

Histological pattern of ovarian tumors and their age distribution

R Jha and S Karki

Department of Pathology, TUTH, Maharajgunj, Kathmandu, Nepal

Corresponding author: Dr Runa Jha, Lecturer, Department of Pathology, TUTH, PO Box No. 3578, Maharajgunj, Kathmandu, Nepal, e-mail: runa75jha@yahoo.com

ABSTRACT

A female's risk at birth of having ovarian tumor sometime in her life is 6-7%. Relative frequency of ovarian tumor is different for western and Asian countries. Two third of ovarian tumors occur in women of reproductive age group. This study was done in Tribhuvan University Teaching Hospital with aim to find out frequency of different histological types of ovarian tumors and their age distribution and thus provide an institutional experience from Nepal also. One hundred and sixty one ovarian tumors, reported from April 2004 to March 2006 were included in the study. One hundred and thirty five of these tumors (83.9%) were benign and 16.1% (26/161) were malignant. Surface epithelial tumors were most common (52.2%) followed by germ cell tumors (42.2%). Mature cystic teratoma was commonest benign tumor (48.2%). Serous adenocarcinoma was commonest malignant tumor (46.2%). For all age groups, benign tumors were more common than malignant ones. Most ovarian tumors (47.2%) were seen between 21 -40 years where as most malignant tumors (73.1%) were seen above 40 years. In 1st two decades, germ cell tumors were more common than other tumors.

Keywords: Age distribution; Germ cell tumor; Surface epithelial tumor; ovarian tumors; Ovary.

INTRODUCTION

Ovarian cancer is 6th most common cancer in females in USA. A female's risk at birth of having ovarian tumor sometime in her life is 6.0-7.0%, of having ovarian cancer is almost 1.5% and dying from ovarian cancer is 1.0%.¹ Relative frequency of different ovarian tumor is different for western world and Asian countries. For example, surface epithelial tumors account for 50.0-55.0% of all ovarian tumors and their malignant counterpart for approximately 90.0% of all ovarian cancers in western world where as this figure is 46.0-50.0% and 70.0-75.0% respectively in Japan. Similarly mucinous tumors account for 12.0-15.0% of all ovarian tumors in western world. This figure is 20.0-23.0% for Japan. Germ cell tumors account for 30.0% of primary ovarian tumors and malignant germ cell tumors account for 3.0% of all ovarian cancers in western world.² About two third of ovarian tumors occur in women of reproductive age group. Fewer than 5.0% are found in children. Seventy five to eighty percent ovarian tumors are benign, 55.0-65.0% of benign tumors occur in females under 40 years. Benign serous tumors can occur at any age but are more common in reproductive age group. Serous carcinomas are extremely rare in first two decades of life. Mucinous cystadenoma may occur at any age but are most often diagnosed in 4th-6th decade. Mucinous cancers have mean age of 53-54 years. In patients under age of 21, approximately 60.0% ovarian tumors are germ cell tumors, accounting for two third of ovarian cancers in 1st two decades of life.¹

Tribhuvan University Teaching Hospital (TUTH) is a tertiary care centre that receives patients from all over Nepal. This study was conducted with the aim to find out frequency of different histologic types of ovarian tumors reported from Department of Pathology of TUTH and to analyse age distribution of these tumors.

MATERIALS AND METHODS

This retrospective study included all consecutive cases with histopathologically proven ovarian tumors, reported from Department of Pathology of TUTH, over two years period from April 2004 to March 2006. These included those patients who were operated at TUTH or were operated somewhere else but the specimen was processed in Department of Pathology of TUTH, irrespective of the surgical procedure by which tumor was removed. So all cystectomy, oophorectomy, salpingo-oophorectomy and total abdominal hysterectomy with bilateral or unilateral salpingo-oophorectomy specimens were included. However, patients with two different synchronous ovarian tumors were excluded from the study. World Health Organization classification of ovarian tumors² was used for classifying the tumors. All the required data were retrieved from the records of Department of Pathology of TUTH.

RESULTS

From April 2004 to March 2006, specimens from 164 cases with ovarian tumors were processed in our laboratory. Three patients had more than one type of

Table -1: Frequency of different classes of benign and malignant ovarian tumors

Classes of tumors	Benign (%)	Malignant (%)	Total (%)
Surface epithelial tumor	66	18	84 (52.2%)
Germ Cell tumor	65	3	68 (42.2%)
Sex cord stromal tumor	4	1	5 (3.1%)
Metastatic tumor	-----	4	4 (2.4%)
Total	135 (83.9%)	26 (16.1%)	161 (100.0%)

Benign tumors were more common than malignant tumors. Surface epithelial tumors were the commonest.

ovarian tumor (One patient had mature cystic teratoma and mucinous cystadenoma in same ovary, one patient had the coma in one ovary and serous cystadenoma in another and 1 patient had serous cystadenocarcinoma and metastatic leiomyosarcoma in same ovary), so they were excluded.

