Original Research Article

Journal of College of Medical Sciences-Nepal, Vol-19, No 3, Jul-Sep 2023
ISSN: 2091-0657 (Print); 2091-0673 (Online) Open Access
DOI: 10.3126/jcmsn.v19i3.45060

Clinicopathological Study of Ovarian Masses in Adolescent Girls and Young Women in a Tertiary Care Hospital

Soumya Kundu,[1] Aditi Bhattacharyya,[2] Sumit Nandy,[2] Pamela Nayak,[3] Arpita Bala[2]

[1]Department of Pathology, Midnapore Medical College & Hospital, West Bengal, India, [2]Department of Pathology, Calcutta National Medical College, West Bengal, India, [3]Department of Pathology, Jhargram Government Medical College & Hospital, West Bengal, India.

ABSTRACT

Introduction

Ovarian masses include both neoplastic and non-neoplastic lesions. Fortunately, though most ovarian masses in adolescents are benign, about 10% turn out to be malignant. Thus, ovarian tumours constitute an important part of paediatric oncology and often create diagnostic dilemmas. The present study aimed to calculate the frequency and clinicopathological patterns of ovarian masses in adolescent and young females and briefly discuss and compare with the existing literature.

Methods

This was a retrospective study conducted at the Department of Pathology of a tertiary care hospital in West Bengal, India. All tissue samples of ovarian masses received in the Pathology department between 10 to 20 years of age group over 6 years (January 2016-December 2021) were included in this study. We evaluated the clinicopathological parameters of the cases. The statistical analysis was performed using Epi Info 7 software.

Results

A total of 53 cases were included in present study of the defined age group over 6 years (January 2016 – December 2021), of which 2 had bilateral lesions, so a total of 55 ovarian masses were studied. Of 55 ovarian masses, 50 (90.9%) were benign tumours or non-neoplastic lesions and 5 ovarian masses (9.1%) were malignant. Mature cystic teratoma was the most common type of tumour in this age group.

Conclusions

Ovarian masses in perimenarchal and young adults show diversity in the histological spectrum. Although most are benign, early diagnosis preserves fertility in this tender age group.

Keywords: Adolescent; Neoplasm; Ovary; Young.

Correspondence: Dr. Pamela Nayak, Department of Pathology, Jhargram Government Medical College & Hospital, West Bengal, India. Email: pamela.nayak@gmail.com. Phone: +91-9806481924.

INTRODUCTION

Ovarian cancer often called the 'silent killer', is the eighth most common cancer in the female population and a leading cause of cancer death.[1] It is one of the most intriguing tumours with diverse histological patterns. Germ cell tumours of the ovary account for the majority of ovarian neoplasm encountered in paediatric practice.[2] Approximately 1.5% of all childhood cancers are ovarian in origin. The reported frequency of malignancy found in paediatric ovarian masses varies greatly and ranges from 4% to 22%. Malignant ovarian masses constitute 8% of all abdominal tumours in children.[3,4] The incidence of paediatric and adolescent ovarian neoplasm is 2.6 per 100,000 girls. Fortunately, most ovarian masses in adolescents are benign, with only about 10% turning out to be cancerous.[5]Ovarian tumours often are clinically silent, producing vague symptoms only. Awareness of the presence of this entity in adolescent and young women is therefore vital for early diagnosis and management which will help in the preservation of their fertility. The aim of this study was to estimate the frequency and clinicopathological patterns of ovarian masses in adolescent and young females in our setup.

