Clinical Disparities for Minorities and Foreign-Born Men With Undescended Versus Descended Testicular Germ Cell Tumors

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Abstract

Few reports have been published regarding the outcomes of patients who develop an undescended testicular malignancy (UTM). Patients with a diagnosis of nonseminomatous or seminomatous testicular cancer were identified in the Surveillance, Epidemiology, and End Results (SEER) database to analyze the sociodemographic and survival outcomes of patients with UTM and those with descended testicular malignancy (DTM). Patients with UTM were more likely to be older, married, a minority or foreign born and to have seminoma, a higher rate of node positivity, and a higher SEER stage compared with patients with DTM.

Background: Few reports have been published regarding the outcomes of patients who develop an undescended testicular malignancy (UTM). Our objective was to analyze the sociodemographic and survival outcomes of patients with UTM and those of with descended testicular malignancy (DTM). **Patients and Methods:** All 17 registries constituting the Surveillance, Epidemiology, and End Results (SEER) database were analyzed from 1988 to 2008. Patients with a descended or undescended testis and a diagnosis of nonseminomatous or seminomatous testicular cancer were identified. Descriptive statistical data and multivariate analysis were used to identify the predictors of a UTM diagnosis. The primary outcomes were overall and disease-specific survival. **Results:** The study cohort included 10,159 men (95.3%) with DTM and 496 (4.7%) with UTM. Patients with UTM were more likely to be older, married, and a minority or foreign born and to have seminoma, a higher rate of node positivity, and a higher SEER stage compared with patients with DTM. The median survival time for patients with UTM was longer than that for patients with to DTM (83.1 vs. 72.5 months; $P = .0001$), although no difference was found in cancer-specific mortality ($P = .34$). **Conclusion:** Patients with UTM are more likely to be a minority or foreign born, highlighting a previously unrecognized healthcare disparity that might represent a lack of diagnosis and access to care.

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Introduction

In 2014, an estimated 8820 new cases of testicular cancer and an estimated 380 deaths will have occurred in the United States.[1] Well-established risk factors for testicular cancer include a family history of testicular cancer, a personal history of testicular cancer, intratubular germ cell neoplasia, and cryptorchidism.[2] Recent studies have also suggested that diet and/or other environmental factors might play a role in development of germ cell testicular malignancies.[3,4] The rate of new cases diagnosed per 100,000 men is 6.6 white, 4.7 Hispanic, and 1.4 African American annually.[5] Previous studies have demonstrated an increased risk of developing testicular cancer for men with a higher socioeconomic status (SES), typically measured by income and/or educational attainment. However, lower levels of education and SES have been linked to later-stage diagnosis and increased mortality.[6]

Cryptorchidism is a common congenital anomaly, occurring in 1% to 4% of full-term and 1% to 45% of preterm infant males.[7] Although the benefits of orchiopexy for cryptorchidism are clear, few reports have been published regarding the outcomes of patients who develop a malignancy in an undescended testis. Given the

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suggested SES disparities associated with cryptorchidism, we hypothesized that men presenting with an undescended testicular malignancy (UTM) would be of lower SES than were men with a descended testicular malignancy (DTM). Therefore, the objective of the present study was to analyze the demographic, clinicopathologic, and socioeconomic demographic data and the survival outcomes of patients with UTM compared with DTM.

Patients and Methods

Study Population

The study cohort consisted of patients from all 17 registries of the Surveillance, Epidemiology, and End Results (SEER) database from 1988 to 2008. Given that the SEER data are public, de-identified data, institutional review board approval was not required. Patients with DTM or UTM were identified in the SEER database using the primary site code C62.1 and C62.0, respectively. Patients with code C62.9 (testis, not otherwise specified) were not included in the analysis (n = 17,672). Subsequently, using the International Classification of Diseases, Oncology (ICD-O) codes, we identified patients with a diagnosis of either seminoma (ICD-O codes 9061-9063) or nonseminomatous testicular germ cell tumor (ICD-O codes 9070-9071, 9080-9085, 9100-9102) for a study cohort of 10,655 patients.

