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Original Article

Clinicopathological and Demographics Analysis of Testicular Tumors: A Single-center Experience

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ABSTRACT

Aim: Testicular cancers are among the most prevalent solid tumors in young males. The majority of these cases involve germ cell tumors, with seminomas emerging as the predominant histological subtype. This study aimed to investigate both the clinical and demographic characteristics of patients diagnosed with testicular tumors and the distribution of histopathological subtypes within this cohort.

Methods: Patients aged 18 years who were diagnosed with testicular tumors other than secondary malignancies and were followed up at our clinic between 2008 and 2022 were included in the study. Comprehensive clinical and pathological data were meticulously recorded for each patient. Survival outcomes were compared using the Kaplan-Meier method with the log-rank test.

Results: Germ cell tumors exhibited a median onset age of 29. Among the cases, non-seminomatous tumors accounted for 55.9% of the cases, whereas seminomas accounted for 44.1%. Within the non-seminomatous tumor category, mixed germ cell tumors were the most frequently encountered subtype, accounting for 45.4% of cases. Testicular involvement was noted predominantly in the right-side testis (56.7%), followed by the left-side testis (42.3%), and bilateral involvement was rare (1%). The percentage of patients diagnosed at stage 1 was 56.7%.

Conclusion: Germ cell tumors are primary testicular malignancies and remain a significant health problem in young men. Although seminomas have historically been predominant, there has been an increase in the rates of non-seminomatous tumors in recent years. Early and accurate diagnosis remains the most important step toward successful treatment of such tumors.

Keywords: Testicular cancer, epidemiology, germ cell neoplasms, seminoma, non-seminomatous germ cell tumor

Introduction

Testicular cancer is the most common solid tumor in young males [1]. The vast majority (>95%) of testicular cancers are testicular germ cell tumors. According to the current World Health Organization classification system, germ cell tumors are classified into two main subgroups: seminomas and non-seminomatous tumors. Approximately 50% of these cases are seminomas. Non-seminomatous tumors include embryonal carcinoma, choriocarcinoma, yolk-sac tumor, teratoma, and mixed germ cell tumors formed by various combinations of these elements [2]. Most cases occur in young men aged 15-40 years [3].

The etiopathogenesis and risk factors associated with testicular cancers remain not fully elucidated. However, undescended testes (cryptorchidism) represent a prominent risk factor, increasing the risk of testicular cancer development by fivefold [4]. Additionally, diet, environmental factors, infertility, and history of testicular cancer in the contralateral testis are risk factors for new testicular cancer development [3].

Approximately 70% of patients are diagnosed at an early stage (normal tumor marker levels, absence of lymph node involvement or distant metastases), whereas approximately 30% receive a diagnosis at an advanced stage [5]. In the metastatic stage, the International Germ Cell Cancer Collaborative Group's risk classification system stratifies

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patients into good, intermediate, and poor risk groups. Patients in the poor-risk group have a worse prognosis [6,7].

This study aimed to investigate epidemiological data, histopathological characteristics, and survival rates by screening patients diagnosed with testicular cancer at our hospital over the past 15 years.

Methods

Medical records of patients who were followed up at our medical oncology clinic between 2008 and 2022 were screened. Patients aged 18 years and above diagnosed with testicular cancer were included in the study. Patients with testis metastasis from another cancer were excluded. The total number of patients enrolled in the study was 95. Patient data were retrieved from the hospital database and follow-up records. Data such as age, pathological diagnoses, histopathological subgroups, tumor location, tumor stage, current status, and last follow-up date were recorded.

The study was approved by the University of Health Sciences Türkiye, Ankara Etlik City Hospital Ethics Committee (code: AEŞH-BADEK-2024-150, date: 06.03.2024). This study was conducted in compliance with the principles outlined in the 1964 Declaration of Helsinki.

Statistical Analysis

Statistical analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS) Statistical Software (IBM SPSS statistics version 22.0, IBM SPSS, USA). Descriptive analysis was used to analyze the clinical and demographic characteristics of the patients. Categorical and numerical variables are presented as numbers and percentages (n, %). Continuous data were reported as means±standard deviation if they followed a normal distribution; otherwise, they were presented as medians and ranges. Survival outcomes were assessed using the Kaplan-Meier method with the log-rank test (univariate analysis) or Cox proportional hazard regression model (multivariate analysis). A p value of <0.05 was considered statistically significant for all analyses.

Results

A total of 95 patients were included in the study, with a median age of 29 (18-79) years. The number of patients with a history of smoking and alcohol consumption was 51 (53.7%) and 10 (10.5%), respectively. Most patients (93.7%) did not have comorbidities. Of the patients, 93 (97.9%) were diagnosed with germ cell tumors. The general characteristics of the patients are presented in Table 1.

Non-seminomatous tumors were the most common germ cell tumor subtype (55.9%). Only 2 patients had Leydig cell tumors classified as non-germ cell tumors. Histopathological subtypes of the tumors are presented in Table 2.

