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# Retrospective Clinicopathological Evaluation of Cases Undergoing Radical Orchiectomy: A Single-Center Experience

## Radikal Orşiektomi Uygulanan Olguların Retrospektif Klinikopatolojik Değerlendirmesi: Tek Merkez Deneyimi

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***ABSTRACT***

**Objective:** Testicular tumors, while rare, constitute 1-2% of all male malignancies, with germ cell tumors (GCTs) being the predominant subtype. This study retrospectively evaluates the clinicopathological characteristics of 102 patients who underwent radical orchiectomy for suspected testicular tumors between January 2016 and January 2021 at a single institution.

**Material and Methods:** Data, including demographic details, tumor markers, histopathological findings, and metastasis status, were analyzed.

**Results:** The mean patient age was 34.5 ± 11.5 years, with 51% of tumors located in the right testis. Germ cell tumors were identified in 88% of cases, with seminomas accounting for 46.1%.

**Conclusion:** Non-seminomatous mixed GCTs were found in 32.3% of patients. Notably, 8.8% of cases had a history of cryptorchidism, and lymphovascular invasion was observed in 46% of patients. The study also identified an unexpectedly higher incidence of Sertoli cell tumors, a rare variant of sex-cord stromal tumors, compared to existing literature. These findings contribute to the understanding of the clinicopathological spectrum of testicular tumors and underscore the importance of early diagnosis and treatment.

**Keywords:** Testicular tumor, seminoma, retrospective, prognosis, survival

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## ÖZET

**Amaç:** Testis tümörleri, nadir görülmekle birlikte, tüm erkek malignitelerinin %1-2'sini oluşturur ve germ hücreli tümörler (GHT'ler) baskın alt tiptir. Bu çalışmada, Ocak 2016 ile Ocak 2021 tarihleri arasında tek bir kurumda şüpheli testis tümörü nedeniyle radikal orşiektomi uygulanan 102 hastanın klinikopatolojik özellikleri retrospektif olarak değerlendirilmiştir.

**Gereç ve Yöntemler:** Demografik ayrıntılar, tümör belirteçleri, histopatolojik bulgular ve metastaz durumu dahil olmak üzere veriler analiz edildi.

**Bulgular:** Ortalama hasta yaşı 34,5 ± 11,5 yıldı ve tümörlerin %51'i sağ testiste yerleşmişti. Olguların %88'inde germ hücreli tümör tespit edilirken, seminomlar %46,1'ini oluşturdu.

**Sonuç:** Hastaların %32,3'ünde seminomatöz olmayan mikst GHT'ler bulunmuştur. Özellikle, vakaların %8,8'inde kriptorşidizm öyküsü vardı ve hastaların %46'sında lenfovasküler invazyon gözlendi. Çalışmada ayrıca, cinsiyet kord stromal tümörlerinin nadir bir varyantı olan Sertoli hücreli tümörlerin mevcut literatüre kıyasla beklenmedik şekilde daha yüksek bir insidans tespit edilmiştir. Bu bulgular testis tümörlerinin klinikopatolojik spektrumunun anlaşılmasına katkıda bulunmakta ve erken tanı ve tedavinin önemini vurgulamaktadır.

**Anahtar Kelimeler:** Radikal orşiektomi, testis tümörü, seminom

## INTRODUCTION

Testicular tumors are relatively rare, with an incidence in Western societies ranging from 3 to 10 new cases per 100,000 men annually. These tumors account for 1-2% of all malignant neoplasms and 5% of urogenital system cancers in men. At the time of diagnosis, 1-2% of cases present bilaterally. Germ cell tumors (GCT) constitute the predominant histological subtype, representing 90-95% of cases (1). Nonseminomatous germ cell tumors (NSGCT) and mixed GCTs tend to peak in incidence during the third decade of life, whereas pure seminomas peak during the fourth decade (2). Testicular cancer is the second most frequently diagnosed malignancy in young men. Its incidence varies between countries, ethnic groups, and socioeconomic classes. While it is more prevalent in Europe, particularly in Scandinavian countries, it is less common in the Americas and Africa (3,4). Key risk factors for the development of testicular tumors include cryptorchidism, hypospadias, impaired spermatogenesis, subfertility or infertility, a family history of testicular cancer in first-degree relatives, a history of contralateral testicular tumor, and testicular dysgenesis (5,6). Among these, cryptorchidism is considered the most significant, with seminoma being more common in these patients. The risk of malignancy is higher in intra-abdominal testes, and 7-10% of all testicular tumors have a history of cryptorchidism.

The incidence of testicular tumors has been increasing in industrialized nations in recent years. Key factors contributing to this rise are believed to include high-calorie diets and decreased physical activity (3,4). Identified risk factors for the development of testicular tumors include cryptorchidism, hypospadias, impaired spermatogenesis, subfertility or infertility, a family history of testicular cancer among first-degree relatives, a history of contralateral testicular tumor, and testicular dysgenesis (5,6).

