoma	2	1%
D. Clear cell tumors	**1**	**0.5%**
Benign	**0**	**0%**
Borderline	**0**	**0%**
Malignant	***1***	
Clear cell carcinoma	1	0.5%
E. Brenner tumors	**1**	**0.5%**
Benign	***1***	
Benign Brenner tumor	1	0.5%
Malignant	**0**	
F. Seromucinoustumors	**4**	**2%**
Benign	***3***	
Seromucinouscystadenoma	3	1.5%
Borderline	**1**	
Seromucinous borderline tumor	*1*	0.5%
G.Sex cord- stromal tumors	**9**	**0.04**
Pure stromal tumors	**6**	**3%**
Fibroma	3	1.5%
Thecoma	3	1.5%
Pure sexcordtumors	**3**	**1.5%**
Adult granulosa cell tumor	2	1%
Sex cord tumor with annular tubules	1	0.5%
H.Germ cell tumors	**25**	**13%**
Mature teratoma	18	9.4%
Immature teratoma	1	0.5%
Dysgerminoma	4	2%
Yolk sac tumor	1	0.5%
Mixed germ cell tumor	1	0.5%
I.Soft tissue tumors	**1**	**0.5%**
Leiomyoma	1	0.5%
J.Secondarytumors	**2**	**1%**
Krukenbergtumor	1	0.5%
Endometrial stromal sarcoma metastasis to ovary	1	0.5%

Among surface epithelial tumors(154) ,mucinous tumors (92;48.16%) were the most common followed by serous tumors (53;34.4%), sero-mucinous tumors(4;2.6%) and endometrioidtumors (3;1.94%). [Table 2] Mucinous cystadenoma was the commonest benign surface epithelial tumor (80;52%) followed by serous cystadenoma (35;22.7%) whereas Serous cystadenocarcinoma (11;7.14%) was more frequent malignant tumor followed by Mucinous cysadenocarcinoma (3;1.94%).

In the present study, majority of the Germ cell tumors (25/191)were benign (18;72%) and all of them were mature teratomas, followed by malignant tumours (7;28%) which included Dysgerminomas, yolk sac tumor and mixed germ cell tumor (with dysgerminoma and embryonal carcinoma components).

Most of the sex cord stromal tumors(9/191) were benign (6; 66.7%) followed by malignant tumors (3;33.3%) which included adult granulosa cell tumor and sex cord tumor with annular tubules.We encountered one case of leiomyoma of ovary (1/191) among soft tissue tumors. One case of krukenbergtumor and one case of endometrial stromal sarcoma metastasizing to ovary constituted metastatic tumors (2/191).

Majority of the fallopian tubes (178/191) received showed no significant pathology except for hydrosalpinx (5/191), salpingitis (5/191), endometriosis (1/191) and. paratubal cyst (1/191).

Figure 5:

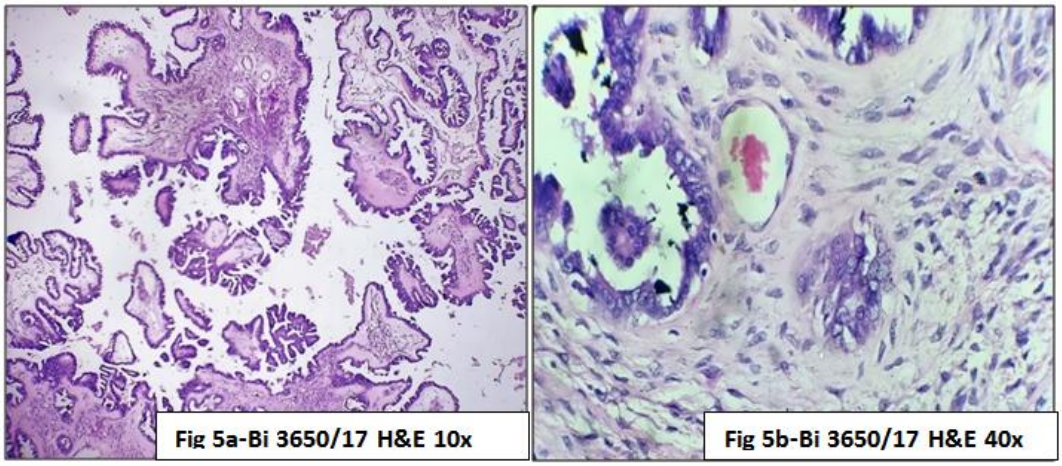


Fig 5a: Atypical proliferative serous tumor - showing hierarchial branching pattern Fig 5b: With foci of microinvasion - less than 5 mm in greatest dimension

