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A clinic pathological study of ovarian Tumor: A prospective study in a tertiary care hospital south India

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Abstract
Background: Ovarian tumors manifests a wide spectrum of clinical, morphological and histopathological features. They account for 30% of all female genital tract tumors. Aims and Objectives: to analyze the demographic pattern, the clinical presentation and different histopathological types of ovarian tumors.
Materials and Methods: A prospective study of 2 years duration on 136 patients with ovarian tumor operated in the department of Obstetrics and Gynecology, Govt. Rajaji Hospital and Medical College, Madurai.
Results: Patients mean age at presentation were 36.7 for benign, 49.7 for borderline and 48.1 for malignant tumors. In our study 66.9% were benign, 2.2% were borderline and 30.9% were malignant based on histopathology. The most common presenting feature was abdominal pain and Epithelial ovarian tumors were the commonest tumors constituting 85.8% of all ovarian tumors.
Conclusion: Benign tumors are common than malignant ovarian tumors in all age groups. Early diagnosis and management help in better prognosis.

Keywords: Ovarian tumor, benign, borderline, malignant, who classification, clinico-pathological correlation

1. Introduction
Ovarian malignancy is the sixth most common cancer [1] among women worldwide and the second most common cause of cancers of the female reproductive system [2-4]. Indian trend analysis reveals a steady increase in the age-standardized incidence rate of ovarian cancer ranging from 0.26% to 2.44% per year in different area registries [5]. Ovary, being an organ concerned with progeny gives rise to complex variety of tumors, varying in presentation, structure and histopathology. The ovarian tissue gives rise to a number of cells with various differentiations, each of which is capable of giving rise to tumors. Hence ovarian tumors have been rightly termed as spectrum of diseases rather than single entity. The varied complex nature, delayed presentation and prognosis make the ovarian tumor a complicating and baffling subject to the Pathologist and the Gynecologist. Due to it insidious onset and vague presentation, the disease has already been spread and metastasized in different sites in many of the cases by the time they report to the doctor. However, the clinical spectrum varies widely, from an excellent prognosis and high likelihood of cure to rapid progression and poor prognosis, most probably reflecting variation in the tumor, biological properties. The survival rate of patients with early stage disease approaches 90%, but most cases are diagnosed late with an overall 5-year survival rate 45% [5]. The aims and objectives of this study are to analyze the demographic pattern and the clinical presentation of the patient with ovarian tumors, to study the different histopathological types of ovarian tumors, to establish the correlation between the clinical signs, symptoms and histological findings and to study the frequency of benign and malignant tumors in our population.

2. Materials and Methods
This is a prospective study conducted on 136 patients who were admitted with clinical diagnosis of ovarian tumor and who were operated for the same at Government Rajaji Hospital and Medical college, Madurai from December 2010 to November 2012. With the relevant clinical details, the incidence of ovarian tumor in the population was calculated. Demographic details like the age, socioeconomic status, obstetric history and clinical presentation were noted. The data was collected in excel and analyzed by descriptive statistics and Chi-square test.

Post-surgery, histopathological examination of the surgically removed tumor mass was done by the Department of Pathology of the same institute and the tumors were classified as per World Health Organization classification of ovarian tumors.

3. Results

A total of 136 women with ovarian tumors were included in the study. Table 1 illustrates the incidence of benign, borderline and malignant tumors based on histopathological examination. Of the 136 ovarian tumors 92 cases were benign (67.6%), 3 were borderline (2.2%) and 41 were malignant (30.2%).

Table 1: Incidence of benign, borderline and malignant tumors as per HPE

Type of tumor	Cases	
	No.	%
Benign	92	67.6
Borderline	3	2.2
Malignant	41	30.2
Total	136	100

The mean age of presentation was 40.5 years (range, 13–85 years).60 patients belong to the age group of 40 years or older and 76 patients were less than 40 years of age. The age distribution of the patients is Illustrated in Table 2

Table 2: Age distribution

Age group (in years)	Number of cases						Total cases	
	Benign		Borderline		Malignant			
	No.	%	No.	%	No.	%	No.	%
11 – 20	6	6.6	-	-	3	7.1	9	6.6
21 – 30	32	35.2	-	-	3	7.1	35	25.7
31 – 40	24	26.4	-	-	8	19	32	23.5
41 – 50	14	15.4	1	33.3	8	19	23	16.9
51 – 60	12	13	2	66.7	14	34.1	28	20.6
Above 60	4	4.4	-	-	5	11.9	9	6.6
Total	92	100	3	100	41	100	136	100
Range	16 – 75		45 – 52		13 – 85		13 – 85	
Mean	36.7		49.7		48.1		40.5	
S.D.	13.1		4.0		15.1		14.6	
P value	**0.0001 Significant**							

