Original Article

Clinicopathological Study of Ovarian Tumors: A 2-year Study

Vaddadi Manoja[1], M Pramood[1], Vaddadi Jyothi[2], K P A Chandrashekar[3]

[1]Assistant Professor, Department of Pathology, SVS Medical College, Mahabubnagar, Telangana, India, [2]Assistant Professor, Department of Pathology, Kurnool Medical College, Kurnool, Andhra Pradesh, India, [3]Professor, Department of Pathology, SVS Medical College, Mahabubnagar, Telangana, India

Abstract

Introduction: The ovarian tumors manifest a wide spectrum of clinical, morphological, and histological features. Their complex nature, unpredictable behavior, and prognosis and varying therapeutic strategies necessitate an accurate diagnosis.

Aims and Objectives: The aim is to study the incidence, age-related occurrence, clinical presentation, gross and various histopathological patterns of ovarian tumors and also to classify them according to World Health Organization (WHO) classification in our institute.

Materials and Methods: This retrospective study included 120 cases of histopathologically proven ovarian tumors, reported in the Department of Pathology, Narayana Medical College, Nellore over a 2 year period (June 2011 to May 2013). These were classified according to the WHO classification of ovarian tumors (2003).

Results: Of the 120 tumors studied, 108 (90%) were benign and 12 (10%) were malignant. Surface epithelial tumors were the most common (84.2%) followed by germ cell tumors (10%). Serous cystadenomas (56.67%) were the most common benign tumors, whereas serous cystadenocarcinomas (25%) were the most common malignant tumors. Benign tumors peaked between 31 and 40 years, whereas malignant tumors were common after 50 years. Mass abdomen and pain abdomen were the common modes of presentation.

Conclusions: Ovarian tumors are quite common in our setup and epithelial tumors are the most common variety of ovarian tumors. The histological type of ovarian tumor correlates with the prognosis of the tumor.

Key words: Germ cell tumors histological type, Ovarian tumors, Surface epithelial tumors

INTRODUCTION

The ovary is complex in its embryology, histology, and steroidogenesis and has the potential to develop malignancy. Therefore, ovarian neoplasms exhibit a wide variation in structure and biological behavior.[1]

Ovarian cancer accounts for about 3% of all cancers in women. Ovarian tumors represent about 27% of all female genital cancers and account for 52% of deaths caused by female genital cancers.[2] This high mortality is attributed to lack of symptoms in most patients with early stage of disease. In approximately 70% of the patients, the tumor has spread outside of pelvis at the time of presentation.[3] Unfortunately, patients with ovarian tumors are often symptom-free for a long time and the signs are often nonspecific. By the time, ovarian malignancy is established, about two-third of these are already advanced, and the prognosis is poor.[1]

Most ovarian tumors cannot be confidently distinguished from one another on the basis of their clinical or gross characteristics alone. These features provide important diagnostic clue in some cases; however, in such cases, both clinician and the pathologist should share their possibly valuable information in establishing correct diagnosis.[4]

The complex nature and unpredictable behavior and prognosis, controversial management make the ovarian tumors a difficult problem for gynecologist. The histogenesis of many tumors is interrelated and accurate

Corresponding Author: Dr. Vaddadi Manoja, House No: 7-43/9, Padmavathi Colony, Mahabubnagar - 509 001, Telangana, India. Phone: +91-9492568595. E-mail: vaddadi71@gmail.com

histopathological diagnosis is needed for effective treatment.

Aims and Objectives
The objectives of the present study are:
1. To classify the ovarian neoplasms as per the World Health Organization (WHO) classification,
2. To study the histological subtypes of ovarian neoplasms,
3. To study the distribution of ovarian neoplasms,
4. To study the age distributions of various tumors,
5. To correlate histopathology with clinical findings.

