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Original article

Sociodemographic disparities in chemotherapy treatment and impact on survival among patients with metastatic bladder cancer

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Abstract

Objective: To evaluate how socioeconomic status and other demographic factors are associated with the receipt of chemotherapy and subsequent survival in patients diagnosed with metastatic bladder cancer.

Methods: Using data from the California Cancer Registry, we identified 3,667 patients diagnosed with metastatic urothelial carcinoma of the urinary bladder between 1988 and 2014. The characteristics of patients who did and did not receive chemotherapy as part of the first course of treatment were compared using chi-square tests. Logistic regression was used to identify predictors of chemotherapy treatment. Fine and Gray competing-risks regression and Cox proportional hazards regression were used to estimate bladder cancer-specific and all-cause mortality, respectively.

Results: Less than half (46.3%) of patients received chemotherapy. Patients from the lowest socioeconomic quintile were half as likely to have chemotherapy as those from highest quintile (odds ratio = 0.5, 95% CI: 0.4, 0.7). Unmarried patients were significantly less likely to receive treatment (odds ratio = 0.6, 95% CI: 0.5, 0.7). Not receiving chemotherapy was associated with greater mortality from bladder cancer (subdistribution hazard ratio = 1.4, 95% CI: 1.3, 1.5) and from all causes (hazard ratio = 2.0, 95% CI: 1.8, 2.1).

Conclusions: We found clear disparities in chemotherapy treatment and survival with respect to socioeconomic and marital status. Future studies should explore the possible reasons why patients with low socioeconomic status and who are unmarried are less likely to have chemotherapy.

Keywords: Urinary bladder neoplasms; Chemotherapy; Neoplasm metastasis; Drug therapy; Cancer; Epidemiology

1. Introduction

Bladder cancer represents an important public health problem, accounting for about 5% of all new cancer cases in the U.S. [1]. In 2018, it is estimated there will be 81,190 new cases and 17,240 deaths due to bladder cancer [1]. This burden is expected to increase with an aging population [2]. About 5% of cases are metastatic at the time of diagnosis, and approximately 15% to 40% of high grade superficial tumors progress to advanced disease [3,4]. These patients have high mortality rates, with only about 5% of metastatic cancer patients surviving at least 5 years postdiagnosis [5]. Despite advances in treatment, there has been little improvement in survival for patients with metastatic bladder cancer over the last 2 decades [6].

This lack of improvement could be attributed to undertreatment for some patients. Chemotherapy is currently the standard first-line treatment for metastatic bladder cancer and has been shown to be effective in improving symptoms, slowing cancer growth, and prolonging survival [7,8]. Yet, despite the apparent efficacy, many patients with metastatic disease do not receive chemotherapy [6,9]. Such treatment disparities in patients with bladder cancer may contribute to

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differential survival across age [10], racial and ethnic groups [11,12], and between men and women [13]. However, few studies have specifically looked at the contribution of socioeconomic status (SES) to receipt of standard treatment for bladder cancer and survival. Better understanding of disparities in treatment and survival should lead to interventions to reduce these disparities.

In this large population-based study of patients with metastatic bladder cancer, we aimed (1) to evaluate how SES and other demographic factors (age, sex, race, and marital status) are associated with the receipt of chemotherapy, and (2) to assess how these factors affect survival from bladder cancer.

2. Methods

Patients were identified through the California Cancer Registry (CCR), the single largest population-based state cancer registry in the U.S. [14]. The CCR contains demographic, diagnostic, treatment, and outcome information on all reportable cancers diagnosed in California residents since January 1988. Persons included in this study were diagnosed with pathologically confirmed urothelial cell carcinoma of the urinary bladder in California between 1988 and 2014. All included cases were diagnosed with metastatic disease and were at least 20 years old at time of diagnosis. Only first primary tumor cases were included, and patients diagnosed at autopsy or by death certificate only were excluded from analysis.

Neighborhood SES (nSES) was based on U.S. Census data on neighborhood characteristics of the patient address at the time of diagnosis, including educational attainment, occupation type, employment rate, median household income, poverty level, median rent, and house values. For cases diagnosed 1988 to 2005, nSES was computed using census-block group data from the Census 2000 Summary File. For patients diagnosed 2006 to 2014, nSES was determined from the 2007 to 2011 American Community Survey. These 2 data sources were combined to form quintiles at the block group level across the state [15,16]. Race/ethnicity was classified into 4 mutually exclusive groups: non-Hispanic white, non-Hispanic black, Hispanic, and Asian/Pacific Islander. Age at diagnosis was categorized into 20 to 64 years, 65 to 74 years, and 75 years and older. Marital status was dichotomized into married or single/unmarried (single/never married, divorced, or widowed). Patients were categorized as having received chemotherapy as part of their first course of treatment or not. The CCR defines first course treatment as all treatment received before disease progression or treatment failure.

Patient information was summarized, and the characteristics of patients who did and did not receive chemotherapy were compared using chi-square tests. Logistic regression was used to predict the receipt of chemotherapy. Odds ratios and their corresponding 95% CIs were generated for crude models and a model adjusted for age, sex, race/ethnicity, nSES, marital status, and year of diagnosis. Fine and Gray competing-risks regression and Cox proportional hazard regression were used to estimate bladder cancer-specific and all-cause mortality, respectively. Both crude and adjusted hazard ratios and their corresponding 95% CIs were calculated. Subdistribution hazard ratios (sHRs) were calculated for bladder cancer-specific mortality [17]. Follow-up time for mortality was calculated as the number of days between the date of diagnosis and date of death through the end of the follow-up period (December 31, 2014). Censoring was accounted for patients who were alive at the follow-up date or were lost to follow-up. Statistical significance was set at the 0.05 level for all analysis. All analyses were performed using SAS version 9.3 (SAS Institute, Cary, NC).

3. Results

A total of 3,667 patients with metastatic bladder cancer were identified. Patient characteristics are displayed in Table 1. A total of 1,427 (38.9%) patients were 75 years or older at the time of diagnosis, and most patients were males (68.7%), non-Hispanic white (75.5%), and married (52.8%). There were similar numbers of patients across nSES quintiles. The majority of patients (56.8%) were diagnosed between 2002 and 2014. Fewer than half (46.3%) of patients received chemotherapy as part of their first course of treatment.

Table 2 compares the characteristics of patients who received and did not receive chemotherapy. Receiving chemotherapy was associated with being 20 to 64 years old ($P < 0.0001$), male ($P < 0.0001$), and married ($P < 0.0001$). Non-Hispanic black race was associated with not receiving chemotherapy ($P = 0.0293$). There was an inverse relationship with respect to treatment status and nSES (P for trend <0.0001). The proportion of patients receiving chemotherapy increased over time (P for trend <0.0001).

The results of the analysis of chemotherapy predictors are shown in Table 3. Adjusting for all other factors, patients aged 65 to 74 and 75 years and older were significantly less likely to receive chemotherapy than those aged 20 to 64 years ($P < 0.0001$ for both). Females were significantly less likely to receive chemotherapy in crude analysis, but there was no significant association after adjustment ($P = 0.3836$). Similarly, non-Hispanic blacks were significantly less likely to have chemotherapy in an unadjusted model, but this was no longer statistically significant in the adjusted model ($P = 0.3016$). In both crude and adjusted analysis, patients diagnosed between 2009 and 2014 were significantly more likely to receive chemotherapy (adjusted odds ratio [OR] = 1.6, 95% CI: 1.3, 2.0, $P < 0.0001$), indicating an increase in chemotherapy treatment in recent years.