Figure 6:

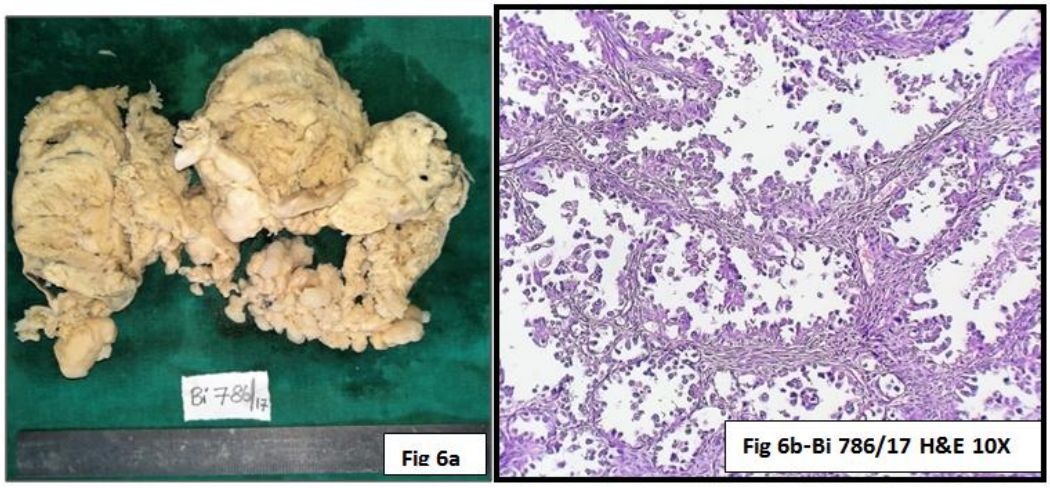


Fig 6a: Gross image of clear cell carcinoma. Fig 6b: Clear cell carcinoma – showing tubulocystic pattern with papillae lined by columnar to polyhedral cells with atypical hyperchromatic nuclei projecting into the lumen (Hobnail cells).

Figure 7:

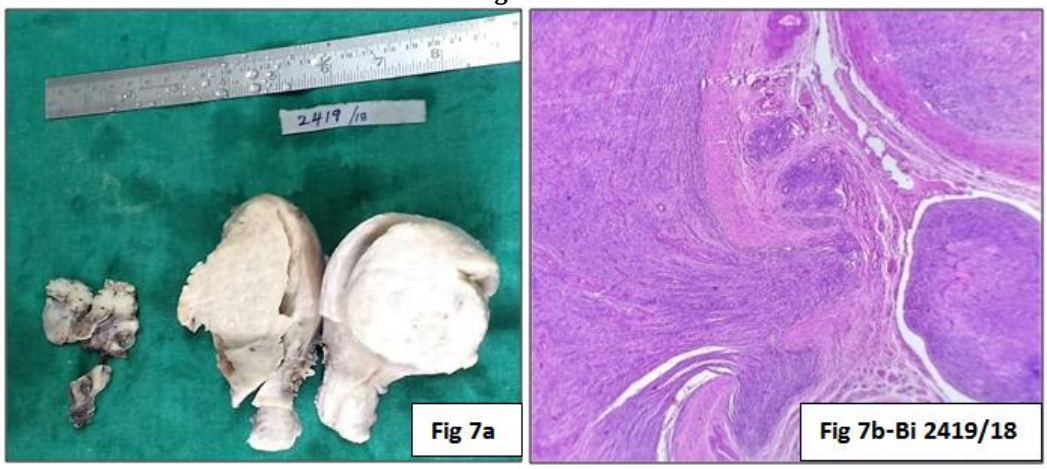


Fig 7a: Gross image of uterus showing grey white polypoidal mass protruding into endometrial cavity, C/S of ovary – showing a grey white area. Fig 7b: Microscopic examination revealed low grade endometrial stromal sarcoma with lymphatic and vascular invasion.

