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Distribution of Ovarian Neoplasms in Young Females Aged 15-24: A Single-center Retrospective Observational Study

15-24 Yaş Arası Gençlerde Over Neoplazmlarının Dağılımı: Tek Merkezli Retrospektif Gözlemsel Bir Çalışma

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Abstract

Objective: Ovarian neoplasms are relatively uncommon in young females; however, they require a multidisciplinary approach to ensure early diagnosis, appropriate treatment planning, consideration of long-term psychosocial effects, and preservation of future reproductive potential. In this study, we aim to evaluate the types and distribution of ovarian tumors in females aged 15 to 24 years who underwent surgery at our institution. We will also review the clinical presentations and treatment strategies employed at the time of diagnosis.

Methods: A retrospective analysis was conducted on 196 patients aged 15 to 24 years who were admitted to the Pediatric Surgery and Obstetrics and Gynecology Departments for gynecological tumors between 2020 and 2025 at University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital. Patient data, including age, obstetric and medical history, and current medications, were reviewed. Ultrasound findings at the time of diagnosis, abdominal magnetic resonance imaging results (if available), tumor marker levels, preoperative and postoperative hemogram values, surgical interventions, and histopathological outcomes were recorded. Statistical analyses were performed to evaluate the distribution of ovarian cyst types in relation to patient age.

Results: The mean age of the patients included in the study was 16.44 years (±1.76). The distribution of ovarian cyst types in the 196 patients was analyzed. The most common type was corpus luteum cyst (n=97), accounting for 49.5% of cases. This was followed by dermoid cysts (n=20, 10.2%), serous cystadenomas (n=15, 7.7%), and mucinous cystadenomas and endometriomas (n=5 each, 2.6%).

Conclusion: Our study contributes to the existing literature on ovarian masses in females aged 15 to 24 years, confirming that the majority of adnexal masses in this age group are benign, with functional cysts and dermoid cysts being the most common.

Keywords: Ovarian neoplasm, young females, cyst types

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Öz

Amaç: Over neoplazmları gençlerde daha az görülür, ancak erken tanı ve tedavi yönetimlerinin belirlenmesi, uzun vadeli psikososyal etki ve gelecekteki üreme sağlığı için multidisipliner bir yaklaşım gerektirir. Bu çalışmada, kurumumuzda opere edilen 15-24 yaş arası genç kadınlarda over tümörlerinin tipleri ve dağılımı incelenecek ve tanı anındaki klinik bulgular ve tedavi yaklaşımları gözden geçirilecektir.

Yöntem: Sağlık Bilimleri Üniversitesi, Başakşehir Çam ve Sakura Şehir Hastanesi'nde 2020-2025 yılları arasında over neoplazmı nedeniyle Çocuk Cerrahisi Kliniği ile Kadın Hastalıkları ve Doğum Anabilim Dalı'na başvuran 15-24 yaş arası 196 hastanın retrospektif analizi yapıldı. Hastaların yaşı, obstetrik öyküsü, tıbbi öyküsü ve kullandığı ilaçlar gözden geçirildi. Tanı anındaki ultrason bulguları, varsa abdominal manyetik rezonans görüntüleme bulguları, tümör belirteçlerinin seviyeleri, preoperatif ve postoperatif hemogram değerleri, cerrahi prosedürler ve patoloji sonuçları kaydedildi. Over kist türlerinin yaşla ilişkili dağılımını değerlendirmek amacıyla istatistiksel analizler gerçekleştirildi.

Bulgular: Çalışmaya katılan hastaların yaş ortalaması 16,44 (±1,76) idi. Toplam 196 hastada saptanan over kistlerinin dağılımı analiz edildi. En sık görülen kist tipi %49,5 oranıyla korpus luteum kistiydi (n=97) Bunu %10,2 ile dermoid kist (n=20), %7,7 ile seröz kistadenom (n=15) ve %2,6'şar (n=5) oranla müsinöz kistadenom ve endometrioma izledi.

Sonuç: Çalışmamız 15-24 yaş arası kadınlarda over neoplasmları ile ilgili literatüre katkıda bulunmakta ve bu gruptaki adneksiyal kitlelerin çoğunun, özellikle fonksiyonel ve dermoid kist gibi benign özellikte olduğunu doğrulamaktadır.