Table 3: Parity distribution

Parity	Number of cases						Total cases	
	Benign		Borderline		Malignant			
	No.	%	No.	%	No.	%	No.	%
Pregnant	5	5.4	-	-	-	-	5	3.6
Nulli	16	17.4	-	-	12	29.3	28	20.5
1	31	33.6	-	-	14	34.14	45	33.1
2	23	25	3	100	10	24.3	36	26.4
3	8	8.6	-	-	4	9.7	12	8.8
4 & above	9	9.7	-	-	1	2.4	10	7.3
Total	92	100	3	100	41	100	136	100

Table 3 illustrates the parity distribution of ovarian tumors. Ovarian tumors were common in multipara of 2 which is considered as statistically significant. Benign tumors were common in 2nd parity women and malignant tumors were common in women with parity 4 and above constituting 33% and 35.7% respectively. Incidence of benign tumors in nulliparous women was 22% and malignant tumors were 14.3%. There were 5 cases (5.4%) of ovarian tumor complicating pregnancy

Table 4: Mode of Presentation

Mode of Presentation	Number of cases						Total cases	
	Benign		Borderline		Malignant			
	No.	%	No.	%	No.	%	No.	%
Mass Abdomen	23	25.3	1	33.3	13	31	37	27.2
Pain	78	84.7	1	33.3	34	82.9	113	83.1
Menstrual Disturbances	3	3.3	2	66.7	5	11.9	10	7.4
Post-Menopausal Bleeding	1	1.1	-	-	-	-	1	0.7
Loss of Weight/ Appetite	5	5.5	-	-	4	9.5	9	6.6
Urinary Symptoms	1	1.1	-	-	-	-	1	0.7
White discharge	1	1.1	-	-	-	-	1	0.7
Vomiting	4	4.4	-	-	-	-	4	2.9
Asymptomatic	1	1.1	-	-	-	-	1	0.7
Total	92*	100	3*	100	41*	100	136*	100

* There was more than one mode of presentation in many cases.

Table 4 illustrates the mode of presentation of ovarian tumors. The most common presenting features in both benign and malignant ovarian tumors were pain abdomen with an incidence of 84.7% and 82.9% respectively.

Table 5: Per abdomen consistency of Ovarian Tumor

Consistency	Number of cases						Total cases	
	Benign		Borderline		Malignant			
	No.	%	No.	%	No.	%	No.	%
Cystic	85	93.4	3	100	8	19	96	70.6
Firm	-	-	-	-	5	11.9	5	3.7
Hard	-	-	-	-	17	40.5	17	12.5
Variable	-	-	-	-	10	23.8	10	7.4
Not palpable	7	7.7	-	-	1	2.4	8	5.8
Total	92	100	3	100	41	100	136	100

Table5 illustrates the consistency of ovarian tumor on clinical examination. Most benign tumors were cystic in consistency (93.4%) and malignant tumors were hard in consistency (40.5%) and around 23.8% of malignant tumors have a variable consistency.

Table 6: Laterality

Laterality	Number of cases						Total cases	
	Benign		Borderline		Malignant			
	No.	%	No.	%	No.	%	No.	%
Unilateral	86	92.3	2	66.7	22	53.6	110	80.9
Bilateral	6	6.6	1	33.3	19	45.2	26	19.1
Total	92	100	3	100	41	100	136	100

Table 6 illustrates the unilateral or bilateral involvement of ovaries in benign and malignant tumors. Most ovarian tumors were unilateral (80.9%). 92.3% of benign tumors were unilateral and 53.6% of malignant tumors were unilateral.