METHODS

A retrospective observational study was conducted at the Department of Pathology, Midnapore Medical College and Hospital, West Bengal, India aftergetting approval from the institute review committee (Ref. no. IEC/2022/25). Application for waiver of informed consent was approved by the Institutional Ethics Review Committee. The reporting of this study conforms to the STROBE statement.[6] All tissue samples of ovarian masses received in the Pathology department between 10 to 20 years of age over 6 years (January 2016-December 2021) were included in the present study.The ovarian tissue samples beyond the age range of the defined study population and cases with poorly preserved histopathology paraffin blocks were excluded from the study. Researchers retrieved all the data from the record file of the histopathology section of the pathology department. Researchers also collected the clinical details from the record file of the gynaecology department. All paraffin blocks of the respective specimens which were previously formalin-fixed and routinely processed for histopathology were retrieved. Thenew sections from these blocks were prepared and stained with haematoxylin and eosin using standard procedure. Immunohistochemical staining was performed wherever necessary. The classification of ovarian neoplasms was according to the recent WHO classification of Ovarian Tumours.In the present study, statistical analysis was done for frequency estimation of ovarian masses. A Chi-square test was performed to find out the association between the clinical, macroscopic and microscopic characteristics of ovarian masses.

RESULTS

In the present study, 53 cases presented with ovarian masses among adolescent girls and young women. Two of them had presented with bilateral ovarian tumours, so the total number of ovarian masses is 55. The median age in our study is 19 years. The majority of the cases presented are between 16 and 20 years old (87.27%) (Table 1).

Table 1. Distribution of ovarian masses according to the age group (n = 55).

Age (Years)	Surface epithelial Tumors	Germ Cell Tumors	Others
<16	3(42.86)	2(28.57)	2(28.57)
16-20	22(45.83)	16(33.33)	10(20.83)
Total	25(45.45)	18(32.73)	12(21.82)

The most common primary presenting complaint of patients was vague abdominal pain followed by abdominal distension. A total of 37 cases presented with vague abdominal pain, dragging sensation and palpable mass in the lower abdomen. Among 15 cases with a history of acute abdominal pain, 6 were mature cystic teratoma, and 9 had twisted ovarian cysts. Menstrual alteration and dysmenorrhea were present in 4 patients of whom one was diagnosed with dysgerminoma other 3 cases had benign conditions like endometrial and luteal cysts.The mean diameter of ovarian masses was 8.95±4.8 cm (range 2.5–24cm). Of the 55 ovarian lesions, 38 cases (69.09%) were benign neoplasm, and 5 (9.09%) were malignant. The non-neoplastic or functional lesions and twisted ovarian cysts without any viable lining constituted the rest of the cases (21.82%)(Table 2).

Table 2. Size of ovarian masses (n = 46) and nature of ovarian masses (we have excluded 9 cases of twisted ovarian cyst).

Nature of Masses	Size of ovarian mass			Total
	< 5 cm	5 – 10 cm	>10 cm	
Benign	10 (21.7%)	20 (43.5%)	11 (23.9%)	41(89.1%)
Malignant	0 (0%)	2 (4.3%)	3 (6.5%)	5 (10.9%)
Total	10 (21.7%)	22 (47.8%)	14 (30.4%)	46 (100%)

Table 3. Histopathological types of ovarian masses (n = 55).

Histopathology of ovarian masses			Frequency(%)	Total no. of ovarian masses
Surface epithelial neoplasm	Benign	Mucinous cystadenoma	9 (16.4%)	25 (45.5%)
		Serous cystadenoma	12 (21.8%)	
		Sero-mucinous cystadenoma	3(5.5%)	
		Serous cyst adenofibroma	1 (1.8%)	
	Malignant	-	0 (0%)	0 (0%)
Germ cell tumour	Benign	Mature cystic teratoma	13 (23.6%)	13 (23.6%)
	Malignant	Dysgerminoma	2 (3.6%)	5 (9.1%)
		Choriocarcinoma	1 (1.8%)	
		Yolk sac tumour	1 (1.8%)	
		Mixed germ cell tumour	1 (1.8%)	
Others		Endometriotic cyst	1 (1.8%)	12 (21.8%)
Corpus luteal cyst		1 (1.8%)		
Theca lutein cyst		1 (1.8%)		
A twisted ovarian cyst (hemorrhagic, necrotic cyst)		9 (16.4%)		
Total			55 (100%)	

Regarding the originating cell line of the tumours, surface epithelial tumours were the most common variant. 25 out of 55 cases (45.45%) were surface epithelial tumours, closely followed by germ cell tumours which constituted 18 cases (32.72%). Of the 43 benign neoplasms, 25(58.14%) were surface epithelial tumours, and 18 (41.86%) were germ cell tumours. Out of the five malignant tumours, all (100%) were of germ-cell origin (Table 2, Chart 2).

tumour presented with an exclusively cystic appearance on the cut surface. Most benign tumours (95.12%) were cystic in type.