MATERIALS AND METHODS

In our retrospective study, 120 cases of ovarian tumors were studied from June 2011 to May 2013 in the Department of Pathology, Narayana Medical College and Hospital, Nellore, India. All the materials such as blocks and slides available in the department were studied.

The data were collected on a pro forma, which consists of the relevant information about age, clinical presentation, size of tumor, bilaterality, provisional diagnosis, operative findings, and histopathological analysis.

Specimens without the complete information were excluded from the study. The slides were stained with hematoxylin and eosin (H and E) stain and reviewed. In addition to H AND E, special stains, periodic acid-Schiff and reticulin stains, were done whenever necessary.

RESULTS

In the present study, 120 cases of ovarian neoplasms were studied during 2 years from June 2011 to May 2013.

Frequency of Benign and Malignant Tumors of Ovary
Out of 120 neoplastic lesions, 108 cases were benign comprising 90% and 12 cases were malignant accounting for 10% (Table 1).

The Clinical Presentation of the Patients with Ovarian Tumor
The most common symptom was mass per abdomen (49 cases; 40.8%) followed by pain abdomen (45 cases; 37.5%), menstrual abnormalities (1 cases; 10%), gastrointestinal disturbances (8 cases; 6.7%), and infertility (3 cases; 2.5%) (Table 2).

Distribution of Tumors in the Different Age Groups
The youngest case was a 12-year-old child with immature teratoma involving both ovaries and the oldest case was a 75-year-old female with serous cystadenoma. Majority

of the cases (35 cases; 29.2%) were in the age group of 31-40 years, followed by 21-30 years age group (30 cases; 25%) and 41-50 years age group (22 cases; 18.3%) (Table 3).

Laterality of Ovarian Tumors
In the present study, majority of the benign tumors (100 cases) were unilateral accounting for 92.6% and only 8 cases (7.4%) had bilateral tumors. Among the malignant tumors, 9 cases had unilateral tumors accounting for 75% and 3 cases (25%) had bilateral tumors (Table 4).

Size Ranges of Ovarian Neoplasms
In the present study, most of the tumors (55 cases) were in 5-9 cm size range accounting for 45.8%, followed by 10-19 cm size range (30 cases; 25%). Most of the tumors in 5-9 cm size range were benign in nature. Most of the

Table 1: Frequency of benign and malignant tumors of ovary

Type of neoplasm	*n* (%)
Benign	108 (90)
Malignant	12 (10)

Table 2: The clinical presentation of the patients with ovarian tumor

Clinical features	*n* (%)
Mass per abdomen	49 (40.8)
Pain abdomen	45 (37.5)
GI disturbances	8 (6.7)
Loss of weight/loss of appetite	2 (1.7)
Ascites	1 (0.8)
Menstrual abnormality	12 (10)
Infertility	3 (2.5)
Total	120 (100)

Table 3: Distribution of tumors in the different age groups

Age group (years)	*n* (%)
1-10	-
11-20	14 (11.7)
21-30	30 (25)
31-40	35 (29.2)
41-50	22 (18.3)
51-60	11 (9.2)
61-70	7 (5.8)
71-80	1 (0.8)
Total	120 (100)

Table 4: Laterality of ovarian tumors

Laterality	Benign (%)	Malignant (%)
Unilateral	100 (92.6)	9 (75)
Bilateral	8 (7.4)	3 (25)
Total	108 (100)	12 (100)

large tumors (>20 cm) were malignant accounting for 5% (6 cases) (Table 5).

Cut Section of Ovarian Neoplasms

In the present study, majority of ovarian neoplasms (86 cases; 71.7%) showed cystic areas on cut section, of which most of them were benign (85 cases; 98.8%). Among the malignant tumors, most of the tumors (7 cases, 58.3%) showed solid and cystic areas (Table 6).

Histological Types of Ovarian Neoplasms

Surface epithelial tumors accounted for 84.2% (101 cases) and formed the major group of ovarian tumors, followed by germ cell tumors (12 cases; 10%) and sex cord-stromal tumors (5 cases; 4.2%). One case showed secondary deposits (0.8%) and one case was an undifferentiated tumor (0.8%) (Table 7).

