

Morphological Patterns of Ovarian Neoplasms in Different Age Groups - A Center based study

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ABSTRACT

Aim: To study the morphological patterns of ovarian tumors received in the department of Pathology, BMSI, JPMC over a period of five years.

Background: The most common type of lesions encountered in the ovary include functional or benign cysts and ovarian tumors. Ovarian tumor accounts for 6% of all cancers in the female population. Mature cystic teratoma is the most common germ cell tumor of ovary occurring at any age with a peak incidence in the first two decades of life. Malignant transformation of a mature cystic teratoma is an uncommon complication occurring in approximately 1-3% of mature cystic teratomas.

Methods: A retrospective study was conducted at the department of Pathology, BMSI, JPMC and all ovarian specimens received over a period of five years i.e., January 2008 to 31 December 2009 were received. All specimens were formalin fixed, routinely processed for paraffin embedding, sectioned and finally stained with haematoxylin and eosin using standard procedures.

Results: During the study period, a total of 1075 ovarian specimens were received out of which the ovaries of 508 cases were unremarkable. Out of remaining 567 cases 209(52.7%) were non neoplastic and 237(22%) were neoplastic lesions. Out of the neoplastic lesions, 185(17.2%) cases were benign tumors. The malignant lesions comprised of 2(.18%) immature cystic teratomas, 27(2.5%) mucinous cystadenocarcinomas, 23(2.1%) serous cystadenocarcinomas and 4(0.37%) were granulosa cell tumors. There was a rare case of mucinous cystadenocarcinoma arising from mature cystic teratoma in a 31 year old female.

Conclusion: We conclude that the commonest malignant tumor was mucinous cystadenocarcinoma followed by serous cystadenocarcinomas. We also suggest that all teratomas showing an overwhelming mucinous component should be thoroughly sampled and reviewed in order not to miss the diagnosis of malignancy and to avoid a misdiagnosis of mature teratomas.

Keywords: ovarian tumors, mucinous cystadenocarcinoma, mature cystic teratoma.

INTRODUCTION

Ovarian cancer often called 'silent killer' is the sixth most common cancer in the female population and subsequently a leading cause of death. It is one of the most intriguing tumors with diverse histological patterns and their ultimate behavior. Ovarian malignancies can be harbored in any age group with ovarian germ cell tumors seen in the younger age group and the malignant variety seen in the more elderly. Of all the malignancies encountered in the female population 15 – 20% are of ovarian nature¹.

Structural changes in ovary are responsible for formation of benign and malignant tumors which can arise from the epithelial wall of ovary, germinal epithelium or connective tissue of ovary. Cancer of the ovary is the most frequent cause of death from

gynecologic malignancies and the fourth most common cause of death from cancer in woman in Europe and United States² simulating the results from Pakistan the fourth most common malignancies encountered is of ovarian nature³. The definite categorization of ovarian tumor is very important as 20 – 30% of all ovarian tumors are malignant⁴.

Younger age at presentation and higher frequency of positive family history are two unusual features of Pakistani patient with epithelial ovarian cancer³. Reproductive age group of women constitutes about 2/3rd of the age group while in children it constitutes fewer than 5%⁵. However ovarian tumors in infants and children are extremely rare comprising only a small proportion of all ovarian neoplasms⁶.

Mature cystic teratomas are recognized as one of the most common tumors in women during reproductive age group with peak incidence in the first two decades of life. The largest number of ovarian tumors comprise of the surface epithelial group, followed by ovarian germ cell tumors representing 15% – 20% of all ovarian tumors out of

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which the malignant germ cell tumors represent 5% of ovarian tumors⁷.

The most recent surveillance, epidemiology and results calculations of lifetime risk for ovarian cancer are that 1 in 55 women will develop ovarian cancer over their lifetime⁸. Our study is based on morphological review of ovarian tumors in various age groups.

The objective of the study was to study the frequency and morphological patterns of various ovarian tumors in different age groups in a tertiary care hospital.