Table 7: Histopathological classification as per who classification

Type of Tumor	Cases	
	No.	%
1) Epithelial tumors		

a. Serous tumors	74	54.5
- Benign Serous cystadenoma	53	39
- Benign papillary serous Cystadenofibroma	1	0.7
- Borderline serous papillary cystadenoma	2	1.5
- Serous cystadenocarcinoma	3	2.2
- Papillary Serous cystadenocarcinoma	15	11.1
b. Mucinous tumor	31	22.7
- Benign Mucinous cystadenoma	21	15.4
- Borderline mucinous cystadenoma	1	0.7
- Mucinous cystadenocarcinoma	8	5.9
- Papillary mucinous cystadenocarcinoma	1	0.7
c. Endometroid tumour - Benign	2	1.5
d. Brenner tumour - Malignant	1	0.7
e. Undifferentiated tumor	8	5.7
- Poorly differentiated papillary carcinoma	2	1.5
- Poorly differentiated carcinoma	1	0.7
- Adenocarcinoma	5	3.5
f. Mixed tumor - Benign papillaryseromucinous cystadenoma	1	0.7
2. Germ cell tumors		
a. Teratoma	11	8.1
1. Immature	1	0.7
2. Mature (Cystic dermoid)	10	7.4
3. Sex cord stromal tumor	6	4.5
a. Granulosa cell tumors malignant	2	1.5
b. Fibrothecoma	4	3.0
4. Metastatic Carcinoma Krukenbergstumor	1	0.7
5. Soft tissue tumors not specific to the ovary (leiomyosarcoma)	1	0.7
Total	136	100

Table 7 illustrates the incidence of various subtypes of ovarian tumors as per WHO classification. In the present study, epithelial tumors (117) were most common ovarian tumors followed by germ cell tumors (11).

4. Discussion

Ovarian tumors manifest a wide spectrum of clinical, morphological and histological features. Clinically they may be misdiagnosed for other non-neoplastic conditions. In this study we have analyzed 136 ovarian tumors over a period of two year and correlated their clinical presentation with the histopathology.

4.1. Benign vs malignant tumors

Among 136 ovarian tumors, 66.9% were benign, 30.9% were malignant, and 2.2% were borderline tumors. The high incidence of benign ovarian tumors is also documented in various other studies [9, 10, 12] where is it 75.2%, 59.4% and 80.7% respectively.

Table 8: Comparison of Incidence of Ovarian Tumors

Study	Benign	Borderline	Malignant
Pilli G *et al.*	75.2%	2.8%	20.74%
Gupta *et al.*	59.4%	0.58%	40%
Couto F *et al.*	80.7%	2.3%	16.9%
Present study	66.9%	2.2%	30.9%

4.2. Age incidence

Ovarian cancer may occur at any age. In our study the age range of our subjects was between 13 years and 85 years. The mean age observed in the present study of 40.5 years in comparable with various other studies conducted in India. In our study, the peak incidence of benign tumor and malignant ovarian tumors were between 21- 30 years and 51-60 years respectively as shown in table 2. This differs from other western data [14, 18] but correlates with most other studies [15, 16, 17] conducted in India. This difference in age predominance is mainly due the racial difference, dietary and life style factors [19].

4.3. Parity

Parity is a single most important non genetic factor affecting the risk of ovarian cancer. The risk of ovarian cancer decreases progressively with increasing number of pregnancies as shown in table 3. In the present study we have reported 5 cases of ovarian tumors during pregnancy and all were benign tumors.

4.4. Clinical manifestations

The ovarian tumors manifest with wide variety of clinical manifestation. According to Sharma *et al*., 93.16% of the cases presented with mass abdomen and 64.9% presented with abdominal pain. In the present study the commonest presenting symptom was abdominal pain (83.1%) in both benign and malignant tumors. 27.2% of patients presented with mass per abdomen. Similar observations were found in the study done by Bhattacharya MM *et al.* [20] &Shahin Rashid *et al.*[21].

Few tumors which produce hormones may cause menstrual disturbances. In our study, 10 cases (7.4%) presented with menstrual disturbances and 1 case (0.7%) with post-menopausal bleeding. According to Pilli *et al.* [9] in 2002, 6.7% of cases presented with menstrual abnormalities which were similar to our study but in contrary to the study conducted by Gupta *et al.* in 1986, in which nearly 40.2% of cases had menstrual disorders as the presenting complaint, were they have reported more number of sex cord stromal tumors which are hormone dependent ovarian tumors.

Incidence of gastrointestinal symptoms like dyspepsia, nausea and vomiting were more in patients with malignant ovarian tumor according to our study mostly in cases who presented in late stage of the disease.

4.5. Consistency

The ovarian tumors vary from cystic to solid in consistency. In the present study 92.3% of benign tumors were cystic, 40.5% of malignant tumors were hard and 23.8% of malignant tumors were variable in consistency. In the study conducted by Pilli *et al*.[9] in 2002, of the benign tumors 76% were cystic in the malignant group, 49.2% cases were hard, 44.1% were variable in consistency.