There was a significant association (p-value <0.05) between the gross appearance and the nature of the masses in the present study. Solid/solid-cystic ovarian masses appear to be more malignant than cystic(unilocular/ multilocular) masses (Table 4).

There was no significant association

Table 4. The appearance of ovarian masses (n = 46) on the cut surface after sectioning (we have excluded 9 cases of twisted ovarian cyst cases as on microscopy only haemorrhage and necrotic area seen, no viable structure identified).

	Appearance on the cut surface of ovarian masses		Total
	Solid /Solid-cystic	Cystic (unilocular/multilocular)	
Benign	2(4.87)	39 (0.951)	41(89.13)
Malignant	4(80)	1(20)	5(0.108)
Total	6(13.04)	40(0.869)	

The cystic ovarian masses were predominant in our study (47 out of 55, 85.45%). Unilocular cysts (61.70%) were more prevalent than multilocular (38.30) ovarian cysts (Table 3). Four ovarian masses presented with the surface breach.Of all the malignant tumours, 80% of cases showed a solid or solid-cystic nature on the cut section, while a single

(p-value>0.05) between the size of the tumor and the nature of ovarian masses. A significant association was also not found in cases of germ cell tumors between their size and nature (p-value >0.05).

IMAGES

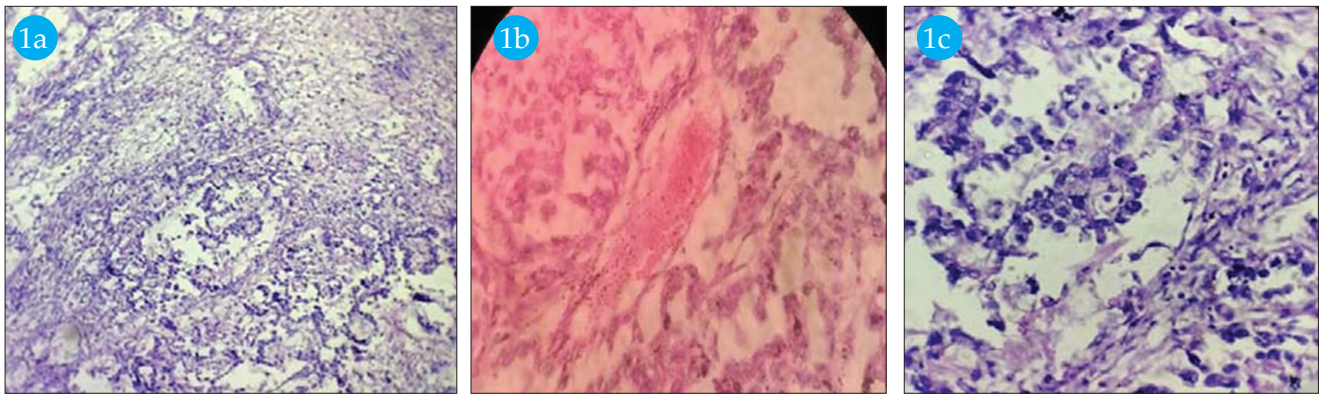
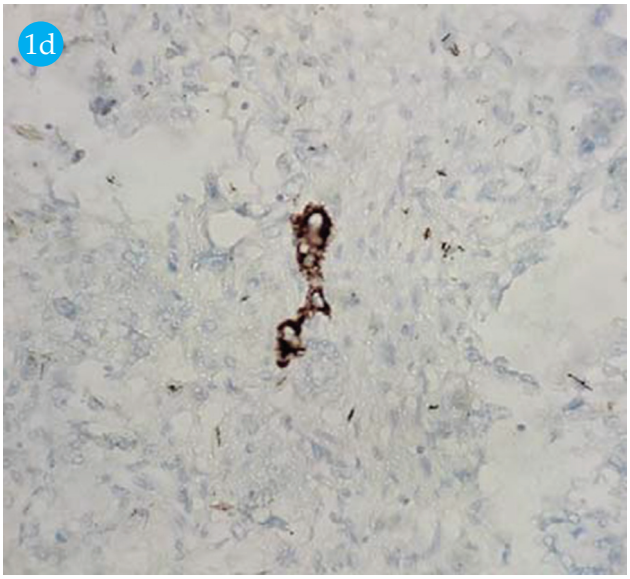


