Original Article

Pediatric ovarian tumors in a tertiary care hospital of Kolkata: An experience of last 5 years with its clinicopathological correlation

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ABSTRACT

Background: Pediatric ovarian tumors are rare with an approximate incidence of 2.6 per 100,000 girls per year. Aims and Objectives: This study was done to delineate the clinicopathological profile of pediatric ovarian masses encountered in a tertiary care hospital over 5 years. **Materials and Methods:** A retrospective study was conducted for a period of 5 years during which all patients whose age did not exceed 20 years and underwent surgical resection of ovarian masses, were included. History, operative notes, gross findings, and microscopic features of each case were noted. **Results:** A total of 76 cases were included in the study. The age of patients ranged between 2 and 20 years with a mean of 17 ± 2.5 years. Of the 76 cases, 53 (69.7%) were benign and 23 (30.3%) malignant tumors. The benign tumors included 16 cases each of teratoma (21.1%) and serous cystadenoma (21.1%), and 21 cases of mucinous cystadenoma (27.6%). Germ cell tumors were the commonest malignant tumors in patients up to 15 years of age and they included four cases of dysgerminoma (5.3%) and one case of immature teratoma (1.3%). Between 16 and 20 years, 8 cases of serous cystadenocarcinoma were found (10.5%), in addition to seven malignant germ cell tumors (9.2%). One case (1.3%) each of granulosa cell tumor and sertoli leydig cell tumor was also found in the same age group. **Conclusion:** Pediatric ovarian tumors require early attention and institution of appropriate treatment since they bear important implications on the future lives of young females.

Key words: Ovarian tumors, pediatric age, tertiary care hospital

INTRODUCTION

The ovary contains four types of tissues – surface epithelium, germ cells, sex cords, and stromal tissue. The ovarian tumors are classified according to the tissue of origin.[1] Most ovarian tumors in the pediatric age group are of nonepithelial origin, in sharp contrast to the adults.[2] The incidence of pediatric ovarian tumors is approximately 2.6/100,000 girls per year.[3] Though rare, these tumors are of much importance due to the numerous challenges they present both to the clinician and the pathologist.

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It has been estimated that nearly 50% of all ovarian tumors in the pediatric population are malignant. Of these malignant tumors, the commonest type is germ cell tumors (85%), followed by epithelial malignancies (8%) and sex cord stromal tumors (5%).[4] These tumors have various histologic patterns, which in many cases, are overlapping, thereby creating diagnostic dilemmas. Serum tumor marker levels are of help in these instances. The surgeon's task is complicated by the need of conserving fertility and ensuring correct dosage of cytotoxic drugs to minimize side effects of chemotherapy in these patients.

There is not much data available regarding ovarian tumors of pediatric population from Eastern Region of India. This

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study aims to contribute in a small but significant way to the existing literature with respect to the clinicopathological profile of pediatric ovarian masses encountered in a tertiary care hospital over a period of 5 years.

MATERIALS AND METHODS

This is a retrospective study conducted in the Department of Pathology of a tertiary care hospital of Eastern India over a period of 5 years from May 2010 to April 2015. The patients whose age did not exceed 20 years and underwent surgical resection of ovarian masses during this time period in the Gynecology Department were included in the study.

The record books of the Pathology Department were analyzed to gather information regarding the patients. History, operative notes, gross findings, and microscopic features of each case were noted. Serum tumor marker levels were also recorded, whenever available.

RESULTS

A total of 76 cases were included in the study conducted over a period of 5 years in a tertiary care hospital. The age of the patients ranged between 2 and 20 years with a mean of 17 ± 2.5 years.

Incidentally, the percentage of ovarian cancers in both pediatric and adult age groups during the study period was found to be 34%. The total number of cancers seen in the pediatric age group in the same period was 676. Among these, number of ovarian cancers was noted to be 23 (3.4%).

Of the 76 cases included in the present study, 53 (69.7%) were benign and 23 (30.3%) malignant tumors. The benign tumors included 16 cases each of teratoma (21.1%) and serous cystadenoma (21.1%), and 21 cases of mucinous cystadenoma (27.6%). However, mucinous tumors were not found in patients below 10 years of age. Germ cell tumors were the commonest malignant tumors in patients up to 15 years of age and they included 4 cases of dysgerminoma (5.3%) and 1 case of immature teratoma (1.3%). However, in the age group between 16 and 20 years, 8 cases of serous cystadenocarcinoma were found (10.5%), in addition to 7 malignant germ cell tumors (9.2%). One case (1.3%) each of granulosa cell tumor (adult type) and sertoli leydig cell tumor was also found in the same age group [Table 1 and Figures 1, 2].

