International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

A Clinicopathologic Study of Ovarian Neoplasms in a Tertiary Hospital

Vishrabdha Pawar[1], Rajesh Mundhe[2], Sanjay Powar[3]

[1]Professor, Dept of Pathology, Bharati Vidyapeeth Deemed University Medical College and Hospital, Sangli.
[2]Consulting Pathologist, Prince Aly Khan Hospital, Mazgaon, Mumbai
[3]Consulting Pathologist, Gurukrupa Pathology Laboratory, Kolhapur

Corresponding Author: Vishrabdha Pawar

Received: 30/11/2015 *Revised: 19/12/2015* *Accepted: 19/12/2015*

ABSTRACT

Introduction: The ovarian neoplasm affects the significant number of female populations. The ovarian tumours presents with wide variation in the clinical and morphological features. There are three main types of primary ovarian tumours: Epithelial tumours, Sex cord-stromal tumours and Germ cell tumours. Malignant neoplasms are the 6th most common cancer in the females and accounts for second highest mortality rate of all the gynaecological cancers.
Aim and objectives: 1. To Classify the Ovarian neoplasms as per WHO classification. 2. To study the Ovarian neoplasms on the basis of demographic & clinical features. 3. To find out the frequency of commonest Ovarian neoplasms.
Material and methods: This is a prospective study of 62 ovarian tumours received in the department of Pathology in the period of May 2007 to May 2009.
Results: Out of 62 cases, benign neoplasms were observed in 43cases (69.35%), borderline neoplasms in 3 cases (4.84%) and remaining 16 cases (25.81%) were malignant. The surface epithelial tumors were the commonest accounting for 62.90%. The benign tumours were most common and mucinous cystadenocarcinoma was the commonest malignant tumor. Benign germ cell tumours were more common than the malignant germ cell tumours. 3 cases of metastatic tumors were found in our study.

Keywords: ovarian neoplasm, ovarian tumours, ovary.

INTRODUCTION

Ovary is the major endocrine organ, the source of female fertility & at the same time the origin of many of the most complex and lethal neoplasms. The ovarian neoplasm affects the significant number of female populations. A female risk of having ovarian tumor in her lifetime is 6 to 7%. [1]

The ovarian tumours presents with wide variation in the clinical and morphological features. Wide variation persists in its incidence in various parts of world, including India. Early diagnosis is difficult due to its asymptomatic nature, inaccessible site and limited use of various newer diagnostic techniques like cytology, tumour markers. Moreover, one cannot be sure of benign nature unless histopathology is determined.

There are three main types of primary ovarian tumours: Epithelial tumours, which arise from the surface epithelium of the ovary or endometriosis, Sex cord-stromal tumours, which arise from the ovarian stroma, from sex cord derivatives, or both; and the Germ cell tumours, which originate from germ cell.

[2] Of the three main types, epithelial tumours are the most common ovarian tumours. [3]

The ovarian neoplasms are not always malignant. The incidence of malignancy is about 15-20% in different parts of the world. [4] Malignant neoplasms are the 6th most common cancer in the females and accounts for second highest mortality rate of all the gynaecological cancers. [4-5] They are more common in the older women between the age group 40-65 years. Relative frequency is different in different parts of world. Carcinoma of surface epithelial - stromal origin accounts for 90% of these cancers in North America & Western Europe. Whereas, in some Asian countries germ cell tumours accounts for a significant proportion (20%) of ovarian malignancy. [4]

About 80% of ovarian neoplasms are benign in nature & usually occur in the age group of 20-45 years. [6]

Borderline tumors constitute 10-15% of all malignant ovarian tumors, but they are enigmatic neoplasms that have caused confusion and apprehension, disproportionate to their incidence. [7]

Ovarian metastases are notorious as they are known to be mimics of the primary lesions. Thus, clinicians face the difficulty in diagnosis & management of various types of ovarian tumours & the decision making process rightly starts with the pathology report.

The studies on various tumor markers have contributed significantly for their role in helping diagnosis, early detection, monitoring and management of radiotherapy, surgery and chemotherapy and also in predicting prognosis. The diagnostic efficacy of tumor markers depends on the various factors such as sensitivity, specificity, positive predictive value and negative predictive value. [8]

The treatment and prognosis of ovarian neoplasms is based upon the accurate surgical staging and a thorough pathological evaluation.

The present study was undertaken to analyse all ovarian tumours for their age distribution, clinical, morphological and histopathological features, to study the percentage of various benign and malignant ovarian tumours, and to classify the tumours according to WHO classification and to assess the efficacy of serum markers in diagnosing the malignant neoplasm.

Aim and Objectives

1. To Classify the Ovarian neoplasms as per WHO classification.
2. To study the Ovarian neoplasms on the basis of demographic & clinical features.
3. To find out the frequency of commonest Ovarian neoplasms.

MATERIALS AND METHODS

This is a prospective study of 62 ovarian tumours received in the department of Pathology in the period of May 2007 to May 2009.

All the specimens were received in 10% formalin. Nature of specimen included in the study were; unilateral and bilateral oophorectomy and pan hysterectomy. Along with these, other tissues like omentum, peritoneal, pelvic and para-aortic lymph nodes were also received in some malignant lesions.

Relevant clinical data i.e., clinical symptoms, examination findings, ultrasonographic findings, tumour marker levels were obtained from the requisition forms sent along with the specimens and also from the record book of the patients.