MATERIAL AND METHODS

A retrospective and prospective study was conducted at the department of Pathology, BMSI, JPMC to determine the morphological patterns of all ovarian tumors received at our department over a period of five years i.e. from January 2008 to December 2012. During this period a total of 353 cases of ovarian tumors were received. All specimens were formalin fixed, routinely processed for paraffin embedding, sectioned and finally stained with haematoxylin and eosin using standard procedures. Special stains were used where necessary.

RESULTS

During the five years study period, a total of 1088 cases of ovarian specimens were received and documented out of which the major bulk of ovaries removed that is 447(41.8%) were unremarkable, 189(17.3%) were haemorrhagic luteal cysts and 99 out of total of 1088(9%) cases were follicular cysts. The remaining 353 cases of neoplastic ovarian lesions were taken into consideration for evaluation in our study.

Of the 353 ovarian tumors, 79% were benign and 63(17.8%) were malignant. Surface epithelial tumors were most common i.e., 279 out 353(79%) followed by germ cell tumors which were 59 out of 353 (16.1%) (Table 1) Benign surface epithelial tumors comprised 211/353 (59.7%) whereas their malignant counterpart formed 57/353 (16.1%) (Table 2).

Most benign surface epithelial tumors were serous cyst adenomas i.e., 134/353 (37.9%) followed by mucinous cyst adenomas i.e., 76/353(21.52%). Only 1(28%) case of transitional Brenner tumor was seen in entire five years.

Whereas amongst the malignant epithelial tumor 32/353 cases (9.06%) of serous cystadenocarcinomas, 21/353 (5.9%) cases of mucinous cystadenocarcinomas, 2/353 (.56%) cases of

endometrioid carcinoma and 2/353 (.56%) cases of malignant clear cell tumor were seen.

Borderline surface epithelial tumors comprised only 11/353 (3.11%) out of which 5/353 (1.41%) were serous and 6/353 (1.61%) were mucinous in nature.

Germ cell tumors constituted 16.7% (59/353) of all ovarian tumors. Most germ cell tumors were benign and composed of Mature cystic teratomas with a percentage of 14.1% (50/353) whereas the immature teratomas were relatively fewer that is 3/353 (.84%) followed by undifferentiated carcinoma that was 2/353 (.56%)

Out of all ovarian neoplasms, serous surface epithelial tumors were the most commonly occurring tumor followed by mature cystic teratomas. However amongst the malignant tumors, serous cystadenocarcinomas accounted for most occurring tumor that is 32/353 (9.06%)

During the course of our study, we also encountered a rare and interesting case of a collision tumor in which mucinous cystadenocarcinoma occurred in mature cystic teratoma in the ovary of a 31 years old unmarried girl.

Amongst the sex cord stromal tumors the frequency of benign tumors was more than the malignant ones which in turn were rare with an occurrence of one case out of 353(.28%) in five years.

The age distribution of ovarian tumors observed was that 224/353 (63.4%) tumors were found upto age 40. Out of these most were benign ovarian tumors. Malignant tumors were less common below 40 years of age. Of all malignant tumors 14% (50/353) were seen above 40 years of age whereas this figure was 9.6% (34/353) upto 40 years of age.

Above 30 years, 316 ovarian tumors were found. Out of these 69.4% (245/353) were surface epithelial tumors and were most common tumors occurring above 30 years of age. Upto 30 years, 39.0% (138/353) tumors were found out of these only 28.8% (102/353) were surface epithelial tumors. In the first three decades, benign germ cell tumors were most common preceded only by surface epithelial tumors (Table 3A).

Benign serous tumors were found in the 15–95 years of lifespan. Serous cystadenocarcinomas were not seen upto 20 years of age. Most serous cystadenocarcinomas were above 40 years of age.

Borderline ovarian neoplasms accounted for only 3.11% of all ovarian tumors and comprised mainly of serous and mucinous surface epithelial tumors & were mostly seen in 3rd – 5th decade of life.