Anahtar Kelimeler: Over neoplazmı, genç kadınlar, kist tipleri

Introduction

Although the exact incidence of ovarian neoplasms in young girls remains unknown, it is estimated to be approximately 2.6 cases per 100,000 girls annually, with malignant ovarian tumors accounting for about 1% of all childhood malignancies[1,2]. Ovarian neoplasms are histologically classified into three main groups: Germ cell tumors, sex cord-stromal tumors, and epithelial tumors. Among these, surface epithelial tumors are less common during childhood and adolescence, while metastatic tumors are extremely rare. Germ cell and sex cord-stromal tumors are more frequently observed in this age group[3]. The majority of ovarian tumors in girls are of non-epithelial origin and can be diagnosed from birth through 9 years of age. Benign functional cysts such as follicular cysts, corpus luteum cysts, and theca lutein cysts are the most commonly encountered ovarian lesions in childhood[4]. Malignancy is present in only 3-8% of adnexal masses, with its incidence increasing with age[5,6].

Ovarian tumors present unique diagnostic challenges during adolescence and young adulthood, as benign neoplasms are significantly more common than malignant ones, and clinical signs, and symptoms are often non-specific. Presenting symptoms may range from acute abdominal pain to a palpable pelvic or abdominal mass, often raising suspicion of malignancy. Assessing the risk of malignancy is a critical step in the diagnostic process. Therefore, early detection and differentiation between benign and malignant masses are essential, requiring a thorough evaluation, including clinical examination, imaging, laboratory tests, and serum tumor markers.

Preoperative evaluation in young women scheduled for ovarian surgery should include a pelvic examination, gynecologic ultrasonography, assessment of hormonal status, and measurement of serum tumor markers. Advanced imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) may also be utilized to further characterize the mass and determine its origin. Surgical intervention in this age group must be carefully considered due to potential implications for future fertility. Ovarian tissue may be inadvertently removed during surgery, and postoperative adhesions may impair reproductive function. While minimally invasive laparoscopic approaches are preferred for the evaluation and excision of benign ovarian tumors, oophorectomy may be necessary in cases with a high likelihood of malignancy, ovarian tissue destruction, or torsion-related necrosis[7-9].

This retrospective study was conducted to review the clinical features and operative management of ovarian tumors in young women aged 15 to 24 years treated at our institution over the past five years.

Materials and Methods

Study Design and Setting

This retrospective observational study was conducted at University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital. Data from patients operated on between January 2020 and January 2025 were reviewed.

Inclusion Criteria

- Female patients aged 15 to 24 years,

- Underwent surgical intervention for an adnexal mass,

- Complete clinical, imaging, and pathology records available.

Exclusion Criteria

- Conservative management without surgery,

- Incomplete or missing diagnostic or histopathologic records.

Surgical Indications

Patients were selected for surgery based on the following clinical criteria:

- Cyst size >5 cm,

- Persistence of cyst beyond two menstrual cycles,

- Acute abdomen symptoms suggestive of torsion, rupture, or hemorrhage,

- Imaging findings suggestive of malignancy (solid components, papillary projections),

- Elevated tumor markers such as CA-125, CA 19-9, alpha-fetoprotein (AFP).

Preoperative Evaluation and Perioperative Management

All patients underwent preoperative pelvic ultrasonography, and MRI was used in cases with inconclusive findings. Tumor markers (CA-125, CA 19-9, AFP, CA 15-3) were routinely assessed. Surgical interventions included laparoscopic or open cystectomy, or oophorectomy, depending on intraoperative findings. Postoperative management included routine follow-up at 1 week and 1 month.

Follow-up

Postoperative follow-up focused on short-term complications, histopathological correlation, and readmission within 30 days. Long-term fertility preservation or recurrence monitoring was not routinely documented.

Ethics

The study was approved by the Ethics Committee of University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital (approval no: E-96317027-514.10-269244759, date: 26.02.2025).

Statistical Analysis

Descriptive statistics were used to summarize the distribution of ovarian cyst types and the associated age characteristics. The number and percentage of each cyst type were reported, along with mean ± standard deviation and median (minimum-maximum) age values. Statistical analyses were performed using the open-source software Jamovi (version 2.3.21).