DISTRIBUTION OF CASES ACCORDING TO THE WHO CLASSIFICATION (2003)[5]

Among the surface epithelial-stromal tumors, serous cystadenomas were the most common (68 cases; 56.7%).

Among the germ cell tumors, benign cystic teratomas were the most common (11 cases; 9.2%). Immature teratoma was the only malignant case presented at the age of 12 years, involving both the ovaries. Among the 5 sex cord-stromal tumors, granulosa cell tumors were the most common (2 cases 1.7%). One case was an adult granulosa cell tumor with all the classical features, and another case was a juvenile granulosa cell tumor of well-differentiated type. Both the cases had TNM staging of T1a NxMx. One case was a Leydig cell tumor, presented at the age of 35 years as a unilateral solid tumor with primary infertility. Another case was a gynandroblastoma, presented at the age of 60 years involving the bladder, and only one case was a benign sex cord-stromal tumor with bilateral fibromas in a 12-year-old girl (Table 8).

Table 5: Size ranges of ovarian neoplasms

Size (cm)	n (%)
<4	29 (24)
5-9	55 (45.8)
10-19	30 (25)
>20	6 (5)
Total	120 (100)

Table 6: Cut section of ovarian neoplasms

Type of neoplasm	Cystic	Solid	Cystic+solid	Total
Benign	85 (78.7)	1 (0.9)	22 (20.4)	108
Malignant	1 (8.3)	4 (33.3)	7 (58.4)	12
Total	86	5	29	120

DISCUSSION

Ovarian tumors manifest a wide spectrum of clinical morphological and histological features. Cancers of the ovary rank second, next to malignancies of cervix among female genital tract. They have become increasingly important not only because of large variety of neoplastic entities but also because of increased mortality rates.

In the present study, 120 ovarian neoplasms were recorded during the study (June 2011-May 2013). The retrospective study with regards to ovarian neoplasms was done in a detailed manner. Clinical and pathological findings of these tumors were analyzed and correlated with different studies. According to the studies, the frequency of benign lesions was more when compared to malignant lesions of the ovary. Our observations were very much similar.

Frequency of Benign and Malignant Tumors of Ovary

In the present study, 108 cases (90%) were benign and 12 cases (10%) were malignant. This is similar to the studies conducted by Gupta *et al.*,[6] Jha and Karki,[7] Kuladeepa *et al.*,[8]

Table 7: Histological types of ovarian neoplasms

Tumor type	n (%)
Surface epithelial-stromal tumors	101 (84.2)
Sex cord-stromal tumors	5 (4.2)
Germ cell tumors	12 (10)
Metastatic tumors	1 (0.8)
Unclassified tumors	1 (0.8)
Total	120 (100)

Table 8: Distribution of cases according to the classification (2003)[5]

Histological sub types	n (%)
Surface epithelial-stromal tumors	101 (84.2)
Serous cystadenoma	68 (56.7)
Serous cystadenofibroma	2 (1.7)
Papillary serous cystadenoma	5 (4.2)
Mucinous cystadenoma	21 (17.5)
Papillary serous cyst adenocarcinoma	3 (2.5)
Mucinous carcinoma	1 (0.8)
Mixed serous and mucinous carcinoma	1 (0.8)
Sex cord-stromal tumors	5 (4.2)
Fibroma	1 (0.8)
Granulosa cell tumor	2 (1.7)
Leydig cell tumor	1 (0.8)
Gynandroblastoma	1 (0.8)
Germ cell tumors	12 (10)
Benign cystic teratoma	11 (9.2)
Immature teratoma	1 (0.8)
Metastatic carcinoma	1 (0.8)
Unclassified carcinoma	1 (0.8)
Total	120 (100)

WHO: World Health Organization

and Shoail *et al.*,[9] showing that the frequency of benign ovarian tumors was more compared to that of borderline and malignant (Table 9).