4.6. Laterality

Ovarian tumors may be unilateral or bilateral; bilaterality represents the multicentric origin of the tumor. 6.6% of benign tumors were bilateral and 45.2% of malignant tumors were bilateral. According to Gupta *et al*. 30.2% of malignant tumors were bilateral. Most of the ovarian tumors which had a bilateral presentation were serous ovarian tumors consistent with all age, nature and stage of the tumor.

4.7. Histopathological types

4.7.1. Surface epithelial tumors

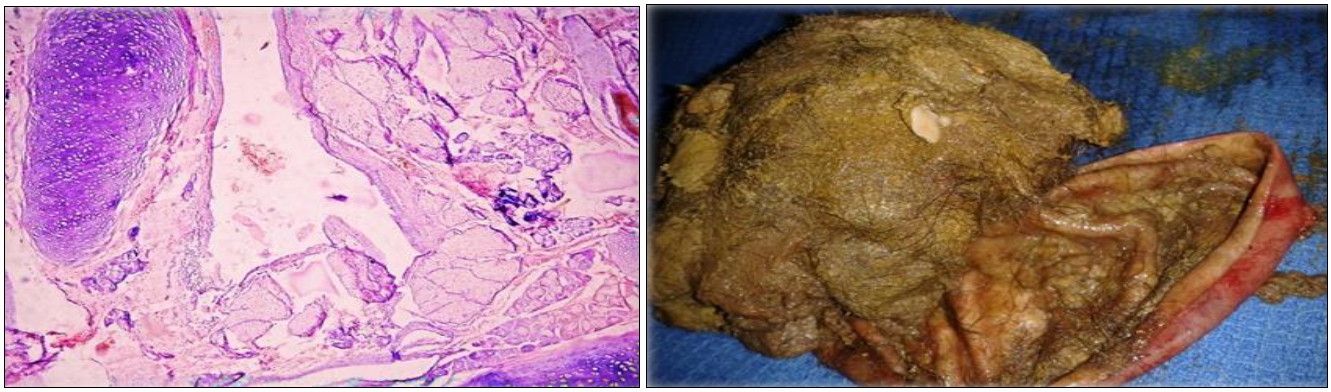
Surface epithelial tumors are common tumors comprising 85.8% of all ovarian tumors. Among epithelial tumors, serous tumors (54.5%) were most common followed by mucinous tumors (22.7%). 53(39%) cases are serous cystadenomas. Histologically they were lined by low cuboidal to columnar epithelium.1 case of cystadenofibroma was present which was cystic and lined by low cuboidal epithelium. Among the 3 cases of borderline ovarian tumors, 2 cases (1.5%) were serous tumors. Out of which one was unilateral and the other was bilateral, both were cystic in consistency. Histologically it has stratification of epithelial cells with mitotic activity and stromal penetration.

A total of 19 malignant serous tumors, serous cystadenocarcinoma were reported. Among the 19, 10 were unilateral and 9 were bilateral. On gross examination most of them had a mixed picture with both cystic and solid areas with papillary projections. Microscopically they are lined by more than one layer of columnar epithelium with nuclear polymorphism and hyperchromatic nuclei.

The next most common type of epithelial tumors were mucinous in origin accounting for 22.7% of all ovarian tumors. On gross examination most of them were multilocular with mucoid material. The epithelial lining of the cyst wall is columnar with basophilic cytoplasm and basal nuclei. We have also reported 1 case of borderline mucinous tumor, 8 cases of mucinous cystadenocarcinoma and 1 case of mucinous cystadenocarcinoma with papillary differentiation.

4.7.2. Germ cell tumors

These are second most common group of ovarian tumors accounting for 8.1% of all tumors in our study. This is very much less compared to that reported by other western studies. This difference may be due to variation in sample size, genetic, socioeconomical and environmental factors. Among the germ cell tumors, mature benign cystic teratomas (7.4%) were most common. The common age group was 20-30 years. 2 patients were in their 5th decade of life. On gross examination these tumors were cystic with solid areas. Majority of tumors have stratified squamous epithelium and dermal appendages like hair, sebaceous glands etc. on histopathology. (Fig. 1)