Among the patients, 54 (56.8%) had right testis tumors. At diagnosis, 55 patients (57.9%) were in stage 1 and 23 (24.2%) were in stage 2. Among the stage 1 patients, 12 (21.8%) received one cycle of carboplatin (area under the curve=7), 11 (20%) received one cycle of bleomycin/etoposide/cisplatin (BEP), and 5 (9.1%) received three cycles of BEP, whereas 27 (49.1%) did not receive any treatment. Among the stage 2 patients, 20 (87%) received three cycles of BEP, whereas 3 (13%) received four cycles of BEP. Among the stage 3 patients, 13 (76.5%) received three cycles of BEP, while 4 (23.5%) received four cycles of BEP.

The median overall survival has not yet been determined. The 5-year overall survival was 89% for the entire patient group, with rates of 98%, 94%, and 57% for stages 1, 2, and 3, respectively. Kaplan-Meier curves according to stage are presented in Figure 1.

Discussion

It is widely acknowledged that the incidence of cancer is progressively rising worldwide. In 2020, a total of 74,500

Table 1. General characteristics of the patients

	n	%
Age (median, range)	29 (18-79)	
Smoking history		
Yes	51	53.7
No	44	46.3
Alcohol consumption		
Yes	10	10.5
No	85	89.5
Comorbidity		
Yes	6	6.3
No	89	93.7
Germ cell tumors	93	97.9
Non-germ cell tumors	2	2.1
Laterality		
Right	54	56.8
Left	40	42.2
Bilateral	1	1
Stage at diagnosis		
Stage 1	55	57.9
Stage 2	23	24.2
Stage 3	17	17.9

Table 2. Histopathological distribution of testicular tumors

	n	%
Seminoma	41	43.2
Non-seminoma (54.7%)		
Embryonal carcinoma	7	7.4
Mixing germ cell tumors	44	46.3
Yolc sac tumor	1	1
Leydig cell tumors	2	2.1
Total	97	100

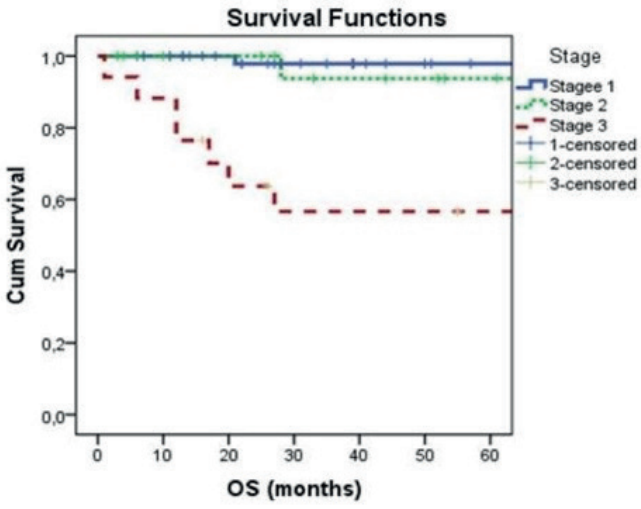

Figure 1. Kaplan-Meier plot according to tumor stage
OS: Overall survival

new cases of testicular cancer were reported globally, placing testicular cancer as the 20th most prevalent malignancy [8]. However, when focusing on younger age groups, the landscape shifts. Testicular tumors reaching their peak incidence within the 15-40 age range are recognized as the most frequent solid cancers in this demographic [3]. This trend is also evident in retrospective studies conducted in Türkiye. In the study of Çalışkan et al. [9], the mean age was 36.9, while Yalçınkaya et al. [10] reported a mean age of 32.9. Similarly, Gürsoy et al. [11] noted the most frequent occurrence within the 26-32 age bracket. Consistent with this trend, our study determined a median age of 29 years, which is the age range in which testicular tumors are most commonly observed. Despite slight variations across series, the consistency of the age group at the peak incidence is coherent.

Existing literature has suggested a lower prevalence of non-seminomatous tumors [12]. However, studies conducted in our country revealed a higher incidence of non-seminomatous tumors. Both Gürsoy et al. [11] and Çalışkan et al. [9] reported a higher incidence of non-seminomatous tumors compared to seminomas. Similarly, in our study, non-seminomatous tumors constituted 54.7% of all testicular tumors. While it is challenging to fully elucidate this discrepancy in the retrospective Turkish series compared with the literature, genetic, sociocultural differences, and specific environmental exposures may contribute to these variations.

Regarding subtypes within non-seminomatous tumors, mixed germ cell tumors are the most common. They are the second most common type of germ cell tumor in adults, the following seminomas. Embryonal carcinoma is the second most common non-seminomatous subtype. Teratomas and yolk sac tumors are less frequently encountered [11]. Our study similarly found the highest prevalence of mixed germ cell tumors within non-seminomatous tumors, with embryonal carcinoma being the second most frequent subtype.