Results

The mean age of the 196 patients was 16.44±1.76 years. The distribution and age characteristics of the ovarian cysts are presented in Table 1. The most common cyst type was corpus luteum cyst (n=97, 49.5%), followed by dermoid cyst (n=20, 10.2%), serous cystadenoma (n=15, 7.7%), and unspecified serous cyst (n=15, 7.7%). Simple/follicular cyst was observed in 14 patients (7.1%), serous cystadenofibroma in 7 patients (3.6%), and mucinous cystadenoma and endometrioma in 5 patients (2.6%) each. Rare tumors included dysgerminoma (n=3, 1.5%) endometrioid adenocarcinoma (n=3, 1.5%), sex cord-stromal tumors (n=2, 1.0%), lymphoma (n=2, 1.0%), and mixed germ cell tumors (n=2, 1.0%). Fibroma, leiomyoma, juvenile-type granulosa cell tumor, low-grade serous carcinoma, and serous carcinoma were observed in 1 patient each (0.5%). No ovarian neoplasm was detected in 15 patients (7.7%), who underwent surgery upon clinical and radiological suspicion.

The mean ages for simple/follicular cyst and corpus luteum cyst were 16.14±0.66 years and 16.12±0.88 years, respectively. The mean ages for dermoid cyst, serous cystadenoma, and mucinous cystadenoma were 16.20±0.95, 15.80±0.68, and 16.20±1.10 years, respectively. The ages for sex cord-stromal tumors, mixed germ cell tumors, and lymphoma ranged from 16.00 to 19.50 years. The mean and median ages for endometrioid adenocarcinoma and serous carcinoma were 24.00 years.

Of the 196 patients, 2 had an obstetric history and 2 had a prior appendectomy. Paratubal cysts were observed in 27 patients (13%), and ovarian torsion was identified in 24 patients (12%), with pathology of the identified cases confirming mainly serous cystadenoma and simple follicular cyst. In acute abdomen cases, 22 patients (11%) underwent appendectomy in the same session as the ovarian cyst excision, and pathology revealed a corpus luteum or a simple follicular cyst. Two patients presented with both ovarian torsion and acute appendicitis.

All patients had normal carcinoembryonic antigen levels. CA-125 was elevated in 15 patients, primarily in those with mucinous cystadenoma, endometrioma, serous carcinoma, and endometrioid adenocarcinoma. CA 19-9 was elevated in 12 patients with mucinous cystadenoma, dermoid cyst, serous cystadenoma, and endometrioid adenocarcinoma. CA-125 and CA 19-9 values were higher in patients with malignancies, and minimally elevated in a few patients with benign conditions such as simple follicular or corpus luteum cysts. CA 15-3 was elevated in one patient with serous carcinoma; and AFP was highly elevated in two patients with mixed germ cell tumors. Preoperative ultrasonography and MRI findings were consistent with intraoperative and histopathological results.

Table 1. Distribution of ovarian cyst types and age characteristics

Cyst type	N (%)	Age (years), Mean ± SD	Age (years), Median (min-max)
Non-ovarian mass	15 (7.7)	17.33±3.09	16 (15-24)
Simple/follicular cyst	14 (7.1)	16.14±0.66	16 (15-17)
Sex cord-stromal tumor	2 (1.0)	19.50±6.36	19.50 (15-24)
Dysgerminoma	3 (1.5)	17.33±3.21	16 (15-21)
Dermoid cyst	20 (10.2)	16.20±0.95	16 (15-18)
Serous cystadenoma	15 (7.7)	15.80±0.68	16 (15-17)
Mucinous cystadenoma	5 (2.6)	16.20±1.10	17 (15-17)
Serous cystadenofibroma	7 (3.6)	16.00±0.58	16 (15-17)
Lymphoma	2 (1.0)	16.00±1.41	16 (15-17)
Endometrioma	5 (2.6)	16.40±0.55	16 (16-17)
Mixed germ cell tumor	2 (1.0)	17.50±2.12	17.50 (16-19)
Endometrioid adenocarcinoma	3 (1.5)	24.00±0.00	24 (24-24)
Corpus luteum	97 (49.5)	16.12±0.88	16 (15-19)
Fibroma	1 (0.5)	15.00	15 (15-15)
Leiomyoma	1 (0.5)	16.00	16 (16-16)
Sex cord-stromal tumor (other)	1 (0.5)	17.00	17 (17-17)
Juvenile-type granulosa cell tumor	1 (0.5)	17.00	17 (17-17)
Serous carcinoma (low grade)	1 (0.5)	18.00	18 (18-18)
Serous carcinoma	1 (0.5)	24.00	24 (24-24)
Total	196 (100)	16.44±1.76	-

SD: Standard deviation

Benign cysts, such as corpus luteum and follicular cysts, were predominantly observed during mid-adolescence, whereas malignant and epithelial tumors tended to occur in later adolescence or adulthood within the studied group (Figure 1).