Out of 161 ovarian tumors included, 83.9% (135/161) were benign and 16.1% (26/161) were malignant. Surface epithelial tumors were most common (52.2%), followed by germ cell tumors (42.2%). Benign surface epithelial tumors comprised 48.9% (66/135) of all benign tumors whereas their malignant counterpart formed 69.2% (18/26) of all malignant tumors (Table-1).

Seventy six ovarian tumors (47.2%) were found in 21-40 years age group. For all age groups, benign tumors were more common than malignant ones. Eighty seven tumors were found up to 40 years of age. Out of these, 91.9% (80/87) were benign where as only 74.3% (55/74) of all tumors occurring above 40 years was benign. Malignant tumors were far less common below 40 years. Of all malignant tumors, 73.1% (19/26) were seen above

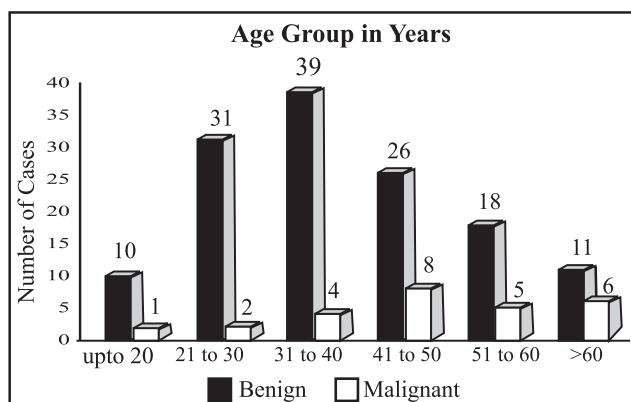


Fig. 1. Frequency of benign and malignant ovarian tumors in different age groups for all age groups, benign tumors were more common than malignant tumors.

Table-2: Frequency of different classes of tumors in different age groups

Classification					
Age group in years	Surface epithelial tumor	Germ cell tumor	Sex cord stromal tumor	Metastatic tumor	Total
Upto 20	2	8	1	0	11 (6.8%)
21-30	9	24	0	0	33 (20.5%)
31-40	25	17	1	0	43 (26.7%)
41-50	21	11	0	2	34 (21.1%)
51-60	17	5	0	1	23 (14.3%)
>60	10	3	3	1	17 (10.6%)
Total	84 (52.2%)	68 (42.2%)	5 (3.1%)	4 (2.5%)	161 (100%)

Most ovarian tumors were seen between 21-50 years.

40 years where as this was 26.9% (7/26) up to 40 years. Tumors belonging to borderline category were not seen during the study period (Fig.1).

Above 30 years, 117 tumors were found. Out of these 73 (62.4%) were surface epithelial tumors and were most common tumors occurring above 30 years. Up to 30 years 44 tumors were found, of this only 11 (25%) were surface epithelial tumors. In 1st three decades 72.7% tumors were germ cell tumors (Table-2).

Fifty seven serous surface epithelial tumors were seen and accounted for 35.4% of all ovarian tumors. Most serous tumors (78.9%) were benign whereas 21.1% were malignant. Mucinous surface epithelial tumors in this study accounted for 16.8% (27/161) of ovarian tumors. Out of these, 77.8% were benign and 22.2% were malignant. Germ cell tumors constituted 42.2% of all ovarian tumors. Most germ cell tumors (95.6%) were benign and all of these benign germ cell tumors were mature cystic teratomas. Benign germ cell tumors constituted 48.2% (65/135) of all benign ovarian tumors where as malignant germ cell tumors constituted 11.5% (3/26) of all malignant ovarian tumors (Table-3).

Overall mature cystic teratoma was the most common tumor. Mature cystic teratoma accounted for 40.3% of all ovarian tumors (65/161), 48.2% of all benign ovarian tumors (65/135) and 63.6% (7/11) of all tumors occurring below 20 years. However, among the malignant tumors, serous adenocarcinoma was most common and constituted 46.2% (12/26) of all ovarian malignancy.

Benign serous tumors were found from 15-82 years of life. Forty four were serous cystadenomas and one was serous cystadenofibroma. Out of these, 77.8% (35/45)

Table-3a: Frequency of individual benign tumors in different age groups

Diagnosis	age group in years						
	upto20	21-30	31-40	41-50	51-60	>60	Total (%)
Mature cystic teratoma	7	22	17	11	5	3	65 (48.2)
Serous cystadenoma	2	4	12	10	12	4	44 (32.6)
Mucinous cystadenoma	0	5	9	5	1	1	21 (15.6)
Thecoma	1	0	0	0	0	2	3 (2.2)
Serous Cystadenofibroma	0	0	1	0	0	0	1 (0.7)
Fibroma	0	0	0	0	0	1	1 (0.7)
Total	10	31	39	26	18	11	135 (100.0%)

were in 4th-6th decades. Serous carcinomas were not seen up to 30 years. Most serous carcinomas (83.3%) were seen above 40 years (Table-3).