Among the 5 (6.6%) cases of immature teratoma found in the study, 2 were of Grade 1 and the other 3, Grade 2. Of the 9 (11.8%) cases of serous cystadenocarcinomas diagnosed during the study period, 5 were in FIGO stage IB, 3 in stage IA, and 1 in stage IC.

The commonest symptom of the patients was abdominal pain and gradual distension of the abdomen, present in 90.8% cases. Acute abdominal pain due to torsion of the tumor was the presenting feature of 16 (21.1%) cases of benign cystic teratoma and 2 (2.6%) cases of serous cystadenoma. Of the 23 patients with malignant ovarian tumors, weight loss was present in 19 (25%) cases. Precocious puberty was found in the single case of granulosa cell tumor [Table 2].

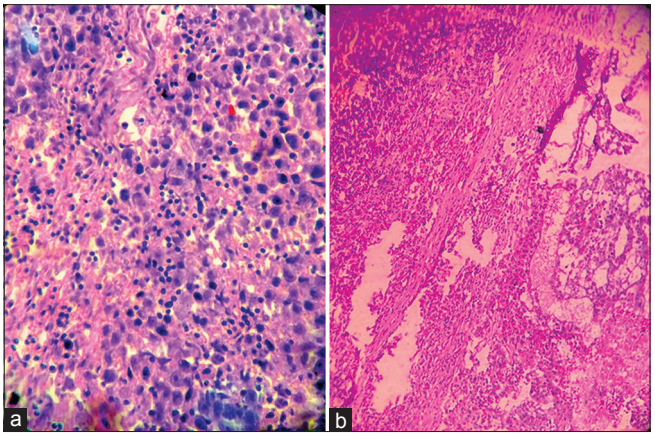

Figure 1: (a) Dysgerminoma; sheets of tumor cells with intervening fibrous bands infiltrated by lymphocytes (H and E, ×400). (b) Mixed germ cell tumor having both dysgerminoma (left side) and yolk sac components (evident by the presence of reticular pattern on the right-hand side) (H and E, ×100)

Table 1: Age-wise distribution of pediatric ovarian tumors

Age group	Total number of cases	Germ cell tumors		Surface epithelial tumors		Sex cord stromal tumors
		Benign	Malignant	Benign	Malignant	
1-5	Benign (2) Malignant (1)	Teratoma (1)	Dysgerminoma (1)	Serous cystadenoma (1)	-	-
6-10	Benign (3) Malignant (1)	Teratoma (1)	Immature teratoma (1)	Serous cystadenoma (2)	-	-
11-15	Benign (5) Malignant (4)	Teratoma (2)	Dysgerminoma (3)	Serous cystadenoma (1) Mucinous cystadenoma (2)	Serous cystadenoca (1)	
16-20	Benign (43) Malignant (17)	Teratoma (12)	Immature teratoma (4) Mixed germ cell tumor (3)	Serous cystadenoma (12) Mucinous cystadenoma (19)	Serous cystadenoca (8)	Granulosa cell tumor (1) Sertoli Leydig cell tumor (1)
Total	Benign (53) Malignant (23)	Teratoma (16)	Dysgerminoma (4) Immature teratoma (5) Mixed germ cell tumor (3)	Serous cystadenoma (16) Mucinous cystadenoma (21)	Serous cystadenoca (9)	Granulosa cell tumor (1) Sertoli–Leydig cell tumor (1)

Cystadenoca: Cystadenocarcinoma

Fertility sparing surgery was undertaken in all benign cases and also in all unilateral malignant ovarian tumors. Unfortunately fertility could not be spared in the 7 (9.2%) cases of bilateral malignant ovarian tumors encountered in the study. Fertility sparing surgery was done in 69 (90.8%) cases. Bilateral salpingo-oophorectomy was undertaken in the 5 (6.6%) cases diagnosed as FIGO stage IB serous cystadenocarcinomas and 2 (2.6%) cases of bilateral malignant germ cell tumors.