Irrespective of histopathological subtype, germ cell tumors exhibit a greater predilection in the right testes. After analyzing laterality, the studies previously mentioned and conducted in our country consistently reported a higher prevalence of right testicular tumors compared with left testicular tumors. This phenomenon can be attributed to the higher frequency of undescended testes in the right testes. Additionally, although bilateral testicular tumors are reported to range between 1% and 7% in the literature, our study observed a bilateral occurrence rate of 1% [13].

Testicular cancers are recognized as chemosensitive tumors, thereby rendering survival outcomes generally favorable, whether in the adjuvant or metastatic setting. Gürsoy et al. [11] reported a 5-year overall survival rate of 88% across the entire patient group. In our study, the 5-year survival rate for the entire patient cohort was 89%, while stage 3 patients exhibited a rate of 57%. These data underscore the significance of administering adjuvant chemotherapy to patients at risk of recurrence or metastasis to enhance survival. Furthermore, the 5-year survival rate was 92% for seminomas and 89% for non-seminomatous tumors in our study. Despite the numerical distinctions, statistical significance was not observed.

Study Limitations

Several limitations are inherent to our study. Primarily, being a single-center, retrospective study, inherent biases are unavoidable. Second, the relatively small number of cases may impact the study's power to provide comprehensive epidemiological insights. Additionally, the lack of information on salvage treatments for patients who experience relapse is another limitation. Therefore, when interpreting the study's outcomes, it is advisable to consider these factors.

Conclusion

Germ cell tumors constitute the majority of testicular malignancies. Although the incidence of these tumors within the general population may be relatively low, they are the most prevalent solid organ tumors among young men. Historically, seminomas have been reported to dominate germ cell tumors; however, recent studies have indicated an increasing prevalence of non-seminomatous tumors. Treatment outcomes, particularly in the early stages, demonstrate near-optimal results. Hence, early and accurate diagnosis remains a pivotal step toward successful management of these tumors.

Ethics

Ethics Committee Approval: The study was approved by the University of Health Sciences Türkiye, Ankara Etlik City Hospital Ethics Committee (code: AEŞH-BADEK-2024-150, date: 06.03.2024).

Informed Consent: Retrospective study.

Footnotes

Authorship Contributions

Concept: Y.D., Design: Y.D., Data Collection or Processing: S.G., A.K., Analysis or Interpretation: Y.D., Literature Search: B.Ö., Writing: B.Ö.

Conflict of Interest: No conflict of interest was declared by the authors.

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References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2018. CA Cancer J Clin. 2018;68:7-30.
2. Moch H, Cubilla AL, Humphrey PA, Reuter VE, Ulbright TM. The 2016 WHO Classification of tumours of the urinary system and male genital organs-part a: renal, penile, and testicular tumours. Eur Urol. 2016;70:93-105.
3. Cheng L, Albers P, Berney DM, et al. Testicular cancer. Nat Rev Dis Primers. 2018;4:29.
4. Bray F, Richiardi L, Ekbom A, Pukkala E, Cuninkova M, Møller H. Trends in testicular cancer incidence and mortality in 22 European countries: continuing increases in incidence and declines in mortality. Int J Cancer. 2006;118:3099-3111.
5. Daugaard G, Gundgaard MG, Mortensen MS, et al. Surveillance for stage I nonseminoma testicular cancer: outcomes and long-term follow-up in a population-based cohort. J Clin Oncol. 2014;32:3817-3823.
6. No authors listed. International Germ Cell Consensus Classification: a prognostic factor-based staging system for metastatic germ cell cancers. International Germ Cell Cancer Collaborative Group. J Clin Oncol. 1997;15:594-603.
7. Aykan MB, Yıldıran GS, Acar R, et al. Retrospective analysis of testicular germ cell tumor patients with brain metastases: a single-center experience. J Oncol Sci. 2022;8:27-33.
8. Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021;71:209-249.
9. Çalışkan S, Kaba S, Özsoy E, Koca O, Akyüz M, Öztürk Mİ. The hematological parameters in testicular cancer. J Oncol Sci. 2017;3:117-119.
10. Yalçınkaya U, Çalışır B, Uğraş N, Filiz G, Erol O. Testicular tumors: results of a 30-year archive study. Turkish Journal of Pathology. 2008;24:100-106.
11. Gürsoy P, Çakar B, Gökmen E, et al. Epidemiological and overall survival characteristics of testicular cancers in Ege University Hospital database. Ege Journal of Medicine. 2019;58:126-132.
12. Vasdev N, Moon A, Thorpe AC. Classification, epidemiology and therapies for testicular germ cell tumours. Int J Dev Biol. 2013;57:133-139.
13. Bandak M, Lauritsen J, Johansen C, et al. Sexual function and quality of life in a national cohort of survivors of bilateral testicular cancer. Eur Urol Focus. 2020;6:711-719.