Comparison of Clinical Presentations in Benign Ovarian Neoplasms

In the present study, most of the patients with benign ovarian neoplasms presented with mass per abdomen (42.6%), followed by pain abdomen in 38.9% of cases. This observation was very much similar to the studies conducted by Kuladeepa *et al.*[8] In the study done by Yasmin *et al.*,[10] pain abdomen was the most common symptom (Table 10).

Comparison of Clinical Presentations in Malignant Ovarian Neoplasms

Studies conducted by Randhawa and Lata[11] and Goff *et al.* (2000)[12] showed mass per abdomen (25%) and pain abdomen (25%) as the most common symptom, similar to our study (Table 11).

Table 9: Frequency of benign and malignant tumors of ovary

Study	Benign %	Borderline %	Malignant %
Gupta *et al.*	72.9	4.1	22.9
Jha and Karki	83.9	-	16.1
Kuladeepa *et al.*	82.35	3.68	13.97
From Shoail *et al.*	74.8	1.6	23.4
Present study	90	-	10

Table 10: Comparison of clinical presentations in benign ovarian neoplasms

Symptoms	Yasmin *et al.*	Kuladeep *et al.*	Present Study
Mass per abdomen	14.71	67.16	42.6
Pain abdomen	70.59	63.4	38.9
Menstrual irregularity/post-menopausal bleeding	4.41	14.9	9.3
Ascites	-	4.47	-
GI disturbances	7.35	11.94	7.4
Urinary symptoms	2.94	5.97	-
Infertility	-	0.04	1.8
Loss of appetite/loss of weight	-	4.47	-

Table 11: Comparison of clinical presentations in malignant ovarian neoplasms

Symptoms	Randhwa and Lata	Goff *et al.* (2004)	Present Study
Mass per abdomen	75	43	25
Pain abdomen	55	22	25
Menstrual irregularity/post-menopausal bleeding	12.5	-	16.7
Ascites	-	27	8.3
GI disturbances	10	24	0
Urinary symptoms	2.5	16	-
Infertility	-	-	8.3
Loss of appetite/loss of weight	-	34	16.7

Table 12: Distribution of ovarian tumors in different age groups

Age in years	Jagadeeshwari *et al.* (1971) *n*=265 (%)	Verma and Bhatia *n*=403 (%)	Ashraf *et al.* *n*=212 (%)	Present study	
				Number of cases	Present study
1-10	-	4 (3.01)	1 (0.47)	0	0
11-20	10 (10.53)	13 (9.77)	27 (12.74)	14	11.6
21-30	25 (26.32)	23 (17.29)	64 (30.19)	30	25
31-40	28 (29.47)	63 (27.07)	48 (22.64)	35	29.2
41-50	20 (21.05)	29 (21.80)	39 (18.40)	22	18.3
51-60	9 (9.47)	22 (16.54)	22 (10.38)	11	9.2
61-70	3 (3.16)	4 (3.01)	08 (3.77)	7	5.8
>70	-	2 (1.50)	03 (1.41)	1	0.9
Total	95 (100)	133 (100)	212 (100)	120	100

Distribution of Ovarian Tumors in Different Age Groups

Our present study was similar to the studies conducted by Jagadeeshwari *et al.* (1990)[13] and Verma and Bhatia,[14] in which the frequency of ovarian tumors was more in the age group 31-40 years and ameena ashraf *et al.* (2012)[15] showed 21-30 years (Table 12).