Appropriate grossing of the ovarian masses was done on the basis of the correct dimensions, weight of the mass and the examination of the external findings and study of cut surface of the mass. The sections were taken from each 1cm of the maximum diameter of the tumour. In cystic lesions all the locules were opened and examined. Sections were taken from cyst walls, solid and papillary areas, and any unusual areas (hemorrhagic, calcified areas etc). Also sections from uterus,

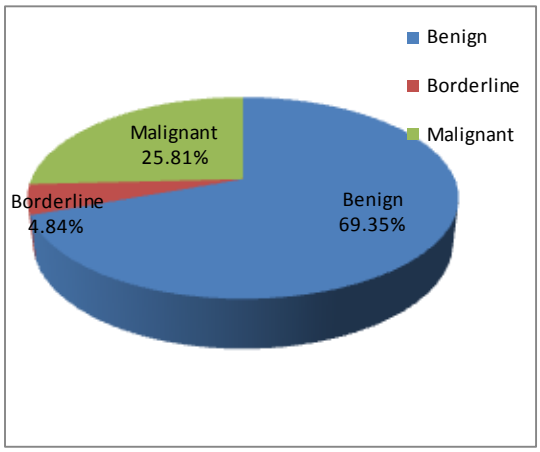
cervix, fallopian tubes, omentum and lymph nodes were taken. Paraffin blocks were prepared, cut and stained with routine Hematoxylin and Eosin. Special stains were used wherever required.

All the observations were recorded and the tumours were classified as per WHO classification and observations compared with the study of other workers.

OBSERVATIONS

This study was conducted in the Department of Pathology, Dr. D.Y. Patil Medical College, Kolhapur. A total of 62 cases of ovarian tumours were studied over a period of 2 years from May 2007 till May 2009. The lesions were studied and classified as per WHO classification of ovarian tumors.

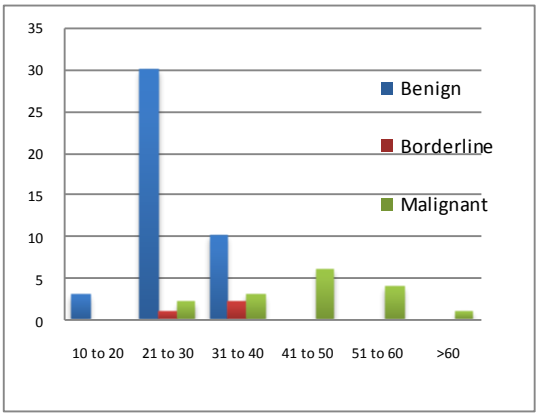
I) Percentage of Benign, Borderline and Malignant tumors



The above table shows that out of 62 cases, benign neoplasms were observed in 43cases (69.35%), borderline neoplasms in 3 cases (4.84%) and remaining 16 cases (25.81%) were malignant.

Majority of the benign ovarian tumours i.e. 30 (48.38%) were seen in the age group of 21-30 years, whereas maximum numbers of malignant cases i.e. 8 (12.90%) were seen in 41-50 years age group. Two cases of borderline tumours were seen during 31-40 years and one case between 21 to 30 years.

II) Age wise distribution of the ovarian neoplasms.



III) Distribution of various lesions as per the laterality

Lesions	Right sided	Left sided	Bilateral
Surface epithelial tumors	25	11	3
Sex cord – stromal tumors	04	02	00
Germ cell tumors	10	04	00
Metastatic tumors	00	00	3
Total	**39 (62.90%)**	**17 (27.42%)**	**06 (9.68%)**

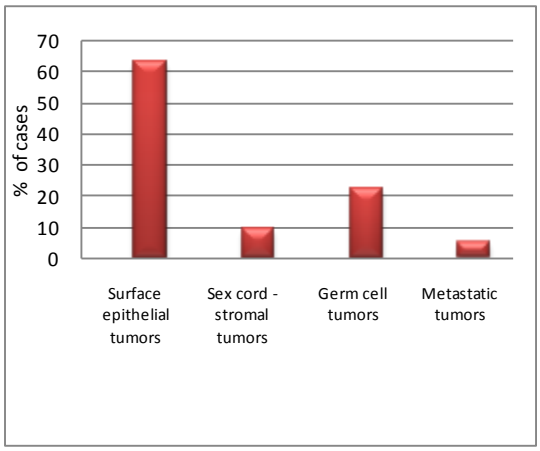
IV) Distribution of various Ovarian neoplastic lesions

Sr. No.	Neoplastic Lesions	No. of Cases	Percentage
1.	**SURFACE EPITHELIAL TUMORS**		
	A. Serous tumors		
	• Serous cystadenoma	12	19.35%
	• Borderline serous tumor	01	1.61%
	• Serous cyst adenocarcinoma	05	8.06%
	B. Mucinous tumors		
	• Mucinous cystadenoma	10	16.14%
	• Borderline mucinous tumor	02	3.22%
	• Mucinous cystadenocarcinoma	04	6.45%
	Intestinal type	02	3.22%
	Endocervical type		
	C. Endometrioid carcinoma	01	1.61%
	D. Transitional cell carcinoma	01	1.61%
	E. Malignant mixed epithelial tumors	01	1.61%
2.	**GERM CELL TUMORS**		
	A. Mature cystic teratoma	11	17.75%
	B. Struma ovarii	01	1.61%
	C. Dysgerminoma	01	1.61%
	D. Yolk sac tumors	01	1.61%
3.	**SEX CORD – STROMAL TUMORS**		
	A. Adult granulosa cell tumor	03	4.84%
	B. Fibroma	02	3.22%
	C. Sclerosing stromal tumor	01	1.61%
4.	**METASTATIC TUMORS**	03	4.84%
	Total	**62**	**100%**

Right ovary was most commonly involved by ovarian tumours constituting 62.90%. Left ovary involved in 27.42% cases and bilateral ovarian tumours were found in 9.68% cases.

