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Original article

Race and postoperative complications following urologic cancer surgery: An ACS-NSQIP analysis

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Abstract

Purpose: Racial disparities in complication rates have been demonstrated for a variety of surgical procedures. We hypothesized that African American (AA) patients experience higher postoperative complication rates than whites following urologic oncology procedures.

Materials and methods: Patients in American College of Surgeons National Surgical Quality Improvement Program who underwent radical prostatectomy (RP), radical or partial nephrectomy (RN/PN), and radical cystectomy (RC) between 2005 and 2013 were included. Complications were grouped as minor (Clavien I–II), major (Clavien III–IV), or death (Clavien V). A 30-day complication rates and disparities in preoperative comorbidity burden were compared by race. After adjustment for comorbidity burden, multivariable logistic regression was performed to test the association between race and risk of complication.

Results: Of 38,642 patients included in the analysis, 90% were white and 10% were AA. In unadjusted analysis, there were no significant differences in complication rates between AA and white patients for any Clavien grade in the procedures queried (RP: $P = 0.07$; RN/PN: $P = 0.70$; RC: $P = 0.12$). After controlling for a higher comorbidity burden among AA patients, AA race was again not independently associated with 30-day postoperative complications for RP (odds ratio [OR] = 1.08, 95% CI: 0.92–1.29), RN/PN (OR = 0.98, 95% CI: 0.84–1.13), or RC (OR = 1.10, 95% CI: 0.84–1.43).

Conclusion: Despite a higher comorbidity burden, AA patients in American College of Surgeons National Surgical Quality Improvement Program are not at increased risk of 30-day postoperative complications following major urologic cancer surgery. These findings suggest that comorbidity burden, as opposed to race, is most strongly associated with the risk of postoperative complications. To minimize perioperative risk, clinicians should strive to preoperatively optimize medical comorbidities in all patients undergoing urologic cancer surgery.

Keywords: Race; Disparity; Oncology; Complications; NSQIP

1. Introduction

In the United States, racial disparities exist in both the access to health care [1] and the quality of care administered [2]. These racial differences are preventable; and therefore, signify inefficiencies in our health care system that represent targets for quality improvement [3,4].

Prior publications have suggested that minorities undergoing surgery for cancer may receive inferior care compared to their white counterparts [5]. Several surgical specialties have shown higher postoperative complication rates among African American (AA) patients after various oncologic procedures [6–10]. Among urological surgeries, a prior analysis of the Health Care Cost and Utilization Project determined that AA patients undergoing cystectomy had more than a 50% increased risk of experiencing a postoperative complication than white patients [11]. For prostatectomy, black men in Health Care Cost and Utilization Project were adversely affected in a number of quality-of-care measures including inpatient mortality and length of stay [12]. Another population-based database analysis

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showed that AA patients were twice as likely to suffer a complication within 90 days following radical nephrectomy [13].

In the current study, we aimed to further characterize racial differences in complication rates following uro-oncologic surgery and to identify factors potentially underlying these racial disparities, using a prospectively collected, robust national dataset. We hypothesized that AA patients would experience higher rates of postoperative complications than white patients, and that a disproportionate burden of comorbidity could at least partially explain why such differences exist. Knowledge that members of minority races are at higher risk of postoperative complications following these procedures would allow practitioners to more accurately counsel patients preoperatively regarding the risks and benefits of surgery [14]. Furthermore, identification of factors underlying racial disparities may reveal modifiable factors that can be addressed preoperatively to minimize the perioperative risk to patients undergoing urologic procedures [15].

2. Materials and methods

The American College of Surgeons' National Quality Improvement Program (ACS-NSQIP) database, established in 2004 as an extension of the National Veterans Affairs Surgical Risk Study, prospectively collects data from more than 700 participating institutions on over 130 clinical variables including demographics, disease characteristics, operative details, and 30-day postoperative morbidity and mortality information. A total of 68% of ACS-NSQIP participating institutions designated themselves as teaching hospitals in 2015 and 65% had >300 beds. Teaching hospitals provided about one-third of the more than 600,000 surgical cases reported in NSQIP for 2015 [16].

All white and AA patients in the ACS-NSQIP database who underwent radical prostatectomy (RP), radical cystectomy (RC), and radical or partial nephrectomy (RN/PN) between the years 2005 and 2013 for oncologic diagnoses were included for analysis. Due to relatively small patient numbers, patients of other races were excluded. Patients were identified by Current Procedural Terminology code as maintained by the American Medical Association through the Current Procedural Terminology editorial panel. Secondary procedures were not assessed and therefore no patients were excluded based on the presence of secondary procedures.

For each procedure, patient demographics, medical comorbidity burden, smoking history, functional status, and body mass index (BMI) data were collected. Covariates of interest were prespecified according to recommendations by Rosenblum, choosing all covariates hypothesized to confound the relationship between race and rate of complications [17]. BMI subdivisions were defined as underweight: <18.5; normal weight: 18.5 to 25; overweight: 25 to 30; and obese: >30. Comorbidities assessed included diabetes, chronic obstructive pulmonary disease (COPD), ascites, congestive heart failure (CHF), hypertension (HTN), and renal failure. Racial differences in patient demographic and comorbidity data were then evaluated using Chi-square or Fisher's exact tests, as appropriate.

The primary study outcome was the presence of documented postoperative complication within 30 days of surgery. Complications were grouped according to Clavien-Dindo classification as minor (Clavien I–II), major (Clavien III–IV), or death (Clavien V). As ACS-NSQIP does not explicitly describe complication severity on an individual patient level, complication groupings were assigned uniformly as per Table 2 and not on an individual case-by-case-basis. Univariate differences in complication rates by race were assessed using Cochran-Armitage tests for trend.

Multivariable ordinal regression analysis was then used to test for associations between race and 30-day complication severity after adjusting for comorbidity burden. Covariates in the multivariable model included patient age, sex, race, diabetes, COPD, ascites, CHF, HTN, renal failure, smoking status, functional status, and BMI. All statistical analyses were performed using SAS software (version 9.4), with $P < 0.05$ meeting statistical significance.

3. Results

3.1. Cohort characteristics

In total, 38,642 patients met inclusion criteria (RP: 19,612 [51%]; RN/PN: 15,209 [39%]; RC: 3,821 [10%]). Of these, 34,824 (90%) were white whereas 3,818 (10%) were AA. For RN/PN and RC, males represented 58% (8,836/15,209) and 70% (2,670/3,821) of the cohorts, respectively.

Significant demographic differences existed between the AA and white patient populations (Table 1). For example, AA patients tended to be younger at the time of surgery irrespective of surgical procedure. Furthermore, a higher percentage of AA patients undergoing RC and RN/PN were female compared to white patients.

Comorbidity burden also differed significantly by race, with AA patients tending to harbor a larger burden of comorbidity across the procedures studied (Table 1). In the RP cohort, diabetes ($P < 0.01$), HTN ($P < 0.01$), renal failure ($P = 0.03$), and smoking status ($P < 0.01$) were all significantly more highly represented in the AA patient population. AA patients receiving RN/PN were proportionally more frequent carriers of each comorbidity studied apart from CHF ($P = 0.08$) and ascites ($P = 0.99$). Finally, diabetes ($P = 0.05$), COPD ($P = 0.02$), HTN ($P = 0.04$), and smoking ($P = 0.02$) were significantly more common in the AA population undergoing RC.