Benign mucinous tumors were found from 15 – 70 years of life but most were in the 3rd–5th decade. Like their serous counterpart, majority of mucinous cystadenocarcinoma were also not seen upto 30

years of age. 52.3% of mucinous tumors were present above age 40 years (Table 3B). Germ cell tumors were seen in all age groups, however, most frequent occurrence was between 21 – 50 years of

age group that is 3rd – 4th decade of life. Sex cord stromal tumors comprised only 1.7% of all ovarian tumors. They were not seen below 20 years of age.

Table 1

Surface Epithelial Tumors	Benign	Borderline	Malignant
Serons	134	5	32
Mucinons	76	6	21
Brenner Tumor	1	-	-
Endometroid	-	-	2
Clear Cell Carcinoma	-	-	2
Total	211(59.7%)	11(3.11%)	57(16.14%)

Table 1A: Relative frequencies of benign and malignant ovarian tumors (n=353)

Cases of tumor	Benign (%)	Borderline (%)	Malignant (%)	Total (%)
Surface epithelial tumors	211 (59.7%)	11 (3.1%)	57 (16.1%)	279 (79.0%)
Germ Cell tumors	54 (15.2%)	-	05 (1.4%)	59 (16.7%)
Sex cord stromal tumors	14 (3.9%)	-	01 (0.28%)	15 (4.2%)
Total	279 (79%)	11 (3.1%)	63 (17.8)	353 (100%)

Table 2: Age wise distribution of different benign and malignant tumors

Ages (Years)	SE tumors	GC tumors	SCS tumors	Total
Upto 20	25	09	01	35
21-30	77	24	04	105
31-40	70	11	05	86
41-50	47	07	06	60
51-60	39	06	01	46
> 60	16	02	03	21
Total:	274	59	20	353

SE: Surface epithelial tumors

GCT: Germ Cell tumors

SCS: Sex cord stromal tumors

Table 3A: Frequency of various types of benign ovarian tumors according to age groups

Diagnosis	Age in years						Total
	Upto 20	21-30	31-40	41-50	51-60	>60	
Mature Cystic teratoma	4	19	12	7	6	2	50
Serous cystadenoma	9	40	37	21	17	8	132
Mucinous cystadenoma	9	24	16	18	11	4	82
Thecomas	0	2	0	3	0	0	5
Germ Cell tumors	0	0	1	3	1	0	5
Brenner tumor	0	0	0	0	0	1	1
Fibromas	0	1	2	0	0	1	4
Total:	22	86	68	52	35	16	279

Table 3B: Frequency of various types of malignant tumors according to age groups

Diagnosis	Age in years						Total
	Upto 20	21-30	31-40	41-50	51-60	>60	
Serous Cystic adenocarcinoma	0	3	6	8	10	5	32
Mucinouscyst adenocarcinoma	1	4	5	16	3	0	19
Immature teratoma	2	1	0	0	0	0	3
Dysgerminoma	3	1	0	0	0	0	4
Undifferentiated round to oval tumor	1	1	0	0	0	0	2
Malignant clear cell tumor	1	1	0	0	0	0	2
Lipid cell tumor	0	1	0	0	0	0	1
Total	22	86	68	52	35	16	279

DISCUSSION

Ovarian cancer is among the ten most commonly occurring cancers². Our study reports an analysis of 353 ovarian tumors of which the major bulk was of surface epithelial tumors which have been further sub classified and analyzed. In this study 79% of the tumors are benign and 17.8% are of malignant nature whereas only 3.11% fall in the borderline category.

In our study surface epithelial tumors comprised 79% of all ovarian tumors. This is in contrast to studies carried out with similar criteria in neighboring countries like Nepal where surface epithelial tumors were only 52.2% of all ovarian neoplasms⁵. Nevertheless, a study carried in Iran shows the incidence of surface epithelial tumors as 67.1%⁹.