Benign mucinous tumors were found from 22-65 years of life but 90.5% were in 3rd-5th decade, however like serous carcinomas mucinous carcinomas were also not seen up to 30 years. Similar to serous carcinomas, 83.3% (5/6) of all mucinous carcinomas were present above 40 years. Germ cell tumors were seen in all age groups; however they were most frequently seen in 3rd - 4th decade (60.3% all germ cell tumors). Up to 30 years all malignant tumors were germ cell tumors, all other were benign. Above 30 years all germ cell tumors were benign.

Sex cord stromal tumors comprised only 3.1% (5/161) of all ovarian tumors. They were not seen below 15 years. Metastatic tumors of ovaries were far less common than primary ovarian tumors. They comprised only 2.5% (4/161) of all ovarian tumors. All were seen above 40 years of age.

Bilateral ovarian tumors were seen in 21 patients. Bilaterality was more a feature of malignant tumors as 42.3% (11/26) malignant tumors were bilateral where as only 6.7% (9/135) benign tumors were bilateral. Fifty

percent (6/12) serous carcinomas, 50.0% (3/6) mucinous carcinomas and 50.0% (2/4) metastatic tumors were bilateral. Although 6.8% serous cystadenomas were bilateral in this study, none of the mucinous cystadenomas were seen bilaterally (Table-4)

DISCUSSION

In this study, 83.9% ovarian tumors were benign and 16.1% were malignant. This is similar to the data from western countries where 75.0-80.0% of ovarian tumors are benign.¹ Also study carried in India by Pilli *et al*³ had approximately similar results which showed that 75.2% ovarian tumors were benign, however this figure was only 59.2% in study carried in Pakistan by Ahmad *et al*.⁴

Surface epithelial tumors account for 50.0-55.0% of all ovarian tumors and their malignant forms for approximately 90.0% of all ovarian cancers in western world. Corresponding figure for Japan is 46.0-50.0% and 70-75% respectively.¹ In this study surface epithelial tumors comprised 52.2% of all ovarian tumors. This was different from results of similar studies from neighbouring countries like India³ and Pakistan⁴ where surface epithelial tumors comprised 70.9% and 63.5%

Table-3b: Frequency of individual malignant tumors in different age groups

Diagnosis	age group in years						
	Up to 20	21-30	31-40	41-50	51-60	>60	Total (%)
Serous cystadenocarcinoma	0	0	2	3	4	3	12 (46.2)
Mucinous cystadenocarcinoma	0	0	1	3	0	2	6 (23.1)
Metastatic adeno/ krukenberg tumor	0	0	0	2	1	1	4 (15.4)
Immature teratoma	1	1	0	0	0	0	2 (7.7)
Granulosa cell tumor	0	0	1	0	0	0	1 (3.8)
Yolk sac tumor	0	1	0	0	0	0	1 (3.8)
Total	1	2	4	8	5	6	26 (100.0%)

Table-4: Distribution of benign and malignant tumors in one or both ovaries

Diagnosis	Bilateral	Unilateral	Total
BENIGN			
<i>Mature cystic teratoma</i>	6	59	65
<i>Serous cystadenoma</i>	3	41	44
<i>Mucinous cystadenoma</i>	0	21	21
<i>Thecoma</i>	0	3	3
<i>Serous cystadenofibroma</i>	0	1	1
<i>Fibroma</i>	0	1	1
Total	9	126	135
MALIGNANT			
<i>Serous cystadenocarcinoma</i>	6	6	12
<i>Mucinous cystadenocarcinoma</i>	3	3	6
<i>Immature teratoma</i>	0	2	2
<i>Metastatic adenocarcinoma</i>	0	2	2
<i>Krukenberg tumor</i>	2	0	2
<i>Granulosa cell tumor</i>	0	1	1
<i>Yolk sac tumor</i>	0	1	1
Total	11	15	26

Bilaterality was mostly observed in malignant tumors

of all ovarian tumors respectively. Although frequency of surface epithelial tumor overall resembled data from the western world, malignant surface epithelial tumors constituted only 69.2% of all ovarian malignancies in this study.