Figure 1a. Yolk sac tumour (H&E stain × 100), Fig. 1b & Fig. 1c: Schiller-Duval body in a case of yolk sac tumour (H&E stain × 400).



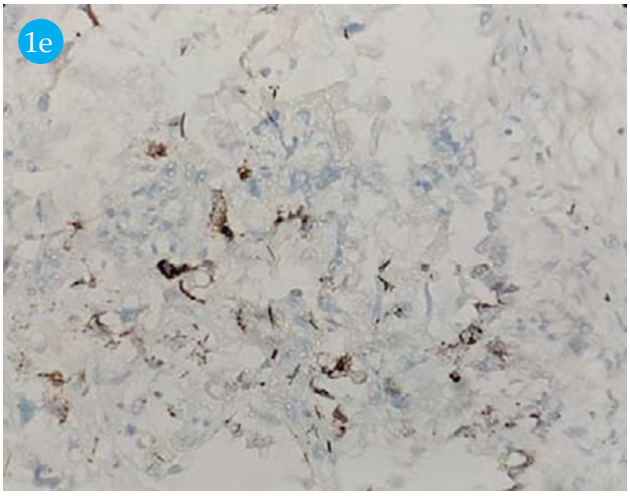
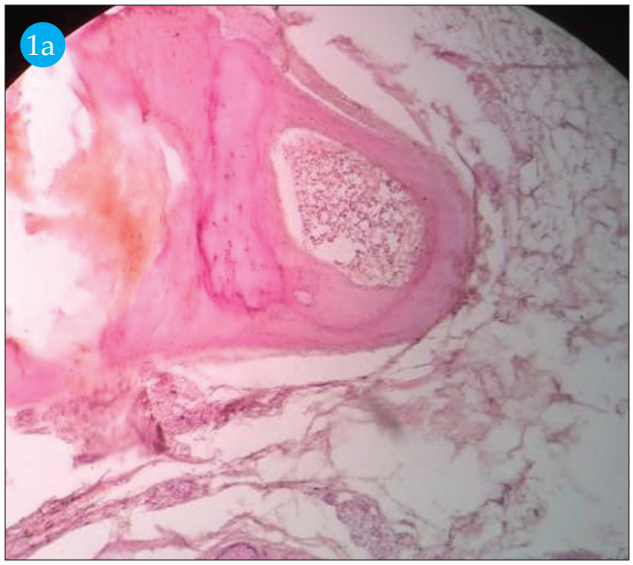


Figure 1d. and 2e: Focal positivity of immunohistochemical staining for Alpha-feto protein in a case of yolk sac tumour.



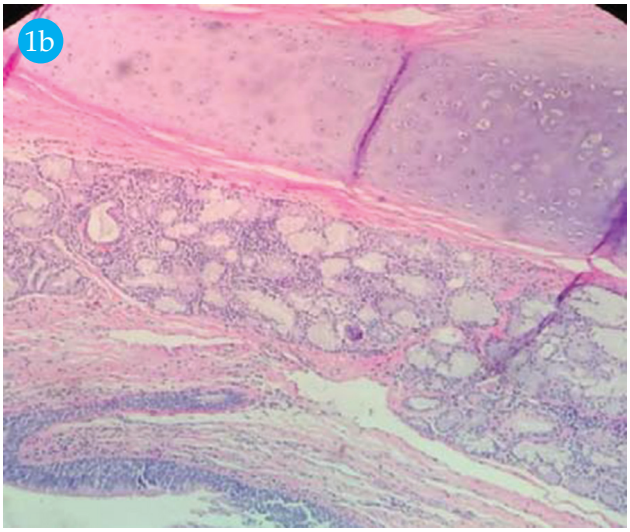


Figure 2a. Mature cystic teratoma showing features of bone formation with haematopoiesis (H&E stain ×100).

