ELSEVIER

CrossMark

Urologic Oncology: Seminars and Original Investigations 34 (2016) 122.e9–122.e15

UROLOGIC ONCOLOGY

Original article

Racial and economic disparities in the treatment of penile squamous cell carcinoma: Results from the National Cancer Database

Pranav Sharma, M.D., Kenan Ashouri, M.S., Kamran Zargar-Shoshtari, M.D., Adam M. Luchey, M.D., Philippe E. Spiess, M.D.*

Department of Genitourinary Oncology, Moffitt Cancer Center, Tampa, FL

Received 15 August 2015; received in revised form 26 September 2015; accepted 2 October 2015

Abstract

Purpose: We evaluated sociodemographic and economic differences in overall survival (OS) of patients with penile SCC using the National Cancer Data Base (NCDB).

Methods: We identified 5,412 patients with a diagnosis of penile squamous cell carcinoma from 1998 to 2011 with clinically nonmetastatic disease and available pathologic tumor and nodal staging. OS was estimated using the Kaplan-Meier method, and differences were determined using the log-rank test. Cox proportional hazard regression was performed to identify independent predictors of OS.

Results: Estimated median OS was 91.9 months (interquartile range: 25.8–not reached) at median follow-up of 44.7 months (interquartile range: 17.2–81.0). Survival did not change over the study period ($P = 0.28$). Black patients presented with a higher stage of disease (pT3/T4: 16.6 vs. 13.2%, $P = 0.027$) and had worse median OS (68.6 vs. 93.7 months, $P < 0.01$). Patients with private insurance and median income ≥$63,000 based on zip code presented with a lower stage of disease (pT3/T4: 11.6 vs. 14.7%, $P = 0.002$ and 12.0 vs. 14.0%, $P = 0.042$, respectively) and had better median OS (163.2 vs. 70.8 months, $P < 0.01$ and 105.3 vs. 86.4 months, $p = 0.001$, respectively). On multivariate analysis, black race (hazard ratio [HR]: 1.39, 95% confidence interval [CI]: 1.21–1.58; $P < 0.01$) was independently associated with worse OS, whereas private insurance (HR = 0.79, 95% CI: 0.63–0.98; $P = 0.028$) and higher median income ≥$63,000 (HR = 0.82; 95% CI: 0.72–0.93; $P = 0.001$) were independently associated with better OS.

Conclusions: Racial and economic differences in the survival of patients with penile cancer exist. An understanding of these differences may help minimize disparities in cancer care.

Keywords: Penile cancer; Squamous cell carcinoma; National Cancer Database; Race; Treatment disparities; Overall survival

1. Introduction

Penile squamous cell carcinoma (SCC) is rare in the United States (US), representing only 0.4% to 0.6% of all malignancies diagnosed among men [1,2]. Additionally, most cases are low grade and superficial with 1% to 2% of patients presenting with metastatic disease. Risk factors for penile cancer include lack of circumcision, multiple sexual partners, chronic inflammatory conditions of the glans and foreskin, and human papillomavirus (HPV) infection [3]. Tumor stage, grade (G), age more than 65 years, basaloid or sarcomatoid histologic features, and presence and extent of lymph node (LN) involvement have been identified as important prognostic factors in determining long-term oncologic outcomes [4].

Although the incidence of penile SCC is more common in the developing nations of Asia and Africa, the role of patient demographics and socioeconomics on survival is still limited [5]. In this study, we used a large, national cancer database to examine the association between various demographic, socioeconomic, hospital-specific, and disease-related characteristics and survival from penile SCC.

2. Methods

2.1. Data source

We used data from the National Cancer Data Base (NCDB) to evaluate our study question. The NCDB is a

* Corresponding author. Tel.: +1-813-745-2484; fax: +1-813-745-8494.
E-mail addresses: philippe.spiess@moffitt.org, philippe.spiess72@gmail.com (P.E. Spiess).

http://dx.doi.org/10.1016/j.urolonc.2015.10.001

hospital-based information source established in 1989 to serve as a clinical surveillance resource for cancer care in the US and Puerto Rico [6]. It consists of more than 29 million records collected from more than 1,500 commission accredited cancer programs, capturing data from ~70% of newly diagnosed cancers yearly. The database includes information on patient demographics, hospital-specific characteristics, cancer grading and staging, tumor characteristics, type of treatment administered, and outcome, including vital status and time of follow-up (until last contact or death). Specific information on cause of death is not available.