Areas of cartilage, hair and squamous epithelial lining

Sebum, well developed teeth and hair in a mature cystic teratoma

Fig 1: Benign cystic teratoma

4.7.3. Sex cord stomal tumors

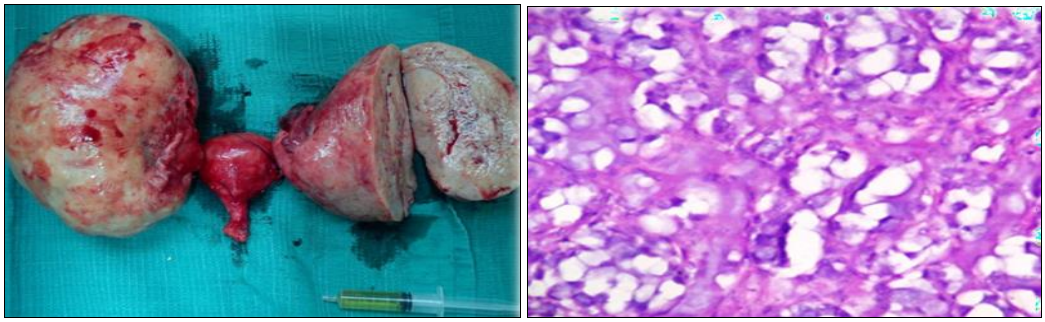
SCST accounts for 4.5% of all ovarian tumors. In our study there were 2 cases of granulosa cell tumor who presented with menstrual disturbances and both were malignant. Histologically the cells appear polygonal to round with hyperchromatic nuclei with central groove and a very scanty cytoplasm. We reported 4 cases of fibrothecoma presented with mass abdomen and menstrual irregularities. Histologically it consists of lipid rich cells resembling theca cells.

4.7.4. Metastatic tumors

There was one case of krukenbergs tumor (Fig 2); the patient was operated for carcinoma stomach 4 years back following which she presented with mass abdomen. Grossly both ovaries revealed solid and cystic tumor masses with hemorrhagic areas and necrosis. On histopathological examination, these were well differentiated adenocarcinoma with focal papillary projections and focal mucin secretions. Ovarian stroma showed dense desmoplastic response.

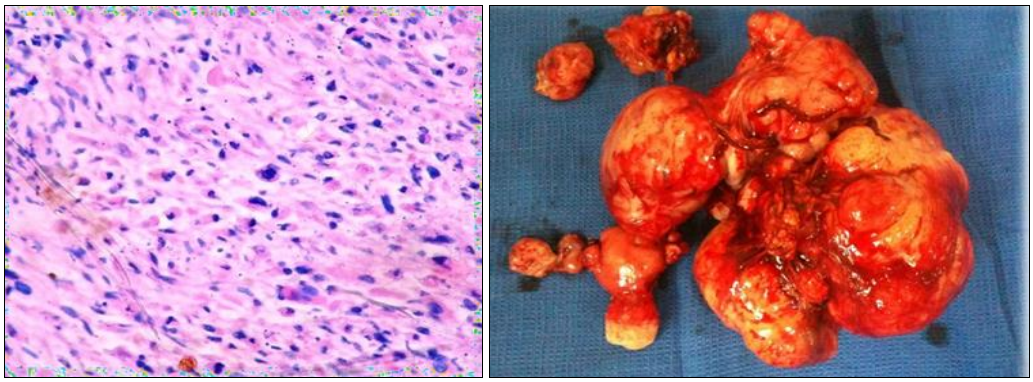
4.7.5. Soft tissue tumors not specific to the ovary

Primary leiomyosarcoma is a rare tumor representing less than 2% of all ovarian tumors, usually seen in post-menopausal women. We have reported 1 case of primary leiomyosarcoma in a 40-year-old P3L3 who presented with a mass abdomen. On examination, it was an irregular mass of size 20x20 cm variable consistency and restricted mobility with no ascites, per operatively Left ovary replaced by a fleshy vascular tumor of size 20x18 cm multiloculated with variable consistency. On histopathology the cells were spindle shaped cells with elongated nuclei and eosinophilic cytoplasm of interlacing bundles with whorled appearance. Pleomorphism, hyperchromatic nuclei with of mitoses 14/10 hp were seen (Fig. 3).



Signet Ring Cell

Fig 2: Krukenbergs tumor



Cells spindle shaped cells with elongated nuclei and eosinophilic cytoplasam of interlacing bundles with whorled appearance pleomorphism, hyperchromatic nuclei with mitoses 14/10 hp

Fig 3: Leiomyosarcoma

5. Conclusion

The ovarian tumors manifest a complex and varied spectrum of clinical, morphological and pathological features. Correlating the clinical parameters and categorizing the tumors according to the WHO classification help us in coming to an early diagnosis, management and hence in the prognosis of ovarian tumors.

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