The surface epithelial tumors were the commonest accounting for 62.90% and the commonest lesion was serous cystadenoma constituting 19.35% of the total lesions. Amongst the malignant neoplasms mucinous cystadenocarcinoma was the commonest accounting for 9.67% of the total lesions

V) Distribution of ovarian neoplasms as per WHO Classification

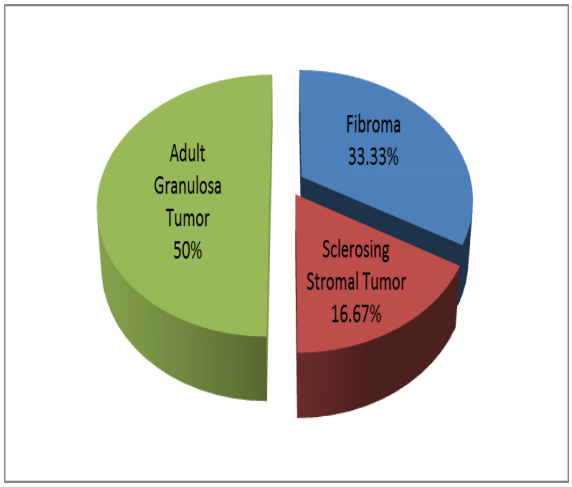


VI) Distribution of various Surface Epithelial Tumors as per WHO classification

Sr. No	Surface Epithelial Tumors	No of Cases
1	SEROUS TUMORS	
	Benign	12 (30.77%)
	Borderline	01 (02.56%)
	Malignant	05 (12.82%)
2	MUCINOUS TUMORS	
	Benign	10 (25.64%)
	Borderline	02 (05.13%)
	Malignant	06 (15.38%)
3	Transitional Cell Tumors	01 (02.56%)
4	Endometrioid Carcinoma	01 (02.56%)
5	Mixed Epithelial Tumors	01 (02.56%)
	TOTAL	**39 (100%)**

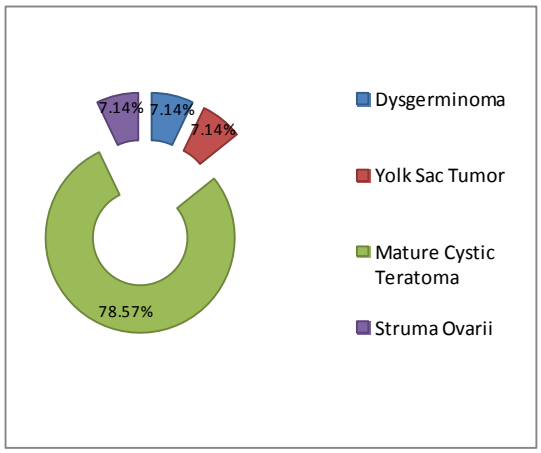
Of 39 cases, the incidence of serous and mucinous neoplasms was same i.e. 46.15%. Benign cystadenoma was the commonest neoplasm constituting 30.77% of all surface epithelial lesions. Amongst the malignant lesions, Mucinous cystadenocarcinoma was the commonest malignant tumor constituting 15.38% of all surface epithelial lesions.

VII) Distribution of various sex cord - stromal tumors.



Of the total 06 sex cord – stromal tumors we received, 02 (33.33%) were of Fibroma, 01 (16.67%) of Sclerosing stromal tumor and 03 (50%) of Adult granulosa cell tumor.

VIII) Distribution of various Germ cell tumors as per WHO classification.



Of the 14 cases of Germ cell tumors, 11 (78.57%) were of Mature cystic teratoma and 01 (7.14%) case each of Dysgerminoma, Yolk sac tumor and Struma ovarii.

DISCUSSION

The present study consists of analysis of 62 cases of ovarian neoplasms over a period of 2 years from May 2007 to May 2009.

The overall incidence of ovarian tumours in our institute was 1.46% of all histopathological specimens received in our laboratory.

The tumors were classified into four major groups:

1. Surface Epithelial Tumors
2. Germ Cell Tumors
3. Sex cord-Stromal Tumors and
4. Metastatic Tumors

Age incidence

In the present study, patients were from 11-68 years of age. Benign tumors were found commonly in 3rd and 4th decade of life. This finding is similar to finding of Bhattacharya et al [9] (1980), Gupta et al [10] (1986), and Maheshwari et al [11] (1994).

Majority of malignant tumours were found commonly in 5th and 6th decade of life in present study. Our findings were similar with the study done by Jacob et al [12] (1993), Kataki et al [13] (1993), Maheshwari et al [11] (1994) and Ranu Sarkar [14] (1996).

Clinical Features

Majority of the benign, borderline and malignant tumours in the present study presented with lump and pain in abdomen. Few cases presented with urinary and gastrointestinal symptoms. Associated menstrual irregularity was also observed in few cases. Gupta et al [10] (1986) and Maheshwari et al [11] (1994) had recorded the similar findings.

Table no: 1 Comparison of percentage of benign, borderline and malignant tumours with other workers.

Authors	Benign	Borderline	Malignant
Gupta et al [10] (1986)	59.40%	0.60%	40%
Prabhakar et al [15] (1989)	66.00%	2.40%	31.60%
Couto et al [16] (1993)	77.26%	2.33%	20.41%
Ranu Sarkar [14] (1996)	67.00%	3.7%	28.40%
Shaikh et al [17] (2007)	68.25%	0.72%	30.96%
Present Study (2009)	**69.36%**	**4.84%**	**25.80%**

Above table shows comparative study regarding behaviour of ovarian neoplasms. The incidence of benign tumours was maximum as compared to the borderline and malignant tumours in the present study which was similar to the studies done by other workers.

The incidence of borderline neoplasms (4.84%) was slightly high in our study as compared to the other studies done by various authors.

Similarly, the incidence of malignant tumors was 25.80%, which was on the lower side as compared to the studies done by Gupta et al [10] (1986), Prabhakar et al [15] (1989), Ranu Sarkar [14] (1996) and Shaikh et al [17] (2007).

Table no: 2 Histopathological types of ovarian tumours in comparison with other workers.