Figure 2b: A case of mature cystic teratoma with the development of different types of tissues like cartilage, the stratified squamous epithelium (H&E stain ×100).

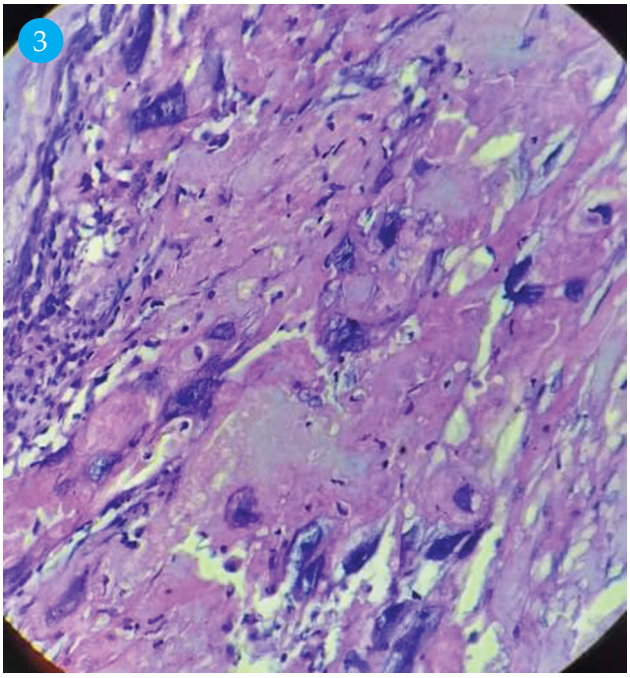


Figure 3. Choriocarcinoma along with tissue necrosis (H&E stain ×100).

DISCUSSION

Ovarian masses can be both neoplastic and non-neoplastic lesions. Non-neoplastic lesions

include follicular cysts, corpus luteal cysts, endometriomas, etc., while neoplastic masses encompass both benign as well as malignant tumours. Neoplastic lesions of the ovary are classified as germ cell tumours (GCT), surface epithelial tumours and sex cord-stromal tumours.[2] Ovarian neoplasms are uncommon in the adolescent population, but the diagnosis of one in this age group is a cause of concern for the patients and their families. At puberty, when menarche begins, there are changes in the hormonal levels of the hypothalamus, pituitary gland, and ovaries, so these girls are predisposed to develop various ovarian masses during puberty.[6] In our study, the age group was 10 to 20 years females with a median age of 19 years. The majority of the cases were between 16 and 20 years old (87.27%).Among the 55 ovarian masses, 14 (25.45%) were 10cm or more in size (Table 1), and among which 11 were benign, 3 were malignant. Like the studies of Zhang et al and Grigore et al,[7, 8] we also found teratomas (5/14, 35.71%) constitute the most common type of large ovarian masses in adolescents.The ovarian mass in the perimenarchal and young adult population shows a spectrum of pathology from functional non-neoplastic cysts to benign to highly aggressive malignant tumours. Tumours of germ cell origin like teratoma and dysgerminoma are predominant during infancy and childhood. A small but significant proportion of ovarian tumours in the paediatric and adolescent population are surface epithelial neoplasms with a marked preponderance for benign or borderline/low-grade malignant subgroups.[9] In our study, surface epithelial tumours were the most common variant (Table 2), i.e., 25 out of 55 cases (45.45%), followed by germ cell tumours which constituted 18 cases (32.72%). These findings of ours corroborate with Bhattacharyya et al.[4] In another study from Pakistan,[10] among ovarian tumours of young girls up to 20 years of age, the most common tumour was surface epithelial in origin (70.83%), followed by germ cell tumour (29.16%).The incidence of surface epithelial tumours published in most world literature is usually 15 - 20% in the pre-pubertal and adolescent age group.[11] In our series, we included cases up to 20 years of age who have already started having menstruation, and the effect of ovarian sex hormones may have contributed to the increased proportion (45.45%) of surface epithelial tumours.Ovarian malignancy in children and adolescents is reported in 10%– 20% of all ovarian masses or neoplasms and comprises approximately 1%–2% of all childhood malignancies.[3] In the current study, the proportion of malignant tumours was 9.09%. In the study by Bhattacharyya et al[4] 22.6% of cases were malignant, and amongst malignant cases, 66% were of germ-cell origin, dysgerminoma being the most common type, similar to ours. Indeed, dysgerminoma is one of the most common malignant ovarian neoplasms of childhood, adolescence and early adult life.[12] Mature cystic teratoma accounts for half of the ovarian neoplasms that appear in the first two decades of life and is the most common ovarian germ cell tumour.[13] In our study, mature cystic teratoma was the most common tumour arising from the germ cell line (72.22%). Though immature teratoma is rare, it is commonly seen in the first two decades of life.[14] None of our teratoma cases showed any features of immaturity. A retrospective study by Oltmann et al[3] found that a larger diameter of the tumour measured by ultrasound was associated with an increased likelihood of malignancy in paediatric patients. Another study that evaluated tumour composition on preoperative USG found that solid components on USG increased the odds of malignancy, and a cystic appearance on ultrasound had a high sensitivity (100%) for benign disease.[15] In the present study, no significant association between the tumour size and the chance of malignancy was found, which