The gross features of the ovarian tumors were studied in detail. Most of the tumors (54%) ranged in size between 11 and 15 cm. Only 13 (17%) tumors exceeded 15 cm in size. These included 4 cases of serous cystadenocarcinoma, 7 cases of serous cystadenoma, and 2 cases of mucinous cystadenoma. Out of the 28 (36.8%) germ cell tumors, only 4 (5.3%) were <10 cm in size and the rest (31.6%) were larger (11–15 cm). Bilateral tumors were found in 7 (9.2%) cases. Among these, 5 (6.6%) were serous tumors and 2 (2.6%) germ cell tumors [Table 3]. Both solid and cystic components were found in most of the tumors diagnosed as malignant neoplasms [Figure 3].

Reports of serum tumor marker levels were available only in a few cases. Inhibin level was found to be raised in the case of granulosa cell tumor. Serum alpha fetoprotein (AFP) was elevated in two cases of immature teratoma and one case of mixed germ cell tumor, in which the components were dysgerminoma and embryonal cell carcinoma. High serum level of cancer antigen 125 (CA-125) was noted in five cases of serous cystadenocarcinoma.

Table 2: Clinical features of pediatric patients with ovarian tumors

Symptom	Number of patients (%)
Abdominal swelling and pain	69 (90.8)
Acute abdominal pain	18 (23.7)
Weight loss	19 (25)
Precocious puberty	1 (1.3)

Table 3: Gross features of pediatric ovarian tumors

Gross feature	Number of cases (%)
Size (cm)	
≤10	22 (29)
11-15	41 (54)
>15	13 (17)
Laterality	
Unilateral	69 (91)
Bilateral	7 (9.2)

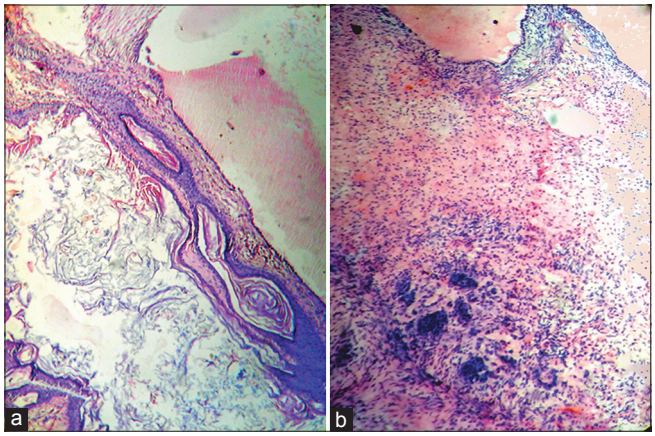

Figure 2: (a) Mature cystic teratoma with a lining of keratinized stratified squamous epithelium (H and E, ×100). (b) Immature teratoma showing sheets of immature neuroectodermal elements (H and E, ×100)

DISCUSSION

Ovarian tumors have been reported to be rare in the pediatric population.[5] But considering the anxiety they cause to the parents and the physical and mental trauma they inflict on the young victims, their importance cannot be denied. The incidence of ovarian neoplasms is found to increase with age, especially after 14 years. This has mostly been attributed to the hormonal changes following menarche at approximately the same age. Other genetic and environmental factors have also been implicated.[6]

Benign ovarian tumors are more common than the malignant ones in pediatric age group.[7] In the present study, 69.7% cases were benign and 30.3% were malignant. Ammor *et al*. reported an incidence of 61% of benign ovarian neoplasms in their study.[5]

Malignant ovarian tumors account for 3% of all pediatric cancers. They in turn constitute 20 to 25% of all pediatric ovarian neoplasms.[8] The commonest cause of pediatric ovarian malignancy has been reported to be germ cell tumors in most studies. The common subtypes found are immature teratoma, dysgerminoma, and mixed germ cell