Discussion

Ovarian tumors are generally reported to be rare in teens and adolescents[10-13]. The present study is one of the first

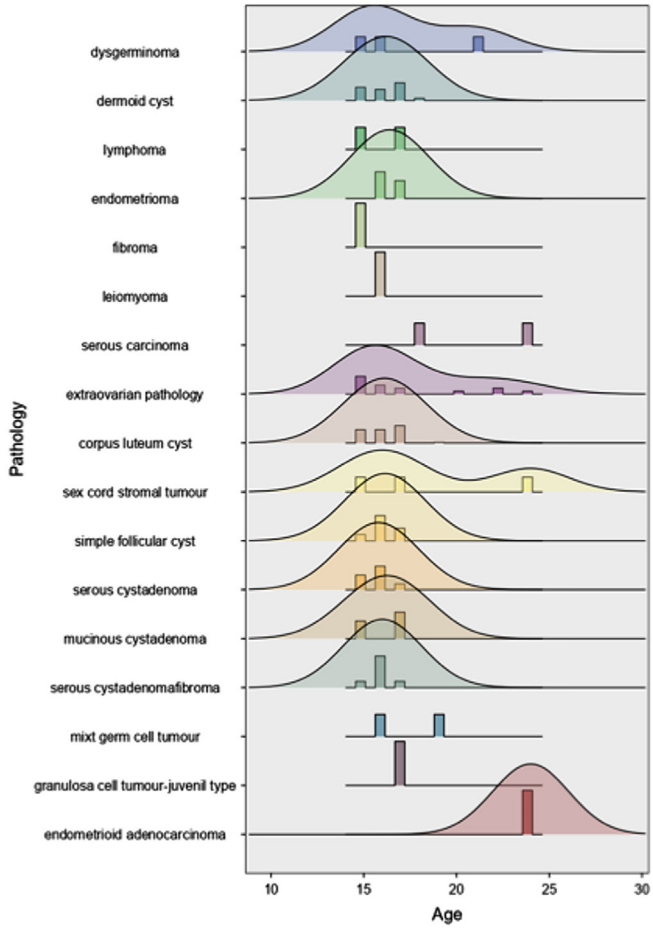

Figure 1. Plot curves showing tumor distributions according to age. This plot shows the distribution of various types of ovarian cysts in different age groups. Benign cysts, such as corpus luteum and follicular cysts, are usually seen in mid-puberty, while malignant and epithelial tumors tend to occur at an older age

studies to focus on young females aged 15-24 years, and our findings support the idea that benign pathologies such as corpus luteum cyst, simple follicular cyst, and dermoid cyst are more common in this age group. Recent studies revealed that most ovarian masses observed in children and adolescents are not neoplastic. Templeman et al.[14] found that 57.9% of girls and young women under 21 who underwent surgery for non-inflammatory ovarian masses had simple, non-neoplastic ovarian cysts. In a study by Deligeoroglou et al.[15], 49.0% of cases were benign neoplasms, 2.1% were malignant neoplasms, and 48.9% were non-neoplastic ovarian cysts. The results of our study support the low rate of gynecologic malignancy in this age group, with only eight patients diagnosed with malignant ovarian tumors. This may be due to the relatively young mean age (16 years), which may partially explain the low malignancy rates observed in our cohort. It may also result from the predominantly benign pathology of adnexal masses in emergent gynecologic operations. One of the drawbacks of our study is the more emergent operations compared to elective procedures.

Many studies have reported that functional cysts account for a significant percentage of non-neoplastic lesions. Functional ovarian cysts include follicular, corpus luteum, and theca lutein cysts. Although most of these cysts regress spontaneously, a few are treated surgically because of persistence or an urgent clinical scenario. In our study, corpus luteum cysts ranked first among benign lesions with 49%, followed by dermoid cysts with 20%. In a study in which functional ovarian cysts were excluded, mature teratoma was reported as the most common benign tumor (73%)[16]. The fact that dermoid cysts were the most common (10.2%) lesion after functional ovarian cysts in our study is consistent with the results of other studies[14,15,17]. Epithelial ovarian tumors are rare in teens and adolescents, and their incidence increases with age[17]. In the present study, 7.7% serous cystadenomas and 2.6% mucinous cystadenomas were found, supporting the fact, that epithelial ovarian cancers are more common in the older age group. Endometrioid cysts represented 2.6% of all ovarian lesions in our study. In contrast to common endometriosis, they are rarely seen in adolescents. Also, the mean age of rare tumors, such as lymphoma, sex cord stromal tumors, and mixed germ cell tumors was slightly higher (16.00-19.50 years). Notably, endometrioid adenocarcinoma and serous carcinoma were observed in significantly younger women with a median age of 24 years, in line with recent reports.