HISTOLOGICAL TYPE	Gupta et al [10] (1986)	Couto et al [16] (1993)	Ranu Sarka [14] (1996)	Shaikh et al [17] (2007)	Present Study (2009)
I) Surface Epithelial Tumours	54.7%	70.27%	66.8%	81%	**62.90%**
A) Serous tumours	26.8%	42.56%	32.7%	50.8%	**29.03%**
i) Cystadenoma	11.8%	30.32%	19.5%	42.07%	**19.35%**
ii) Borderline tumour	0.29%	0.87%	1.6%	-	**1.61%**
iii) Cystadenocarcinoma	14.71%	7.58%	11.1%	8.78%	**8.06%**
B) Mucinous tumours	25%	27.71%	27.3%	29.6%	**29.03%**
i) Cystadenoma	20.59%	24.20%	21.6%	16.85%	**16.14%**
ii) Borderline tumour	0.29%	1.46%	1.0%	0.72%	**3.22%**
iii) Cystadenocarcinoma	4.12%	2.05%	4.7%	12.11%	**9.67%**
C) Endometrioid carcinoma	0.29%	-	2.1%	-	**1.61%**
D) Transitional cell carcinoma	-	-	-	-	**1.61%**
E) Malignant mixed epithelial tumour	-	-	-	-	**1.61%**
II) Sex – Cord Stromal Tumours	7.06%	-	5.3%	5.03%	**9.68%**
i) Granulosa cell tumours	4.43%	1.17%	1.6%	3.6%	**4.84%**
ii) Fibroma	2.35%	2.34%	1.6%	1.29%	**3.22%**
iii) Sclerosing stromal tumor	-	-	-	-	**1.61%**
III) Germ Cell Tumours	31.18%	18.64%	27.9%	10.95%	**22.59%**
i) Dysgerminoma	3.53%	2.90%	5.3%	2.73%	**1.61%**
ii) Yolk Sac Tumours	1.15%	-	2.1%	0.14	**1.61%**
iii) Teratoma	25.78%	15.74%	19%	7.77%	-
a) Benign Cystic	23.13%	15.45%	16.9%	7.2%	**17.75%**
b) Struma ovarii	0.59%	0.29%	0.5%	-	**1.61%**
IV) Metastatic Tumours	6.28%	1.46%	--	1.58%	**4.84%**

The above table shows that in the present study, surface epithelial tumours were the commonest, comprising 62.90% of all ovarian tumours. The incidence was comparable with the studies done by range as compared to that of other workers. Amongst the surface epithelial tumours, serous tumours were the most common, which was similar to the study done by Gupta et al [10] (1986), Ranu Sarkar [14] (1996), Couto et al [16] (1993) and Shaikh et al [17] (2007). Amongst the serous tumours, the most common tumour was serous cystadenoma and the overall most common individual ovarian tumour was also serous cystadenoma which was similar to the study done by Couto et al [16] (1993) and Shaikh et al [17] (2007). However, Gupta et al [10] (1986) found benign cystic teratoma to be the commonest ovarian tumor and Ranu Sarkar [14] (1996) found mucinous cystadenoma to be the commonest lesion. These findings were not comparable to our study.

Germ cell tumours (22.59%) formed the next common group. Gupta et al [10] (1986) and Ranu sarkar [14] (1996) had recorded the incidence higher than the present study, whereas the incidence was low in studies done by Couto et al [16] (1993) and Shaikh et al [17] (2007).

The incidence of sex-cord stromal tumours (9.68%) was little higher as compared to the other studies.

I) Surface Epithelial Tumours -

In the present study there were 39 cases of surface epithelial tumours.

Table no: 3 Comparison of benign, borderline and malignant surface epithelial tumours with other studies.

Surface epithelial tumours	Tyagi et al [18] (1978)	Gupta et al [10] (1986)	Prabhakar et al [15] (1989)	Maheshwari et al [11] (1994)	Gupta et al [4] (2007)	**Present Study (2009)**
Benign	81.93%	59.14%	67.61%	71.9%	77.7%	**56.40%**
Borderline	6.02%	1.07%	3.88%	4.4%	06.34%	**07.69%**
Malignant	12.05%	39.71%	28.49%	23.7%	15.8%	**35.88%**

Above table shows that in our study, the incidence of benign tumors was significantly low as compared to studies done by Tyagi et al [18] (1978), Maheshwari et al [11] (1994) and Gupta et al [4] (2007).

The incidence of Borderline tumors was comparable with the study done by Tyagi et al [18] (1978) and Gupta et al [4] (2007) and was significantly high as compared to the studies done by the various authors

The incidence of malignant surface epithelial tumours was high in our study as compared to the other studies.

In the present study serous cystadenoma constituted 19.35% of all ovarian tumours. Gupta et al [10] in 1986 reported the incidence as 11.18% and the incidence reported by Maheshwari et al [19] in 1994 was 32.2%. A recent study done by Shaikh et al [17] in 2007 reported the incidence to be 42.07%.

Table No: 4 Comparison of incidence of serous cystadenoma with other studies

Authors	**Percentage**
Gupta et al [10] (1986)	11.18%
Mukherjee et al [19] (1990)	20.5%
Couto et al [16] (1993)	30.32%
Maheshwari et al [11] (1994)	32.2%
Shaikh et al [17] (2007)	42.07%
Present study (2009)	**19.35%**

In the present study, the patients were from 12 to 40 years of age with a mean age of 28 years. Tyagi et al [18] (1978), Gupta et al [10] (1986) and Ranu Sarkar [14] (1996) have also reported the mean age of 32.5, 31.5 and 33 years respectively. Majority of patients presented with lump and pain in abdomen.

Table No: 5 Comparison of incidence of serous borderline tumours with other authors.

Author	**Year**	**Percentage**
Tyagi et al [18]	1978	0.77%
Prabhakar et al [15]	1989	0.94%
Ranu Sarkar [14]	1996	1.6%
Present Study (2009)	**2009**	**1.61%**

The incidence of borderline tumours was comparable with the studies done by other authors.

Table No: 6 Comparison of incidence of serous cystadenocarcinoma with other workers.