In west, serous tumors account for about 30.0% of all ovarian neoplasm, 60.0% of these are benign, 10.0% are borderline and 30% are malignant. Similarly mucinous tumors account for 12.0-15.0% of all ovarian tumors in west. Approximately 75.0% mucinous tumors are benign, 10.0% are borderline and 15.0% are carcinomas.¹ In this study serous tumors constituted 35.4% of all ovarian tumors. This figure was 42.9% and 32.7% other studies.^{3,7} Mucinous tumors here comprised 16.8% of all ovarian tumors where as this figure were 25.5% and 25.0% in other studies.^{3,7} In this study, 78.9% of serous tumors were benign and 21.1% were malignant. Similarly 77.8% of mucinous tumors were benign and 22.2% were malignant. Borderline tumors were not seen.

Like other studies^{4,8,9} mature cystic teratoma was the commonest benign tumor and serous carcinoma was the commonest malignant tumor in this study. Ethnic difference among ovarian tumors have also been noted. In study of Thaniskasalam *et al*¹⁰ in Malaysia, teratomas were commonest benign tumors among Malays and

Chinese where as serous cystadenoma was commonest among Indians. We didn't study frequency of different ovarian tumors in different ethnic groups residing in Nepal.

We found that germ cell tumors comprised 42.2% of all ovarian neoplasms. This is similar to findings of Sah *et al*¹¹ and Kooning *et al*⁸ who found germ cell tumor to comprise 43.4% and 44.0% of all ovarian neoplasms respectively. 95.0% of ovarian germ cell tumors are mature cystic teratomas in the western world and only 3.0% of ovarian teratomas are immature.^{1,2} Similar figures have been found in this study also.

Sex cord stromal tumors account for 8.0% of all primary ovarian tumors.¹ Here they comprised 3.0% of all ovarian tumors. Literature shows that 70.0% metastatic ovarian tumors are bilateral and almost 10.0% of bilateral ovarian cancers are metastatic.¹ In this study, 50.0% of metastatic tumors were bilateral and 18.2% of bilateral ovarian cancers were metastatic.

So in our study, some data approximated to data from the western world where as some approximated to that of neighbouring countries like India and Pakistan. Even results of two studies from India are different.^{3,7} This study as well as studies from India and Pakistan which are included here for comparison have small sample size where as most data of western world is taken from results of large population based studies. This could be one cause of variation in results.

Similar to this study, other studies also show that most ovarian tumors occur in women of reproductive age group. Peak incidence of ovarian tumor is between 21-40 years.^{3,12} Benign ovarian tumors occur in all age group where as malignant ovarian tumors are more common in elderly.^{12,13} Majority of benign serous tumors occur in 4th-6th decade although they may occur in patients younger than 20 or older than 80 years.² Serous carcinomas are extremely rare in first two decades of life, average patient age for serous carcinomas is 56 years. Mucinous cystadenoma may occur at any age but are most often diagnosed in 4th-6th decade. Mucinous cancers have mean age of 53-54 yrs.¹ We also found similar results. Serous carcinomas were not seen in first 3 decades of life. Average age of patient for serous carcinoma was 53.3 years. Mucinous cystadenoma was seen from 22-65 years age group, however it was more common between 3rd-5th decade and mucinous cancers had mean age of 50.7 years.

Malignant germ cell tumors are most common ovarian cancers among children and adolescent females.² In patients under age of 21, approximately 60% ovarian tumors are germ cell tumors, accounting for two third of

ovarian cancers in 1st two decades of life.¹ Mature cystic teratomas account for half of ovarian neoplasms that appear in 1st two decades of life. Over 80.0% mature cystic teratomas occur during the reproductive period. Immature teratomas form 10.0-20.0% of ovarian cancers occurring in 1st two decades of life.¹ In study of Hassan *et al*¹⁴ in 1st two decades, 49.1% tumors were germ cell tumors and of all malignancies, malignant germ cell tumors comprised 44.5%. In this study, under 21 years of age 11 ovarian tumors were seen, out of which 8 (72.7%) were germ cell tumors. Mature cystic teratoma accounted for 63.6% of all ovarian neoplasms in 1st two decades and 60.0% were seen from 21-40 years age group. Malignant germ cell tumors here comprised 100.0% of all malignancies in 1st two decades.

Thus we conclude that benign tumors are more common than malignant ones for all age groups. Surface epithelial tumors are most common class of tumors, benign surface epithelial tumors being most common benign tumors and malignant surface epithelial tumors being most common malignant tumors. Considering individual tumors, mature cystic teratoma is the most common ovarian tumor overall as well as most common benign tumor where as serous cystadenocarcinoma is most common malignancy. Malignant ovarian tumors are more common above 40 years. Germ cell tumors are seen in all age groups and are most common tumor up to 30 years. Bilaterality is more frequently seen in malignant tumors.

However this study is institution based and has small sample size. So the result obtained may or may not reflect the actual histological pattern and age distribution of ovarian tumors in Nepalese women. So more studies with larger sample size should be done.

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