corroborates with the study of Grigore et al[8] on giant ovarian masses in the adolescent age group. In our study, 47/55 or 85.45% of masses were exclusively cystic (unilocular and multilocular). Ovarian neoplasms with cystic appearance were mainly benign (95.12%), and the malignant counterpart had predominance with solid or solid-cystic consistency (80%). Only 4.88% of benign tumours had mixed solid-cystic areas. No benign masses were purely solid. (Table 3)

There was a significant correlation (p-value <0.05) between the gross appearance and the nature of the masses in the present study. Malignancy is more likely in solid/solid-cystic lesions than the cystic ones (unilocular/multilocular).Ovarian torsion must always be kept in the differential diagnosis in young girls presenting with acute lower abdominal pain or a pelvic mass. The overall rate of malignancy in torsed ovaries is low, ranging from 3.5 to 5.4%.[16] None of the 9 cases presented with torsion of the ovary proved to be malignant histologically in our study.The limitation of this study is a relatively smaller sample size. Since malignant tumours constituted a small proportion of our cases, we could not perform a detailed comparative clinicopathological analysis of benign and malignant ovarian tumours. Additionally, the retrospective nature of this study restricted our access to radiological and biochemical parameters. Therefore, we believe there is a need for a prospective study with a larger population for an in-depth analysis of ovarian tumours in this study population.

CONCLUSIONS

In adolescent perimenarchal girls and young adults, ovarian mass can show a spectrum of histology. The majority of the ovarian mass in this age group is benign, but we should always rule out the chances of malignancy. As the mainstay of treatment of ovarian tumours is surgery, the extent of surgery and preservation of fertility is one of the major concerns in this age group. Early diagnosis is essential for both malignant and benign tumours. The presenting symptoms are sometimes vague, and ignorance of symptoms like abdominal pain and menstrual abnormalities in this age group delays seeking health care. Increased awareness about these tumours in the general population and health care personnel may result in early radiological investigation and further intervention.