Authors	Year	Percentage
Tyagi et al [18]	1978	2.30%
Gupta et al [10]	1986	14.17%
Maheshwari et al [11]	1994	4.42%
Ranu sarka [14]	1996	11.10%
Present study	**2009**	**8.06%**

The above table shows that the incidence of serous cystadenocarcinoma in the present study was 8.06% which was higher than the study done by Tyagi et al [18] (1978) and Maheshwari et al [11] (1994) and lower than the study done by Gupta et al [10] (1986) and Ranu Sarkar [14] (1996). .

Patients were from 38 to 62 years of age, making the mean age of 46 years. Tyagi et al [18] (1978), Maheshwari et al [11] (1994) and Ranu Sarkar [14] (1996) reported the mean age as 50, 44.5 and 44 years.

Table No: 7 Comparison of incidence of mucinous cystadenoma with other authors

Author	Percentage
Gupta et al [10] (1986)	20.59%
Couto et al [16] (1993)	24.20%
Maheshwari et al [11] (1994)	14.55%
Ranu sarkar [14] (1996)	21.6%
Shaikh et al [17] (2007)	16.85%
Present study(2009)	**16.14%**

The above table shows that the incidence of mucinous cystadenoma lies in close range to the studies done by Maheshwari et al [11] (1994) and Shaikh et al [17] (2007), while incidence was low as compared to studies done by Gupta et al [10] (1986), Couto et al [16] (1993) and Ranu sarkar [10] (1996).

Table No: 8 Comparison of incidence of mucinous borderline tumour with other workers.

Author	Incidence
Tyagi et al [18] (1978)	3.08%
Couto et al [16] (1993)	1.46%
Maheshwari et al [11] (1994)	2.08%
Ranu Sarkar [14] (1996)	1.00%
Shaikh et al [17] (2007)	0.72%
Present Study (2009)	**3.22%**

In our study, the incidence of borderline mucinous tumors was 3.22% which was slightly higher than the studies done by Couto et al [16] (1993), Maheshwari et al [11] (1994), Ranu Sarka [14] (1996) and Shaikh et al [17] (2007). The finding was comparable with Tyagi et al [18] (1978).

Table No: 9 Comparison of incidence of mucinous cystadenocarcinoma with other workers.

Author	Incidence
Gupta et al [10] (1986)	4.12%
Couto et al [16] (1993)	2.05%
Ranu Sarkar [14] (1996)	4.7%
Shaikh et al [17] (2007)	12.11%
Present Study (2009)	**9.67%**

The above table shows that the incidence of mucinous cystadenocarcinoma is lower than studies done by Gupta et al [10] (1986), Couto et al [16] (1993), and Ranu Sarkar [14] (1996). While Shaikh et al [17] (2007) reported the incidence to be higher than the present study.

Table no: 10 Comparison of incidence of endometrioid carcinoma given by different workers.

Authors	Percentage
Tyagi et al [18] (1978)	1.54%
Gupta et al [10] (1986)	0.29%
Maheshwari et al [11] (1994)	2.34%
Ranu Sarkar [14] (1996)	21%
Present Study (2009)	**1.61%**

The above table shows that the incidence of endometrioid carcinoma in present study lies in close range to study done by Tyagi et al [18] (1978) and Maheshwari et al [11] (1994).

Table no: 11 Comparison of incidence of transitional cell carcinoma given by different workers.

Authors	Percentage
Tyagi et al [18] (1978)	1.54%
Gupta et al [10] (1986)	0.29%
Maheshwari et al [11] (1994)	2.34%
Present Study (2009)	**1.61%**

The above table shows that the incidence of transitional cell carcinoma in our study was comparable with the studies done by Tyagi et al [18] (1978), Gupta et al [10] (1986) and Maheshwari et al [11] (1994).

Malignant Mixed Epithelial Tumors

One case of mixed epithelial tumor was found in a 51 year female who presented with pain and lump in abdomen. Grossly a left ovarian cystic mass measuring 12x8x5cms was noted.

On microscopy, it was reported as malignant mixed epithelial tumor – Transitional Cell Carcinoma with Serous Cystadenocarcinoma.

Gupta et a [4] (2007) mentioned the incidence of malignant mixed epithelial tumor as 2% whereas, Prabhakar et al [15] (1989) mentioned it as 1.25%, both the findings were comparable with our study (1.61%).

II) Germ Cell Tumours

In the present study 14 cases were noted, accounting for 22.59% of all ovarian tumours.

Table no: 12 Comparison of the incidence of germ cell tumors with the other studies

Authors	Percentage
Gupta et al [10] (1986)	31.18%
Prabhakar et al [15] (1989)	27%
Couto et al [16] (1993)	20.1%
Shaikh et al [17] (2007)	10.95%
Gupta et al [4] (2007)	23.9%
Present study (2009)	**22.59%**

Gupta et al [10] (1986) recorded their incidence as 31.18%, whereas, Shaikh et al [17] (2007) recorded its incidence as 10.95%.

Prabhakar et al [15] (1989) recorded it as 27% and Gupta et al [4] (2007) recorded the incidence as 23.9% of all ovarian tumours, this finding was comparable with the present study.

The germ cell tumors in our study presented in the age group of 13 to 45 years.

Gupta et al [10] (1986) reported these tumors in the age group 3 to 60 years, while Bharati et al [20] (2003) reported them in the age group of 18 to 38 years.

Table no: 13 Comparison of incidence of dysgerminoma with other workers.

Author	Year	Percentage (%)
Ramchandran et al [21]	1972	3.99%
Tyagi et al [18]	1978	3.53%
Gupta et al [10]	1986	5.3%
Maheshwari et al [11]	1994	2.90%
Present Study	**2009**	**1.61%**

In present study the incidence of dysgerminoma was low to that of other workers.

Table no: 14 Comparison of the incidence of yolk sac tumor with other studies

Authors	Percentage
Gupta et al [10] (1986)	3.53%
Prabhakar et al [15] (1989)	0.31%
Mukherjee et al [19] (1990)	2.9%
Couto et al [16] (1993)	0.29%
Shaikh et al [17] (2007)	0.14%
Present study (2009)	**1.61%**

The above table shows that the overall incidence of yolk sac tumor is less and the findings are comparable with our study except for the study done by Gupta et al [10] (1986).