Description of Covariates

The variables of interest included age, race (African American, white, Hispanic, other, unknown), marital status (married, single/divorced/widowed, unknown), retroperitoneal lymph node dissection (RPLND) (yes vs. no), histologic type (nonseminoma vs. seminoma), American Joint Committee on Cancer (AJCC), 7th edition, tumor classification, pathologic nodal status, SEER stage (local, regional, distant, unstaged), and median overall survival (OS) (censoring date, June 10, 2011). The SES variables of interest included the median census county data for the percentage of educational attainment (< 9th grade vs. less than high school), median family income, percentage of poverty level, percentage of unemployed, percentage of ethnic or racial minority, percentage of foreign born, and rural versus urban status.

Statistical Analysis

Descriptive statistical analyses for the demographic, clinicopathologic, and SES variable comparisons were performed using the *t* test and χ^2 test. Survival estimates were calculated using the Kaplan-Meier method for disease-specific survival stratified by testicular descent. Cox proportional hazard analysis was performed to generate odds ratios (ORs) for the risk factors of a diagnosis of UTM using the clinicopathologic and SES factors. Variables listed as "unknown" were kept in the descriptive statistical tables to demonstrate frequencies, but they were not included in the statistical analysis. To prevent confounding of AJCC stage with SEER stage, only the SEER stage was included in the multivariable analysis. The models were constructed using all pertinent variables, and backward selection was used to find the best fit model. Statistical analyses were performed using SAS, version 9.3 (SAS Institute, Cary, NC). All tests were 2-sided, with statistical significance set at $P < .05$.

Results

Patient Demographics

The complete listing of patient demographics is included in Table 1. The study cohort included 10,159 men (95.3%) with DTM and 496 (4.7%) with UTM. Patients with UTM were older (median age, 36 vs. 34 years; $P \leq .0001$) and more often married (52.0% vs. 47.1%; $P = .0495$) than were the patients with DTM. Significant differences were found between the 2 groups regarding race ($P < .0001$), with a greater percentage of African American (6.1% vs. 1.7%) and Hispanic (19.2% vs. 17.3%) men with UTM than DTM.

Clinical and Pathologic Outcomes

Patients with UTM had a greater rate of a diagnosis of seminoma (71.0% vs. 56.4%; $P < .0001$) than did the patients with DTM (Table 1). Between the 2 groups, the differences in T classification ($P < .0001$), pathologic nodal status ($P = .0001$), and SEER stage ($P = .0004$) were significant. Patients with UTM had a more favorable T classification (T0 in 1.4% vs. 0.2%; T4, 1.8% vs. 5.1%). However, they had worse nodal disease (distant, 4.8% vs. 2.1%) and SEER stage (localized, 64.3% vs. 70.9%; distant, 16.5% vs. 11.0%) compared with patients with DTM. The median survival time for patients with UTM was significantly longer than that for those with DTM (83.1 vs. 72.5 months; $P = .0001$), although no difference was found in cancer-specific mortality ($P = .34$; Figure 1).

Socioeconomic Outcomes

Compared with patients with DTM, those with UTM were from counties with a greater median income ($56,611 vs. $54,143; $P < .0001$; Table 2). Furthermore, patients with UTM were more commonly living in rural (< 2500 people) or metropolitan (> 1 million people) communities ($P < .0001$).

Predictors of UTM Diagnosis

On multivariable analysis, after adjusting for race, age, RPLND, histologic type, and SEER stage, the significant factors associated with a UTM diagnosis included seminoma histologic type (OR, 2.58; 95% confidence interval [CI], 2.05-3.25), RPLND (OR, 1.40; 95% CI, 1.06-1.87), and SEER stage (OR, 1.44; 95% CI, 1.26-1.64; for a 1-unit increase in SEER stage—localized to regional, regional to distant). The factors that were protective against a diagnosis of UTM included white race (vs. nonwhite; OR, 0.31; 95% CI, 0.24-0.41) and Hispanic race (vs. non-Hispanic; OR, 0.40; 95% CI, 0.29-0.56). After adjusting for socioeconomic factors, residing in a county with more foreign-born inhabitants (highest quartile vs. lowest quartile, OR, 1.33; 95% CI, 1.01-1.76) was associated with a diagnosis of UTM (Table 3).

Discussion

The present analysis, to our knowledge, represents the first population-based study to analyze the outcomes of patients with UTM versus the outcomes of those with DTM. Patients with UTM were more frequently younger, were more diagnosed with a seminoma, and were more commonly not white. Although patients with UTM had comparable educational attainment, they were more often from counties with a greater number of foreign-born inhabitants. Patients with UTM also had poorer clinical stage disease