Clinically, testicular tumors typically present as a unilateral, painless, firm mass within the testis. However, approximately 20% of patients may report scrotal pain at the time of diagnosis. Gynecomastia is observed in 7% of patients, particularly in those with NSGCT tumors (7). Most cases of testicular cancer are diagnosed at an early stage, with the disease confined to the testis (clinical stage I), and can be effectively treated with high success rates via radical orchiectomy (8).

In this study, the clinical characteristics, histopathological findings, and case distributions of patients who were prediagnosed with testicular tumors based on the presence of a testicular mass and underwent radical orchiectomy at our clinic were thoroughly analyzed. The aim of our study is to evaluate the demographic and clinical data of these patients, investigate the relationship between histopathological diagnoses and clinical findings, and interpret the results in the context of current literature. Within this scope, we aim to contribute to the literature by sharing our clinical experiences regarding the diagnosis and treatment processes of testicular tumors.

## MATERIAL AND METHODS

All radical orchiectomies performed at our clinic with a preliminary diagnosis of testicular tumor between January 2016 and January 2021 were retrospectively reviewed following approval from the Received by the Health Sciences University Antalya Training and Research Hospital Clinical Research Ethics Committee (Date:29.09.2022 Number:2022-290)

Data were retrieved from the hospital registry system and pathology archives. The recorded variables included demographic characteristics, clinicopathological features such as tumor localization, laterality, serum tumor markers, presence of metastasis, history of undescended testes, and pathology results for all cases. Patients with incomplete data or those diagnosed with benign testicular conditions were excluded from the study.

### Statistical Analysis

Statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) version 26.0. The conformity of variables to a normal distribution was assessed using visual and analytical methods (Kolmogorov-Smirnov/Shapiro-Wilk tests). Descriptive statistics were presented as numbers, percentages, means, and standard deviations.

## RESULTS

In the retrospective review, 110 radical orchiectomies were screened, and 102 patients met the inclusion criteria for the study, all of whom had testicular malignancies. The mean age of the cohort was 34.5 ± 11.5 (25-78) years, with a median age of 33 years. Regarding tumor laterality, 52 cases involved the right testis and 50 the left. The mean tumor diameter was 4.76 ± 2.78 cm, with a median of 4.5 cm. No bilateral testicular tumors were identified among the patients. The most common presenting complaint was a unilateral, painless testicular mass.A history of unilateral or bilateral undescended testis was reported in 9 cases (8.8%), and 2 patients had a documented history of infertility. Semen cryopreservation was performed in 7 patients prior to treatment. Preoperative serum tumor markers (αFP, LDH, βhCG) were elevated in 27 patients (26.4%)(Table 1).

Histopathological evaluation (Table 2) revealed that germ cell tumors (GCT) accounted for 90 cases, while sex-cord stromal tumors were observed in 6 cases. Additionally, 6 cases were classified as other tumor types, including diffuse large B-cell lymphoma, mature cystic teratoma, B-cell lymphoblastic leukemia/lymphoma, and fibrothecoma. Among the germ cell tumors, 47 were seminomas and 43 were non-seminomatous germ cell tumors (NSGCTs). Thirty-three of the NSGCTs were mixed germ cell tumors. Furthermore, 46 patients exhibited lymphovascular invasion (LVI), 26 had tunica albuginea/vaginalis invasion, and 4 had spermatic cord invasion.

During a median follow-up period of 48.2 months, disease progression was observed in 12 patients (11.8%), and 5 patients (5%) died. All deceased patients had NSGCT (non-seminomatous germ cell tumors). The median overall survival was 58.0 months (95% CI; 5.6–79.2).

**Table 1**. Clinical and demographic characteristics of the patients

| Characteristic features | Number of cases(n=102) | |
|---|---|---|
| **Age** | **n** | **%** |
| <33 | 38 | 37,3% |
| ≥33 | 64 | 62,7% |
| Lateralization | | |
| Right | 52 | 50,9% |
| Left | 50 | 49,1% |
| Tumor size | | |
| <4.5 cm | 58 | 56,8% |
| ≥4.5 cm | 44 | 43,2% |
| History of undescended testicle | | |

| | | |
|---|---|---|
| No | 93 | 91,2% |
| Yes | 9 | 8,8% |
| Infertility | | |
| No | 100 | 98,1% |
| Yes | 2 | 1,9% |
| Application complaint | | |
| Unilateral painless mass | 63 | 61,7% |
| Pain in testis | 21 | 20,5% |
| Undescended testis+infertility+subfertility | 12 | 11,7% |
| İncidentally | 5 | 4,9% |
| Neck mass (supraclavicular lymph node) | 1 | 1,0 % |

**Table 2.** Histopathological classification of the cases

| **Tumor Type** | **Number of cases (n=102)** | |
|---|---|---|
| **Germ Cell Tumors** | **n** | **%** |
| Seminoma | 47 | 46% |
| Embryonal carcinoma | 8 | 8% |
| Yolk sac tumor | 1 | 1% |
| Choriocarcinoma | 1 | 1% |
| Mixed germ cell tumor | 33 | 32% |
| Sex-Cord Stromal Tumors | | |
| Sertoli cell tumor | 4 | 4% |
| Leydig cell tumor | 1 | 1% |
| Sertoli-Leydig cell tumor | 1 | 1% |
| Other | | |
| Diffuse large B-cell lymphoma | 3 | 3% |
| Mature cystic teratoma | 1 | 1% |
| B lymphoblastic leukemia/lymphoma | 1 | 1% |
| fibrothecoma | 1 | 1% |