2.2. Study population

The NCDB was queried for cases of penile SCC diagnosed between 1998 and 2011. Cases were limited to patients with clinically nonmetastatic disease (cM0) with pathologic tumor (pT) and nodal (pN) staging and International Classification of Disease for Oncology histology codes that defined SCC: 8070 (NOS), 8071 (keratinizing), 8072 (large cell, nonkeratinizing), 8073 (small cell, nonkeratinizing), 8074 (spindle cell), 8075 (adenoid), 8076 (stromal invasion), 8078 (horn formation), 8084 (clear cell type), and 8052 (papillary). Given the particularly aggressive nature of SCC with basaloid or sarcomatoid features, we excluded these subtypes, which included 106 patients.

2.3. Sociodemographic characteristics

Variables analyzed included age, race, ethnicity, geographic location, housing type, education level of the population, median income, and insurance status. Hispanic ethnicity included patients with a Spanish surname excluding those of Brazilian and Portuguese origin. Geographic location of the reporting facility was based on US Census division categories of Northeast, South/Southeast, Midwest, or West. Housing unit of the reporting facility was defined as metropolitan (counties with >250,000 residents), urban (counties with 2,500–250,000 residents), or rural (counties with <2,500 residents). The education level of the population was based on the number of adults in the patient's zip code who did not graduate high school using data from the 2012 American Community Survey. Median income was based on the median household income of the patient's zip code. Finally, insurance status was defined as the primary insurance carrier of the patient at the time of cancer diagnosis.

2.4. Hospital-specific and disease-specific characteristics

Variables analyzed included year of diagnosis, facility type, distance traveled for treatment, time from diagnosis to treatment, tumor grade, pT stage, pN stage, and use of radiation therapy (XRT) or chemotherapy. Reporting facility type was defined as a community cancer program (100–500 newly diagnosed cancer cases per year), comprehensive community cancer program (>500 newly diagnosed cancer cases per year), academic cancer program (>4 postgraduate medical education programs with >500 newly diagnosed cancer cases per year), or other. Distance traveled for treatment was based on great-circle measurements from the patient's zip code to the zip code of the reporting facility. Tumor grade, stage, and pathologic nodal staging were based on the American Joint Committee on Cancer Staging Manual edition in use during the year of diagnosis. Finally, use of XRT or chemotherapy was defined as yes or no based on any use during the patient's treatment course.

2.5. Statistical analysis

Continuous variables were reported as medians and interquartile ranges (IQRs), and categorical variables were reported as frequency counts and percentages. For median income based on zip code, ≥$63,000 was used for the higher economic group as it represented the uppermost quartile in the study population. Our primary end point was overall survival (OS). OS was estimated using the Kaplan-Meier method, and differences in survival between groups were determined using the log-rank test. Cox proportional hazards regression analysis was performed to evaluate the association of relevant demographic, clinical, and pathological features with OS. Any variable that was found to be significantly different between groups on univariate analysis ($P < 0.05$) was included in the adjusted multivariate model.

Statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS) software package version 21.0 (IBM Corporation, Armonk, NY). All tests were 2 sided with a $P < 0.05$ considered to be statistically significant.

2.6. Results

In total, 5,412 cases of cM0 penile SCC with available pT and pN stage were identified in the NCDB. The sociodemographic characteristics of our study population are listed in Table 1, and hospital-specific and disease-specific characteristics are listed in Table 2. The estimated median OS was 91.9 months (IQR: 25.8–not reached) at median follow-up of 44.7 months (IQR: 17.2–81.0). There were 2,382 (44.0%) deaths in our study population with a 5-year OS of 65.9% and a 10-year OS of 57.5%. The median OS did not change over the study period ($P = 0.28$), even though a great percentage of patients in recent years presented with more locally advanced (pT3/T4) (2008–2011: 18.5% vs. 1998–2000: 10.0%, $P < 0.01$) and node-positive (pN+) disease (2008–2011: 22.8% vs. 1998–2000: 15.0%, $P < 0.01$). On univariate analysis, patient age, race, insurance status, median income, tumor grade, pT stage, and pN stage were associated with OS ($P < 0.05$). Interestingly, patient ethnicity, geographic location, housing unit,