Table no: 15 Comparison of incidence of benign cystic teratoma with other workers.

Author	Year	Percentage (%)
Gupta et al [10]	1986	23.13%
Prabhakar et al [15]	1989	20.44%
Couto et al [16]	1994	16.09%
Ranu Sarkar [14]	1996	16.05%
Present Study (2009)	**2009**	**17.75%**

The above table shows that the incidence of benign cystic teratoma in the present study is almost similar to that of Couto et al [16] (1993), Ranu sarkar [14] (1996), whereas it is slightly lower as compared to the studies done by Gupta et al [10] (1986) and Prabhakar et al [15] (1989).

The patients were from 12-45 years of age with a mean age of 28 years. Tyagi et al [18] (1978) and Ranu Sarkar [14] (1996) had noted the mean age as 30 years and 26 years respectively.

All the tumours were unilateral and majority of the patients presented with pain and lump in abdomen. Similar observations were reported by other workers.

Table no: 16 Comparison of incidence of struma ovarii with other workers.

Author	No. of ovarian tumours studied	Percentage (%)
Tyagi et al [18] (1978)	130	1.54%
Gupta et al [10] (1986)	340	0.59%
Couto et al [16] (1994)	634	0.16%
Ranu Sarkar [14] (1996)	190	0.50%
Present Study (2009)	**062**	**1.61%**

The above table shows that the overall incidence of struma ovarii is less and is almost similar to that of other workers

III) Sex – Cord Stromal Tumours

In the present study, these tumours constituted 9.68% of all ovarian tumours. Gupta et al [10] (1986) and Ranu Sarkar [14] (1996) recorded their incidence as 7.06% and 5.3% respectively. Whereas, recent studies done by Gupta et al [4] (2007) and Shaikh et al [17] (2007) reported their incidence to be 8.3% and 5.03% respectively.

Sex cord - stromal tumors presented in the age group of 21 to 56 years.

Table no: 17 Comparison of incidence of granulosa cell tumour with other workers.

Author	Year	Percentage (%)
Tyagi et al [18]	1978	3.33%
Gupta et al [10]	1986	4.43%
Prabhakar et al [15]	1989	4.40%
Maheshwari et al [11]	1994	5.52%
Shaikh et al [17]	2007	3.60%
Present Study	**2009**	**4.84%**

The above table shows that the incidence of granulosa cell tumour in present study is comparable with the studies done by Gupta et al [10] (1986), Prabhakar et al [15] (1989), Maheshwari et al [11] (1994) and Shaikh et al [17] (2007).

Table no: 18 Comparison of incidence of fibroma with other workers

Authors	Percentage
Gupta et al [10] (1986)	2.33%
Ranu sarkar [14] (1996)	1.6%
Shaikh et al [17] (2007)	1.29%
Present study(2009)	**3.22%**

Incidence of this tumour in present study is 3.22% of all ovarian tumours. Gupta et a [10] (1986) reported the incidence as 2.33%, Ranu Sarkar [14] in 1996 as 1.6% and Shaikh et al [17] in 2007 as 1.29%. The above findings suggest that the incidence was high in our study.

Sclerosing Stromal Tumor

One case of sclerosing stromal tumor was noted in a 40 year female. Grossly, a left ovarian mass measuring 8x4.5x1.5cms was noted.

IV) METASTATIC TUMORS

Single case of Krukenberg tumour was found accounting for 1.61% of all ovarian tumours.

A 45 year female presented with epigastric pain and nausea. On USG bilateral ovarian tumor with normal uterus was noted. Grossly, bilateral ovarian tumors measuring 17x5.5x3.5 cms, bosselated, grey white, firm, cut section - gray white.

Table No: 19 Comparison of finding with other studies.

Authors	Percentage
Prabhakar et al [15] (1989)	1.57%
Couto et al [16] (1993)	1.46%
Shaikh et al [17] (2007)	1.58%
Present study (2009)	**1.61%**

The above table shows that the incidence of metastatic tumors (Krukenbergs tumor) was almost similar and very much comparable with other studies.

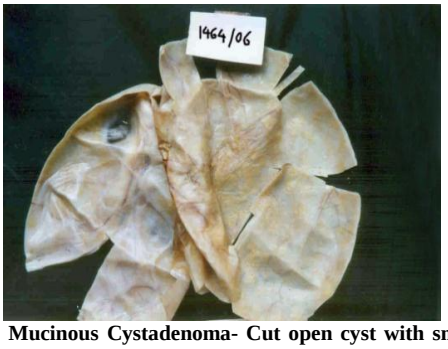


Fig 1: Mucinous Cystadenoma- Cut open cyst with smooth inner surface.

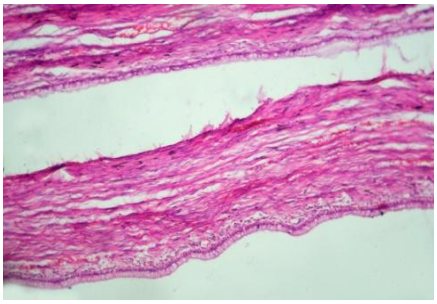


Fig 2: 10X H&E –Mucinous cystadenoma- Fibrocollagenous cyst wall lined by mucin Secreting tall columnar epithelium.

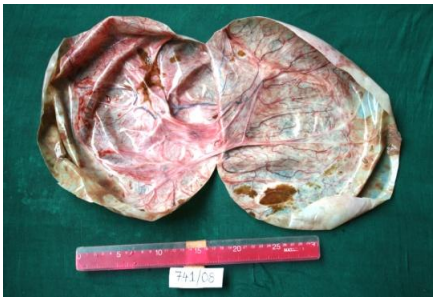


Fig 3: Serous Cystadenoma- Cut open cyst with smooth inner surface and filled with serous fluid.