Ovarian pathologies can have a variety of symptoms. These symptoms are often non-specific. The non-specificity of these symptoms makes accurate preoperative diagnosis more difficult. As an initial symptom, abdominal pain is one of the most common. It is difficult to suspect ovarian masses in this age group. This is because acute symptoms are often attributed to more common conditions, such as appendicitis. In our study, 22 patients (11%) who presented with acute abdominal pain underwent appendectomy with ovarian cyst excision in the same surgical session. The presence of an ovarian cyst on preoperative imaging increased clinical suspicion and created diagnostic uncertainty. Therefore, both appendiceal and ovarian pathologies were treated during the same operation. Another condition that clinically presents with acute abdominal symptoms is ovarian torsion. The frequency of ovarian torsion has varied between 10% and 42% in studies[18,19]. This may be due to differences in the patient group included in the study. In our study, this rate was 12%.

In our study, ultrasonography was 100% accurate in diagnosing ovarian pathology. However, it was impossible to differentiate between benign and malignant tumors in the patients included in the study. The use of ultrasonography in the first-line evaluation is reliable. If ultrasonography detects a suspicious adnexal mass, CT and/or MRI might confirm the diagnosis. These imaging modalities provide thorough information about a suspicious mass, its location, and exclusion of other pathologies. Color Doppler sonography is essential in the diagnosis of emergencies such as ovarian torsion and can also help in differentiating ovarian malignancies.

Tumor markers can be used as a follow-up parameter in cancer patients. Biomarkers may increase in malignant germ cell tumors, endometriomas, and epithelial tumors, and are used for follow-up in these patients[20]. For the screening and early diagnosis of epithelial ovarian cancer, serum CA-125 levels are commonly used[21]. Shan et al.[22] showed that the detection of combined tumor markers, including CA-125, in serum in epithelial ovarian cancer has higher sensitivity and specificity. In our study, CA-125 was elevated in 15 patients, who were diagnosed with mucinous cystadenoma, endometrioma, serous carcinoma, and endometrioid adenocarcinoma. Twelve patients had elevated CA 19-9 levels and were classified as having mucinous cystadenoma, dermoid cyst, serous cystadenoma, and endometrioid adenocarcinoma. This supports combined elevation of CA-

125 and CA 19-9 in epithelial ovarian tumors, endometriosis, and malignancy. In a review by Matonóg and Drosdzol-Cop[23], the importance of serum AFP measurement in children in the early diagnosis and treatment of ovarian masses was mentioned, and it was reported that it was high, especially in germ cell tumors. In our study, only two cases of germ cell tumors were identified; however, both were associated with markedly elevated AFP levels. Elevated tumor markers in these patients contributed to both the preoperative suspicion of malignancy and the postoperative confirmation of the diagnosis of adnexal masses in the young population.

Study Limitations

Our study has some important strengths. We used a relatively large sample covering a variety of ovarian diseases with a specific focus on histopathological subgroups and the distribution of adnexal masses by age. Our study also has some limitations. First, the study had the inherent limitations of any retrospective study. Secondly, the inclusion of urgent ovarian pathologies may have increased the proportion of benign lesions observed, potentially influencing the overall malignancy rate. Future research should focus on collecting data in a prospective manner from multiple centers. In addition, exclusion criteria could be established for benign ovarian cysts, which may resolve spontaneously without the need for surgery but are nevertheless operated on due to acute clinical presentations.

Conclusion

This study adds valuable insight to the existing literature on ovarian masses in young females aged 15 to 24 years. Consistent with previous research, the majority of adnexal masses in this age group were benign, with functional cysts and dermoid cysts being the most commonly identified lesions. These findings highlight the importance of a comprehensive diagnostic approach that includes clinical assessment, imaging techniques, and tumor marker evaluation to ensure accurate diagnosis and appropriate management of adnexal masses in this population.

Ethics

Ethics Committee Approval: The study was approved by the Ethics Committee of University of Health Sciences Türkiye, Başakşehir Çam and Sakura City Hospital (approval no: E-96317027-514.10-269244759, date: 26.02.2025).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: G.G., C.B.K., M.Y., Histopathology Practices: A.K., E.T., Concept: G.G., Design: G.G., Data Collection or Processing: C.B.K., A.H., Y.O., E.T., Analysis or Interpretation: F.E.Ç., Literature Search: C.B.K., F.E.Ç., E.T., Writing: F.E.Ç., G.G.

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