## DISCUSSION

Notably, surgical descent of the intra-abdominal testis into the scrotum does not reduce cancer risk. Additionally, it has been suggested that exogenous estrogen exposure during pregnancy may increase the relative risk of testicular cancer (9). Advances in imaging techniques and chemotherapy regimens, particularly cisplatin-based therapies, have significantly improved survival rates, from 10% to 90%. In our series, 9 cases (8.8%) had a history of cryptorchidism, consistent with findings in the literature.

In industrialized societies, the incidence of testicular tumors has been rising in recent years, potentially influenced by socioeconomic status and dietary habits (3,4). Studies conducted in Turkey have shown that testicular tumors are more common in individuals of higher socioeconomic status and with higher education levels (10,11). The risk of testicular cancer is also elevated in those with a family history of the disease, particularly among fathers and siblings (12-14). In our series, one patient had a sibling with a history of testicular cancer.

Testicular tumors are reported to occur more frequently on the right side than on the left. Our series supported this observation, with a higher number of tumors on the right side, aligning with the literature. The typical clinical presentation of testicular tumors is a painless, unilateral, firm mass in the testis (7). Approximately 10% of patients may present with symptoms related to metastasis as the initial manifestation of the disease (10,13). In our series, the most common presenting symptom was a unilateral, painless testicular mass, consistent with existing literature. Only one patient presented with a neck mass, identified as a supraclavicular lymph node. The time from the symptom of a palpable painless mass to his presentation to our clinic was 7 months. he was metastatic at the time of diagnosis and was treated as stage 4 after orchiectomy.

Bilateral testicular tumors were not observed in our series. The incidence of bilateral testicular tumors in the literature is reported to be 1-5%, with approximately one-third of cases diagnosed as synchronous and two-thirds as metachronous (15). Lymphoma is the most frequently detected bilateral testicular tumor and is the most common cause of secondary testicular tumors (16). In our series, 4 patients were diagnosed with lymphoma, specifically diffuse large B-cell lymphoma and B lymphoblastic lymphoma.

In our series, 90 out of 102 cases (88%) were diagnosed with GCTs. Seminomas are the most common subtype among GCTs (13), and in our series, 47 cases (46.1%) exhibited seminoma pathology.

Mixed germ cell tumors (GCTs) consist of multiple coexisting GCT types, and 69-91% of non-seminomatous GCTs are found as mixed GCTs (17). In our study, 33 cases (32.3%) were diagnosed with non-seminomatous mixed GCTs. The pure form of yolk sac tumor is rare in adults, and those diagnosed in adulthood are typically a component of mixed GCTs (18). Adult yolk sac tumors are known to be more aggressive and have a higher propensity for metastasis compared to those seen in prepubertal cases (19). In our series, one case of pure yolk sac tumor was identified in a 24-year-old male. Unfortunately, postoperative follow-up records were unavailable for this patient, as they were not captured in the clinical archive.

Sex cord-stromal tumors are exceedingly rare, comprising approximately 5% of all testicular tumors. Leydig cell tumors are the most common variant, while Sertoli cell tumors represent about 0.5-1.5% of all testicular tumors. The mean age at diagnosis for Sertoli cell tumors is 45 years (20,21). In contrast to the literature, our series reported a 3.9% incidence of Sertoli cell tumors. The treatment, malignancy criteria, and follow-up for malignant Sertoli cell tumors are similar to those of Leydig cell tumors. However, overall survival tends to be lower. Banerji JS et al. reported a 5-year overall survival rate of 77% for patients with clinical stage I Sertoli cell tumors, while the 5-year overall survival for malignant stage I Leydig cell tumors was 91%. In comparison, the 5-year survival for stage I seminomas is 98%. As such, retroperitoneal lymph node dissection is recommended as a key component of treatment for malignant Sertoli cell tumors (22).

## CONCLUSION

In conclusion, the general clinical and pathological characteristics of the patients who underwent radical orchiectomy in our study were consistent with the existing literature. However, our series reported a higher incidence of Sertoli cell tumors, a rare variant of sex cord-stromal tumors, than previously documented. Sex cord stromal tumors of testicular origin may be more frequent than indicated in the literature and should be worked with an experienced pathologist. The treatment of sex cord stromal tumors of testicular origin is still controversial. One should be very careful about the choice of testicular-sparing surgery and retroperitoneal lymph node dissection should be considered for the treatment of patients at high risk of recurrence. The efficacy of systematic chemotherapy has not yet been proven and there is no standardized procedure. Sex cord stromal tumors of testicular origin may be more common than reported in the literature, our study shows that Sertoli cell tumors are more common and should be worked with a pathologist experienced in sex cord stromal tumors.

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