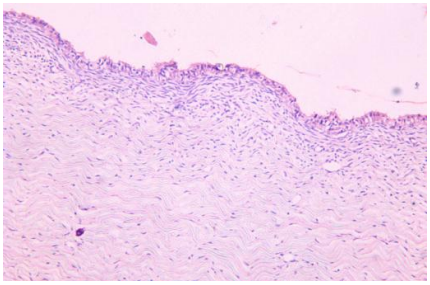


Fig 4: 10X H&E –Serous cystadenoma- Fibrocollagenous cyst wall lined by ciliated tall columnar epithelium

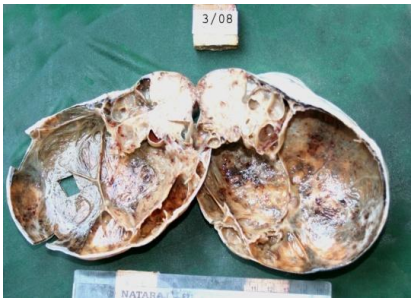


Fig 5: Borderline serous tumor- Cut open mass with multiloculated cysts and few solid areas.

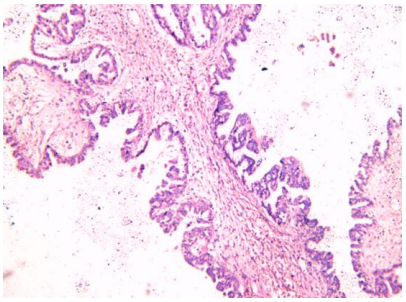


Fig 6: 10 X H&E- Borderline serous tumor- Fibrous cyst wall lined by multilayered epithelium arranged in complex architecture. The basement membrane is intact.

Fig 7: Serous cystadenocarcinoma -Cut section of bilateral ovarian partially cystic masses with variegated solid areas of papillary processes.

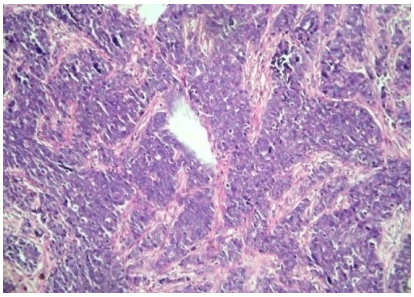


Fig 8: 40X H&E- Papillary serous cystadenocarcinoma.

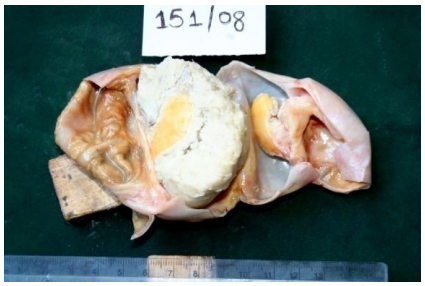


Fig 9: Mature cystic teratoma- Cut section of solod –cystic tumor filled with hair tuft entangled in groumous material.

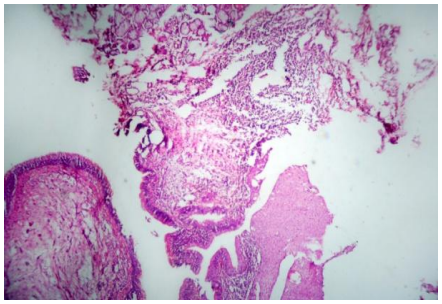


Fig 10: 10X H&E- Mature teratoma showing neural tissue, respiratory epithelium & serous glands.

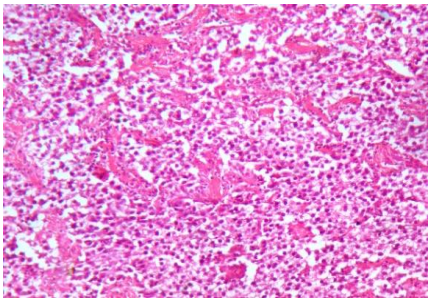


Fig 11: 10X H&E- Dysgerminoma- large clusters of polygonal cells with clear cytoplasm.

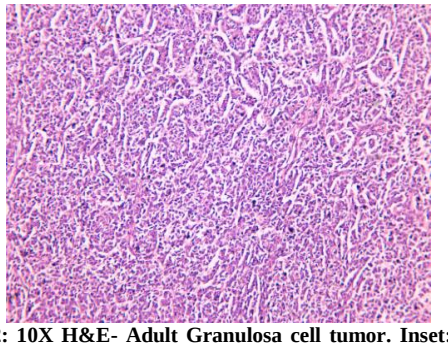


Fig 12: 10X H&E- Adult Granulosa cell tumor. Inset:40X- Coffee bean nuclei.

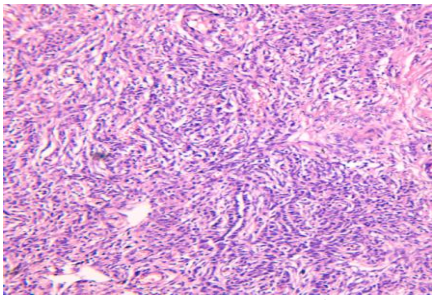


Fig 13: 10X H&E- Thecoma- Sheets of spindled cells.

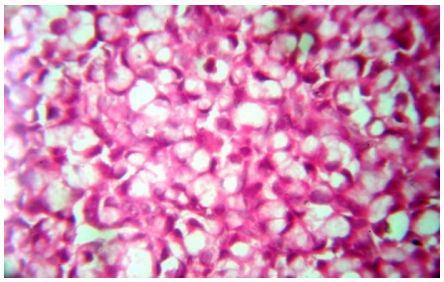


Fig 14: 40X H&E – Krukenberg tumor with diffusely spread signet ring cells.