Our study shows that 48.4% (171/353) of ovarian neoplasms are of serous variety, of which 37.9% (134/353) are benign and 9.0% (32/353) are malignant and only 1.4% are borderline serous tumors. Mucinous tumors here comprised 29.1% (103/353) of all ovarian tumors as well, as this figure is 30% of all ovarian tumors in other studies^{3,4}.

Serous tumors were found to be more common than mucinous tumors. Similar results have been compiled by other hospital based studies in neighbouring countries where serous tumors outnumbered the mucinous variety^{8,13}.

In our study, the serous cystadenoma surpassed as the commonest benign tumor and serous cystadenocarcinoma as the commonest malignant tumor. This is in contrast to a study conducted by R. Jha and Karki, 2008 in Nepal where mature cystic teratoma is by far the commonest benign tumor.

Regarding the borderline ovarian tumors, most were of surface epithelial origin and accounted for 3.1% of all ovarian tumors. Another study done by Sohail et al, 2012 showed the occurrence of borderline ovarian tumors to be 1.6% of all ovarian tumors and the mean age of patients was more than 40 years old¹³. It was also noted by them that patients with borderline ovarian tumors were younger than those with massive carcinoma and the risk decreases with increasing parity¹³.

A study conducted in India is in consistence with our results where the germ cell tumors comprised the second most common group of ovarian neoplasms that is 24.3% of all ovarian tumors owing to the frequent occurrence of mature cystic teratoma whereas this figure was 14.1% (50/353) for mature cystic teratoma in our study.

A study based on the childhood tumors accounts for more than 80% occurrence of germ cell neoplasms amongst all ovarian cancers⁷.

In our study 94.3% (50/53) of germ cell tumors were mature cystic teratomas and only 5.6% (3/53) were immature cystic teratoma. Similar figures have been found in studies conducted in other countries. In a study conducted in France, 15%–20% of all ovarian tumors are of germ cell variety, 95% are mature cystic teratomas and only 5% immature cystic teratomas⁷, also in consistence with our study.

Sex cord stromal tumors account for 4.2% of all ovarian tumors and is in consistence with the data submitted in the west⁶ whereas this data was 3% in a study in Nepal⁹ and 6.8% in a study from India¹⁰.

The incidence of gynecologic malignancies is highly dependent on age. Similar to our study, other studies also show that most ovarian tumors occurred in women of reproductive age groups. Peak incidence for ovarian tumors is 21 – 50 years. The variation in the occurrence of benign tumors in all the age groups and malignant tumors in the elderly is also conspicuous and in consistence with other studies.

The age of the patients in our study varied from 9 -95 years old. Majority of benign serous tumors occurred in the 4 – 6th decade of life but occurrence in patients younger than 20 and older than 70 has also been noted. Mucinous cystadenomas may occur at any age but mostly occurred between 21–60 years of age groups. The malignant counterpart had a mean age of 42 yrs.

Among the children and adolescents, the malignant germ cell tumors are the most prevalent. In a study conducted in France, the germ cells tumors of ovary represent 15 – 20% of all ovarian tumors. Mature cystic teratomas account for half of ovarian neoplasms that appear in first two decades of life and mostly occur in the reproductive age group.

Malignant transformation of mature cystic teratoma is an uncommon complication occurring in approx. 1 – 3% of all mature teratomas¹¹. We encountered just one such case in our five year study span, where mucinous cystadenocarcinoma occurred in a mature cystic teratoma. Adenocarcinoma arising in a mature cystic teratoma is extremely rare. Definite diagnosis is most often rendered postoperatively. The malignant transformation is rare and just 6.8% and prognosis is very poor¹².

Conclusively we can say that benign tumors are more common than malignant ones for all age groups. Surface epithelial tumors comprise the most frequently occurring and the benign surface epithelial tumor being the most common, whereas the malignant serous epithelial tumors as the most frequent malignant ovarian tumor which occurs most frequently in the age group 21 – 50 years. Germ cell tumors are most frequent in the adolescents.

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