Figure 8:

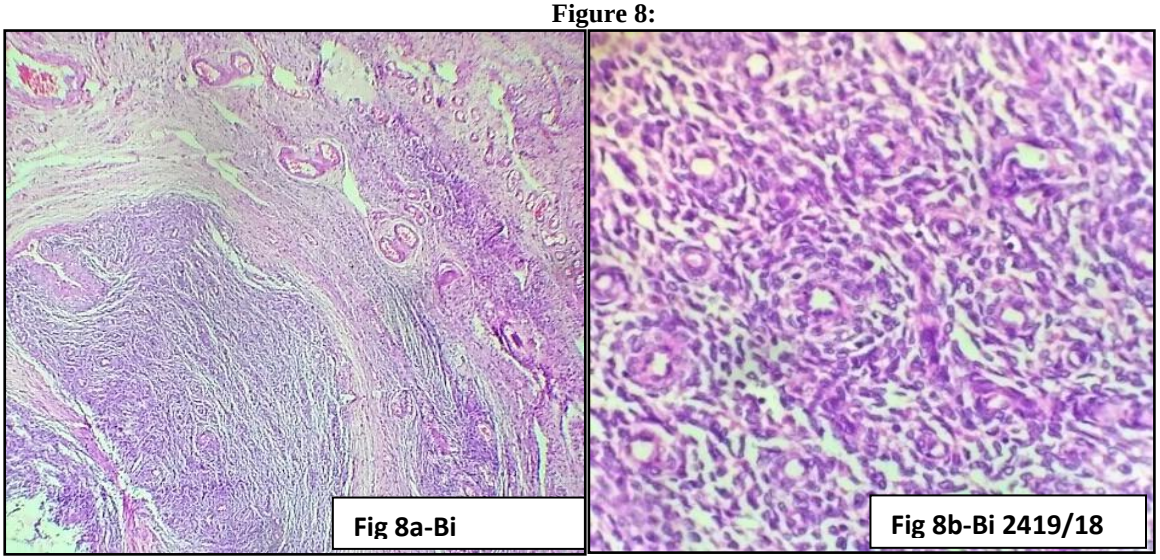


Fig 8a: Ovary shows metastasized endometrial stromal sarcoma. Fig 8b: High power view showing tumor cells arranged around blood vessels

Figure 9:

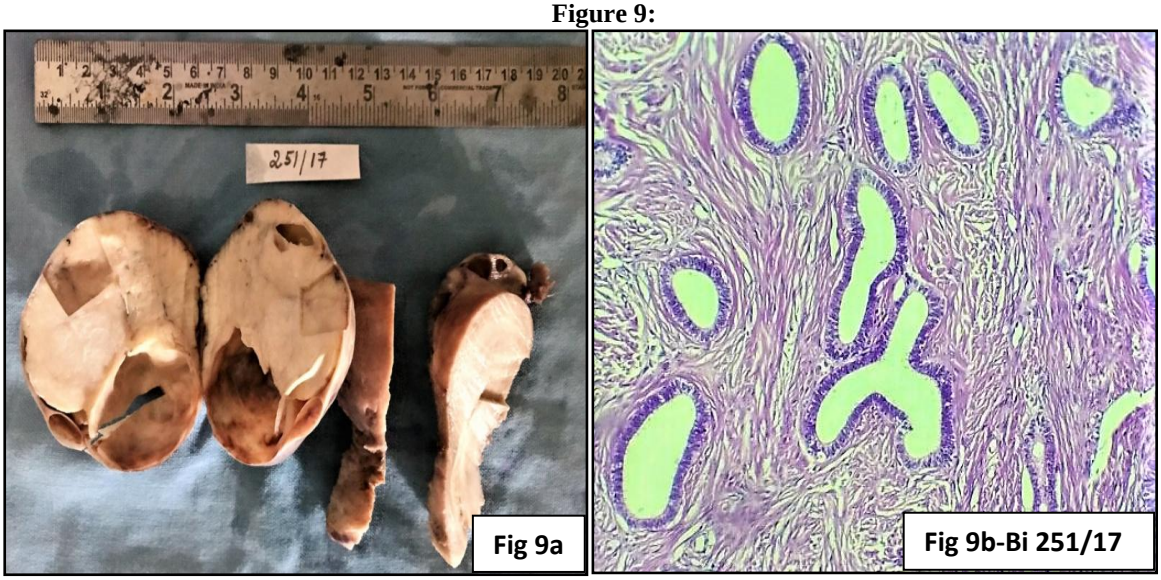


Fig 9a: C/S of ovary shows cystic and solid graywhite areas. Fig 9b: Microscopy showing cystically dilated glands surrounded by dense fibrous stroma – Endometrioidadenofibroma.

Figure 10 :

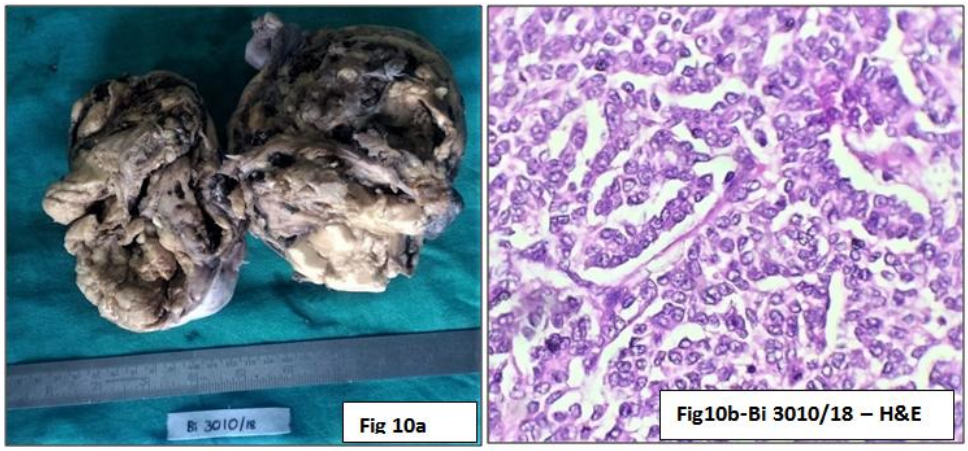


Fig10a: Gross appearance of granulosa cell tumor. Fig 10b: Microscopy showing cords and trabeculae of small uniform round cells with grooves.

Figure 11:

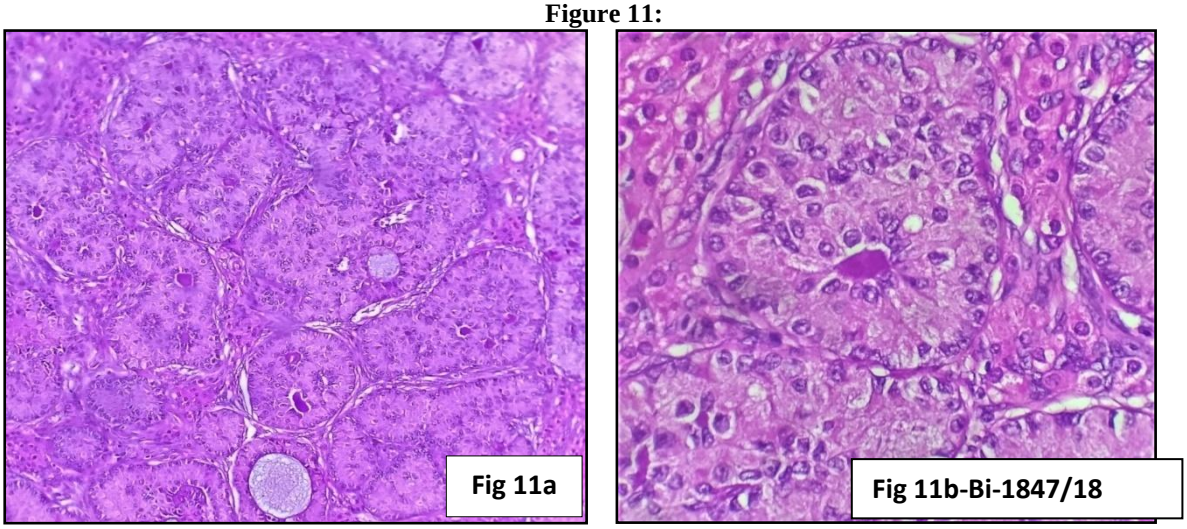


Figure 11a,b: Nests of tumor cells forming annular tubules with central eosinophilic hyaline material – Sex-cord stromal tumor with annular tubules.

IV. Discussion

In the present study, ovarian tumors showed a wide range from 8 -70 yrs. There was a gradual increase in tumors with increasing age, peaking in fourth to fifth decade and were very less common after 60 years

Kar et al,[5] and N.Garg et al.,[2] also reported proportionally low frequencies of ovarian tumors at bimodal age spectrum (below 20 years and > 60 years).Most of the cases occurred in fourth to fifth decade in their study. Similar observations were made by Thakkar et al.,[6]Mankar et al. [7]

Most of the cases in our study were unilateral and few were bilateral which was also observed by Sheik et al [8] and Prakashet al.[3] Primary ovarian neoplasms were the most commonesttumors in our study similar to Agarwal et al[9] and N Garg et al.[2]

Among various histomorphological types of ovarian tumors, surface epithelial tumors were the most common followed by germ cell tumors and sex cord stromal tumors. Badge et al,[11] Krishna M &Mourya G,[10] and Thakkar documented similar observations in their studies.

Histological type	Present study(2018)	Krishna M &Maurya G (2015)[10]	Badge S et al.(2013)[11]	Thakkar et al.(2015)[6]	N.Garg et al. (2017)[2]
Surface epithelial tumors	80.6%	77.7%	77%	73.8%	69.2%
Sexcordstromaltumors	4.7%	6.1%	6%	6.1%	4.2%
Germ cell tumors	13.1%	15.5%	16%	17.8%	25.8%
Metastasis	1%	2%	1%	2.3%	0.8%

Majority of the tumors were benign, followed by malignant and borderline tumors similar to Sheik et al., [8] N Garg et al,[2]Ranjana et al.,[13] and Ivy Sharma et al.[14][Table 3]

Table 3:Comparison of incidence of benign, borderline and malignant ovarian tumors

Nature of tumor	Present study (2018)	Sheik et al (2017)[8]	N.Garg et al (2017)[2]	Ivy Sharma et al (2014)[14]	Angela et al (2018)[14]
Benign	81.7%	80.3%	81.2%	78.4%	75%
Borderline	4.2%	4.1%	1.2%	0.98%	3.6%
Malignant	14.1%	15.6%	17.6%	20.6%	21.4%

Among benign surface epithelial tumors, mucinous cystadenoma was the commonest histological type followed by serous cystadenoma in our study which was the similar finding by Mankar et al.,[7] and Kiranmayi et al.,[15] Serous cystadenocarcinoma was the commonest malignant tumor in correlation with Sheik et al., [8] and Mankar et al.[7]

V. Conclusion

Both benign and malignant tumors were common among 4th to 5th decades. Surface epithelial tumors were the commonest tumors followed by germ cell tumors. Mucinous cystadenoma was the most common benign tumor while serous cystadenocarcinoma was the commonest malignant tumor.

Ovarian tumours are silent menaces which throw clinical challenges to gynaecologist, medical oncologist and radiotherapists. The prognosis and varying therapeutic strategies of ovarian tumours necessitate

an accurate pathological evaluation. Although newer techniques like IHC and molecular analysis have made the diagnosis easier and more precise, in the institutes with provision of limited resources, histopathology is still the gold standard in diagnosing most of these tumours. Practice of fertility sparing surgery, replacement of radiotherapy by chemotherapy and arrival of newer chemotherapeutic drugs has made the prognosis much better now a days.

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