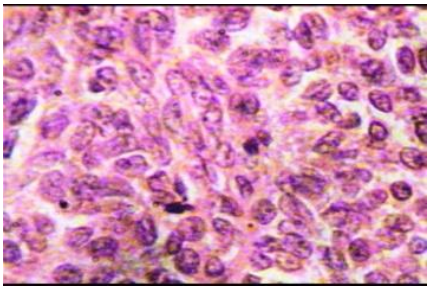


Fig.15

CONCLUSION

1. The overall incidence of ovarian tumours in our institute was 1.46%.
2. The commonest clinical presentation was lump and pain in abdomen.
3. The benign tumours were most common during younger age (3^{rd} decade) and the malignant tumours were most common during older age group (5^{th} decade).
4. Overall, serous cystadenoma was the most common tumour encountered in the present study with 12 cases (19.35%), followed by mature cystic teratoma with 11 cases (17.75%) and mucinous cystadenoma with 10 cases (16.14%). Serous cystadenoma was encountered most commonly during 3^{rd} and 4^{th} decade of life.
5. Amongst the malignant tumours, mucinous cystadenocarcinoma was the most common comprising 6 cases (9.67%) and seen most commonly during 5th decade of life.
6. Benign germ cell tumours were more common than the malignant germ cell tumours and mature cystic teratoma was the most common benign germ cell tumour.
7. 3 cases of metastatic tumors were found in our study, the primary site of 2 tumors were in the stomach and 1 in small intestine.

REFERENCES

1. Jha R, Karki S. Histological Pattern of Ovarian Tumors and their Age Distribution. Nepal Med Coll J 2008; 10(2): 81-85
2. Sternberg WH, Dhurandhar HN. Functional ovarian tumours of stromal and sex – cord origin. Human pathology 1977; 8: 565 – 582.
3. Talerman A. Haije WG, Baggerman L. Serum Alphafetoprotein (AFP) in Patients with Germ Cell Tumors of the Gonads and Extragonadal Sites: Corrrelation Between Endodermal Sinus (Yolk sac) Tumor and Raised Serum AFP. Cancer 1980; 46: 380-385.
4. Nalini Gupta, Dipti Bisht, Anil Kumar Agarwal, Veena K Sharma. Retrospective and Prospective Study of Ovarian Tumours and Tumour-like Lesions. Indian J. Pathol Microbiol 2007; 50(3): 525-527.
5. Prat J, Scully RE. Cellular fibromos and fibrosarcomas of the ovary. A comparative clinicopathologic analysis of seventeen cases. Cancer 1981; 47: 2663 – 2670
6. Pelusi G, Taroni B, Flamigni C. Benign Ovarian Tumors. Frontiers in Bioscience 1996; 16-19.
7. Fruscella E, Testa AC, Ferrandina G, De Smet F, Holsbeke VC, Scambia G, Zannoni GF, Ludovisi M, Achten R, Amant F. Ultrasound Features of different Histopathological Subtypes of Borderline Ovarian Tumors. Ultrasound Obstet Gynecol 2005; 26: 644-650
8. Malati T, G. Rajani Kumari, B.Yadagiri. Applications of Tumor Markers in Ovarian Malignancies. 2001; 16(2): 224-233.
9. Bhattacharya MM, Shinde SD, Purandare VN. A Clinicopatho-lological Analysis of 270 Ovarian Tumors. J Postgrad Med 1980; 26: 103-107.
10. Gupta SC, Singh PA, Mehrotra TN, Agrawal R. A Clinicopathologic study of ovarian tumours. Ind J Pathol Microbiol 1986; 29: 354-362.

11. Maheshwari V. Tyagi SP, Saxena K, Tyagi N, Sharma R, Aziz M, Hameed F. Surface epithelial tumours of the ovary. Ind J Pathol Microbiol 1994; 37(1): 75 – 85.
12. Saji Jacob, Lalitha K, Kaveri Gopalakrishnan, M. Krishnan Nair, Sankaranarayan R. Malignant Ovarian Tumors – A profile. J Obstet Gynecol Ind 1993; 413-417.
13. Kataki AC, Bhuyan C, Goswami BC, Ahmed GG. Malignant Ovarian Tumour – Analysis of 50 cases. J Obstet Gynec Ind 1993; 299-303.
14. Ranu Sarkar. Ovarian neoplasms – A 14 years study. J Obstet Gynecol India 1996; 46: 156 – 160.
15. Prabhakar B. R. and Maingi K. Ovarian Tumours – Prevalence in Punjab. Indian J. Pathol. Microbiol 1989: 32(4); 276-281.
16. Naseer A. Shaikh, Fazila Hashmi, Rukhsana Parveen Samoo. Pattern of Ovarian Tumors: Report of 15 years experience at Liaquat University Jamshroro. JLUMHS 2007; 13-15.
17. Francisco Couto, Nisha S. Nadkarni, Maria Jose D A P. Rebello. Ovarian tumours in Goa: A Clinicopathological Study of Ovarian Tumours J. Obstet Gynecol India 1994; 43: 408-412.
18. Tyagi SP, Madan A, Mohsin S, Hameed F, Saxena K. Epithelial tumours of ovary. Ind J Pathol Microbial 1978; 21:281-289.
19. Mukherjee Chhanda, Dasgupta Anjali, Ghosh RN, Sengupta J.Ovarian Tumors – A Ten years Study. J Obstet Gynec 1990; 691-696.
20. Minochi Bharti, Sen soumendra K, Dewan Rupali, Banerjee Sutopa, Sen Purba. Ovarian Germ Cell Tumor – A Clinical Profle and Management – 4 yrs study. J Obstet Gynecol Ind 2003; 53(1): 62-65.
21. Ramchandran G, Harilal KR, Chinnama K et al. ovarian neoplasm. Study of 903 cases. J obstet Gynecol 1972; 22: 309.

How to cite this article: Mundhe R, Pawar V, Powar S. A clinicopathologic study of ovarian neoplasms in a tertiary hospital. Int J Health Sci Res. 2016; 6(1):138-149.

****