Laterality of Benign Ovarian Tumors

The observation was very much similar to the studies conducted by Pilli *et al.*,[16] Jha and Karki,[7] and Kuladeepa

Table 13: Comparison of laterality of benign ovarian neoplasms

Study	Unilateral	Bilateral
Pilli *et al.*	92.2	7.8
Jha and Karki	93.3	6.67
Kuladeepa *et al.*	93.75	6.25
Present study	92.6	7.4

Table 14: Comparison of laterality of malignant ovarian neoplasms

Study	Unilateral	Bilateral
Prabhakar and Maingi	78.10	21.9
Misra *et al.*	82.98	17.02
Couto *et al.*	72.4	27.6
Kuladeepa *et al.*	68.42	31.58
Present study	75	25

Table 15: Comparison of size ranges

Size in cm	Okugawa *et al.* n=1648 (%)	Present study n (%)
<4	100 (6.07)	29 (24.2)
5-9	658 (39.93)	55 (45.8)
10-19	589 (35.74)	30 (25)
>20	152 (9.22)	6 (5)
Total	1648 (100)	120 (100)

et al.[8] showing most of the benign tumors were unilateral, of which most of them were surface epithelial tumors and germ cell tumors (Table 13).

Laterality of Malignant Ovarian Tumors

Our observations were very much similar to the studies conducted by Prabhakar and Maingi,[17] Misra *et al.*,[18] Couto *et al.*,[18] and Kuladeepa *et al.*[19] showing that most of the malignant tumors are unilateral (Table 14).

Comparison of Size Ranges

Our study was similar to the study conducted by Okugawa *et al.*,[20] which had the mean size of 4-9 cm (Table 15).

Frequency of Histological Types of Ovarian Neoplasms

Our study was similar to Ramachandran *et al.*,[21] Verma and Bhatia,[14] Swamy and Satyanarayana,[22] and Mondal *et al.* and Ashraf *et al.*,[15] in which surface epithelial tumors were the most common, followed by germ cell tumors (Table 16).

Frequency of Different Classes of Benign and Malignant Ovarian Tumors

Our study was similar to that of Jha and Karki.[7] Surface epithelial tumors had a higher incidence in both benign and malignant ovarian tumors (Table 17).

CONCLUSION

The ovarian tumors manifest a complex wide spectrum of clinical and pathological features. Correlation of age, clinical features, gross, various histological patterns, and categorizing according to the WHO classification help in early and accurate diagnosis as well as prognosis of ovarian tumors. Although histopathological study is still the gold standard in diagnosing most of the primary ovarian tumors, may be supplemented by the newer techniques such as

Table 16: Comparison of histological types of ovarian neoplasms

Types of tumors	Swamy and Satyanarayana (*n*=120)	Ashraf *et al.* (*n*=127)	Jha and Karki (*n*=161)	Santhosh *et al.* (*n*=957)	Present study *n*=120
Surface epithelial-stromal tumors	61.6	52.76	82.2	67.9	84.2
Sex cord-stromal tumors	21.7	43.31	42.2	5.6	4.2
Germ cell tumors	11.7	3.15	3.1	23.1	10
Metastatic tumors	5.0	0.78	2.4	3.2	0.8
Miscellaneous	-	-	-	-	0.8

Table 17: Comparison of different classes of benign and malignant ovarian tumors

Classes of tumors	Jha and Karki		Present study	
	Benign (%)	Malignant (%)	Benign %	Malignant %
Surface epithelial tumors	66 (41)	18 (11.2)	80	4.2
Sex cord-stromal tumors	4 (2.5)	1 (0.6)	0.8	3.4
Germ cell tumors	65 (40.3)	3 (1.9)	9.2	0.8
Metastatic	-	4 (2.5)	-	0.8
Miscellaneous	-	-	-	0.8

immunohistochemistry, morphometric analysis, and flow cytometric analysis of ploidy status, to resolve the difficult, dilemmatic cases and also to predict the prognosis.