Conflict of interest: None

REFERENCES

1. World Health Organization (WHO). Global Health Estimates 2020: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2019. [Internet]. WHO. 2020. Available from: https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/ghe-leading-causes-of-death.
2. Norris HJ, Jensen RD. Relative frequency of ovarian neoplasms in children and adolescents. Cancer. 1972;30(3):713-9.
3. Oltmann SC, Garcia N, Barber R, Huang R, Hicks B, Fischer A. Can we preoperatively risk stratify ovarian masses for malignancy? J Pediatr Surg. 2010;45(1):130-4 DOI:https://doi.org/10.1002/1097-0142(197209)30:3<713::AID-CNCR2820300319>3.0.CO;2-G
4. Bhattacharyya NK, De A, Bera P, Sristidhar M, Chakraborty S, Bandopadhyay R. Ovarian tumors in pediatric age group - A clinicopathologic study of 10 years'

cases in West Bengal, India. Indian J Med Paediatr Oncol. 2010;31(2):54-7. DOI: 10.4103/0971-5851.71656

5. Skinner MA, Schlatter MG, Heifetz SA, Grosfeld JL. Ovarian neoplasms in children. Arch Surg. 1993;128(8):849-53; discussion 53-4. DOI: 10.1001/archsurg.1993.01420200023004
6. Ki EY, Byun SW, Choi YJ, Lee KH, Park JS, Lee SJ, et al. Clinicopathologic review of ovarian masses in Korean premenarchal girls. Int J Med Sci. 2013;10(8):1061-7. DOI: 10.7150/ijms.6216
7. Zhang B, Zhang L, Meng G. Clinical analysis of 52 adolescent patients with ovarian masses ≥10 cm in diameter. J Int Med Res. 2021;49(8):3000605211032781. DOI: https://doi.org/10.1177/03000605211032781
8. Grigore M, Murarasu M, Himiniuc L, Toma B, Duma O, Popovici R. Large ovarian tumors in adolescents, a systematic review of reported cases, diagnostic findings and surgical management. Taiwanese Journal of Obstetrics and Gynecology. 2021;60:602-8. DOI: https://doi.org/10.1016/j.tjog.2021.05.005
9. Hazard FK, Longacre TA. Ovarian surface epithelial neoplasms in the pediatric population: incidence, histologic subtype, and natural history. Am J Surg Pathol. 2013;37(4):548-53. DOI: 10.1097/PAS.0b013e318273a9ff
10. Baloch S, Khaskheli M, Malik AM, Sheeba A, Khushk IA. Clinical spectrum and management of ovarian tumours in young girls up to 20 years of age. J Ayub Med Coll Abbottabad. 2008;20(4):14-7.
11. Grapsa D, Kairi-Vassilatou E, Hasiakos D, Kondi-Pafiti A. Ovarian mucinous cystadenoma with extended calcification in an 11-year-old girl: case report and review of the literature. Clin Exp Obstet Gynecol. 2006;33(3):181-2.
12. Björkholm E, Lundell M, Gyftodimos A, Silfverswärd C. Dysgerminoma. The Radiumhemmet series 1927-1984. Cancer. 1990;65(1):38-44. DOI: https://doi.org/10.1002/1097-0142(19900101)65:1<38::AID-CNCR2820650110>3.0.CO;2-U
13. Rafia S, Shankar BR, Khan MI. Morphological Patterns of Ovarian Neoplasms in Different Age Groups-A Center based study. 2016.
14. Li X, Zhu D, Lv LI, Yu J. An uncommon recurrence of an immature teratoma: A case report. Oncol Lett. 2016;11(4):2453-6. DOI: https://doi.org/10.3892/ol.2016.4254
15. Abbas PI, Elder SC, Mehollin-Ray AR, Braverman RM, Lopez ME, Francis JA, et al. Ovarian lesion volumes as a screening tool for malignancy in adolescent ovarian tumors. J Pediatr Surg. 2015;50(11):1933-6. DOI: https://doi.org/10.1016/j.jpedsurg.2015.06.020
16. Renaud EJ, Sømme S, Islam S, Cameron DB, Gates RL, Williams RF, et al. Ovarian masses in the child and adolescent: An American Pediatric Surgical Association Outcomes and Evidence-Based Practice Committee systematic review. J Pediatr Surg. 2019;54(3):369-77. DOI: https://doi.org/10.1016/j.jpedsurg.2018.08.058

Citation: Kundu S, Bhattacharyya A, Nandy S, Nayak P, Bala A. Clinicopathological Study of Ovarian Masses in Adolescent Girls and Young Women in a Tertiary Care Hospital. 2023; 19(3); 251-58.