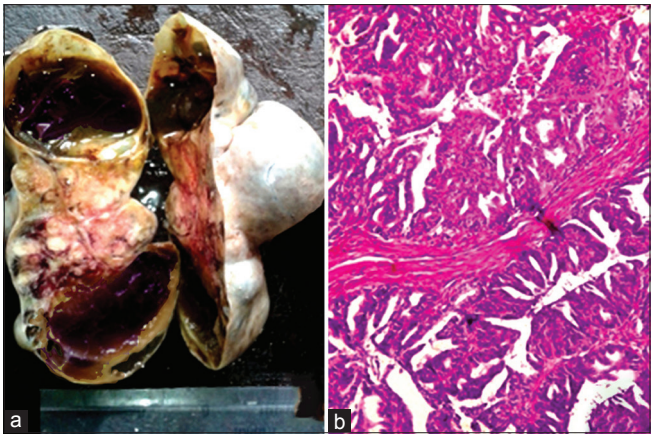

Figure 3: (a) Gross appearance of an ovarian tumor showing both solid and cystic areas. (b) Photomicrograph of the same tumor showed destructive invasion of ovarian stroma by numerous papillae lined by large cells with hyperchromatic pleomorphic nuclei and prominent nucleoli (papillary serous cystadenocarcinoma) (H and E, ×400)

tumors.[9] The results in the present study conform to these findings.

It has been reported that epithelial tumors rarely occur in the pediatric age group.[10] Liu *et al*. reported an incidence of 72% germ cell tumors, 23% epithelial cell tumors, and 5% sex cord stromal tumors in their study.[6] In contrast, 37% germ cell tumors, 60.5% epithelial cell tumors, and 2.6% sex cord stromal tumors were found in the present study. A similar contrast in incidence has been highlighted in a previous study from West Bengal in which the study period was between the years 1998 and 2007.[11] The present study was conducted from the year 2010 to 2015 and it may be possible that there is indeed a higher incidence of surface epithelial tumors in the pediatric population of Eastern India as compared to other parts of the world. However, in both the studies from West Bengal, patients up to 20 years of age have been included. The level of awareness and literacy status of the study populations in both studies are very poor. Since germ cell tumors mostly present with vague symptoms, such patients may not seek medical attention at an early stage, thereby contributing to a false low incidence of germ cell tumors.[11]

Mahadik and Ghorpade stated that 50–75% pediatric patients with ovarian masses present with abdominal pain.[4] The commonest symptom in this study was found to be abdominal pain and swelling. Often the clinical features of patients with ovarian tumors are vague.[5] However, hormone secreting tumors may present with specific features like vaginal bleeding and precocious puberty.[4]

Ultrasound is the diagnostic modality of choice for detection of ovarian tumors.[2] But it is limited in its ability to distinguish between benign and malignant tumors.[3] Tumor markers are useful indicators of malignancy. The most widely used tumor markers include AFP and CA-125, raised levels of which indicate presence of germ cell tumor and surface epithelial tumor respectively.[6] The specificity of CA-125 is however low. Routine estimation of CA-125 is therefore not recommended in pediatric patients with ovarian masses.[12] In the present study, limited data was available regarding serum level of tumor markers.

Bilaterality is found in 30–50% serous tumors whereas only 10–20% mucinous neoplasms have bilateral presentation.[1] In this study, 7 out of 25 serous tumors (28%) were found to be bilateral. The maximum diameter of solid component of an ovarian tumor is an important predictor of malignancy.[13] Detailed gross examination of all specimens of ovarian tumors was undertaken in the present study.

The primary challenge faced during management of pediatric ovarian tumors is conserving fertility and endocrine function to the largest extent while completely resecting the tumor.[4] For benign tumors, surgical removal of the tumor is sufficient but in case of malignant neoplasms, surgery is followed by chemotherapy and/or radiotherapy. Patients with benign tumors must be followed up regularly during their reproductive years by ultrasound monitoring since the reported risk of recurrence in contralateral ovary is approximately 10%.[5] The prognosis of malignant ovarian neoplasms in the pediatric age group is largely dependent on early diagnosis and inclusion of cisplatin in the chemotherapy regimen.[14] The present study being a retrospective one, based on records available in the Pathology Department of the institution, information regarding follow-up of patients could not be accumulated. However, the records revealed that standard therapeutic regimen was followed in each case.

CONCLUSION

Pediatric ovarian neoplasms deserve much attention owing to the grave implications they bear on the lives of young females. The incidence of surface epithelial tumors has been found to be higher in this study compared to that in the existing literature. However, among malignant ovarian neoplasms, germ cell tumors were the commonest, in concordance with other studies. Since most malignant ovarian tumors in the pediatric population have good prognosis, the importance of early diagnosis and institution of appropriate therapy cannot be overemphasized.

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Conflicts of interest

There are no conflicts of interest.

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