REFERENCES

1. Howkins J, Bourne G. Shaw's Textbook of Gynecology. 15th ed. New Delhi: Elsevier; 2010. p. 376-89.
2. Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. CA Cancer J Clin 2009;59:225-49.
3. Damjanov I, Linder J. Aderson's Pathology. 10th ed., Vol. 2. United State of America: Mosby; 1996. p. 2231-309.
4. Mills SE. Stenberg's Diagnostic Surgical Pathology. 5th ed. Ch. 54. London and Tokyo: Lippincott Williams Wilkins; 2010. p. 2278-308.
5. Fox H, Wells M. Haines and Taylor Obstetrical and Gynecological Pathology. 5th ed., Vol. 1. London: Churchill Livingstone Pvt. Ltd.; 2003. p. 693-879.
6. Gupta N, Bisht D, Agarwal AK, Sharma VK. Retrospective and prospective study of ovarian tumours and tumour-like lesions. Indian J Pathol Microbiol 2007;50:525-7.
7. Jha R, Karki S. Histological pattern of ovarian tumors and their age distribution. Nepal Med Coll J 2008;10:81-5.
8. Kuladeepa AV, Muddegowda PH, Lingegowda JB, Doddikoppad MM, Basavaraja PK, Hiremath SS. Histomorphological study of 134 primary ovarian tumors. Adv Lab Med Int 2011;1:69-82.
9. Shoail I, Hayat Z, Saeed S. A comparative analysis of frequency and patterns of ovarian tumours at a tertiary care hospital between two different study periods (2002-2009). J Postgrad Med Inst 2012;26:196-200.
10. Yasmin S, Yasmin A, Asif M. Clinicohistological pattern of ovarian tumours in Peshawar region. J Ayub Med Coll Abbottabad 2008;20:11-3.
11. Randhwa I, Lata P. A study of ovarian neoplasms. J Obstet Gynaecol India 1980;30:531-5.
12. Goff BA, Mandel L, Muntz HG, Melancon CH. Ovarian carcinoma diagnosis. Cancer 2000;89:2068-75.
13. Jagadeeshwari N, Reddy RS, Rao KS. Incidence of ovarian tumors. J Obstet Gynaecol India 1990;40:582-6.
14. Verma K, Bhatia A. Ovarian neoplasms - A study of 403 tumors. J Obstet Gynaecol India 1981;31:106-11.
15. Ashraf A, Shaikh AS, Akram AI, Kamal F, Ahmad N. The relative frequency and histopathological pattern of ovarian masses. Biomedica 2012;28:98-102.
16. Pilli GS, Suneeta KP, Dhaded AV, Yenni VV. Ovarian tumours: A study of 282 cases. J Indian Med Assoc 2002;100:420, 423-4, 447.
17. Prabhakar BR, Maingi K. Ovarian tumors - Prevalence in Punjab. Indian J Pathol Microbiol 1989;32:276-81.
18. Misra RK, Sharma SP, Gupta U, Gaur R, Mishra SD. Pattern of ovarian neoplasm in Eastern UP. J Obstet Gynecol India 1991;41:241-6.
19. Couto F, Nadkarni NS, Rebello MJ. Ovarian tumors in Goa: A clinic pathological study. J Obstet Gynaecol India 1993;43:408-12.
20. Okugawa K, Hirakawa T, Fukushima K, Kamura T, Amda S, Nakano H. Relationship between age, histological type and size of ovarian tumors. Int J Gynecol Obstet 2001;74:45-50.
21. Ramachandran G, Harilal KR, Chinnamma KR. Ovarian neoplasms a study of 903 cases. J Obstet Gynaecol India 1972;22:309-15.
22. Swamy GG, Satyanarayana N. Clinicopathological analysis of ovarian tumors - A study on five years samples. Nepal Med Coll J 2010;12:221-3.
23. Mondal SK, Banyopadhyay R, Nag DR, Roychowdhury S, Mondal PK, Sinha SK. Histologic pattern, bilaterality and clinical evaluation of 957 ovarian neoplasms: A 10-year study in a tertiary hospital of eastern India. J Cancer Res Ther 2011;7:433-7.