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Original article

Differences in the aggressiveness of prostate cancer among Korean, Caucasian, and African American men: A retrospective cohort study of radical prostatectomy

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Abstract

Purpose: We aimed to compare the pathologic aggressiveness of clinically localized prostate cancer (PCa) treated by radical prostatectomy in Korean and Western (Caucasian and African American [AA]) men by analyzing data from representative hospitals in the capitals of Korea (Seoul) and the United States (Washington, DC).

Methods: We performed a retrospective cohort study of 1,939 patients who underwent radical prostatectomy for clinically localized PCa in the Asan Medical Center and Washington Hospital Center. After adjusting for confounding clinical variables, we used multivariate logistic regression analysis to assess differences in the aggressiveness of PCa.

Results: We analyzed 1,152 Korean, 473 Caucasian, and 314 AA patients. There were significant differences between Korean and Western patients in terms of age at surgery, preoperative levels of prostate-specific antigen, and clinical stage ($P < 0.001$). Overall, high-grade PCa (Gleason score ≥ 8) was more common in Korean (19.4%) than in AA (6.1%) or Caucasian (5.5%) patients ($P < 0.001$). The incidence of advanced-stage PCa (pT3 or higher) was higher in Korean (34.8%) than in AA (18.2%) or Caucasian (13.3%) patients ($P < 0.001$). After adjusting for age, prostate-specific antigen, prostate volume, and clinical stage, multivariate logistic regression analysis showed that Korean men had a high risk of high-grade PCa (Korean vs. Caucasian, odds ratio [OR] = 3.48, $P < 0.001$; Korean vs. AA, OR = 3.14, $P < 0.001$) or advanced-stage PCa (Korean vs. Caucasian, OR = 2.40, $P < 0.001$; Korean vs. AA, OR = 1.59, $P = 0.009$) than Western men.

Conclusions: There are differences in PCa aggressiveness between Korean and Western men. The incidence of high-grade or advanced-stage PCa is higher in Korean men.

Keywords: Prostatic neoplasm; Neoplasm grading; Neoplasm staging

1. Introduction

Although the incidence of prostate cancer (PCa) in Asia is lower than in Western countries, it has been increasing rapidly with an annual average increase of 13.8% in Korea from 1999 to 2007. Mortality from PCa in Asia is lower than that in Northern Europe or the United States, with regional differences evident among Asian countries. These regional differences might reflect differences in genetic factors, dietary pattern, and the influence of prostate-specific antigen (PSA) testing on PCa. Trends in PCa mortality rates also vary, with significant decreases seen in Japan (approximately 2% per year) from 2004 to 2010 but increases in Korea (approximately 1% per year) observed from 2002 to 2010 [1–3].

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Besides the aforementioned discrepancies in PCa incidence and mortality, there are important ethnic differences in the aggressiveness of PCa.[4–6] Epidemiologic studies have shown that Asian men present more frequently with advanced-stage and high-grade PCa than Caucasian men [7–9]. The unfavorable risk profile in Asian men could be partly explained by differences in screening behavior. However, stage and grade migration from the widespread use of PSA screening has also been reported in Asian men, such as China, Japan, and Korea during the last decade. These studies showed that despite the wide use of PSA screening in Asian men, most PCa tumors among Asian men are poorly differentiated high-grade lesions [10–12].

The aggressiveness of PCa correlates directly with the age at diagnosis, serum PSA level, clinical stage, and race/ethnicity. Although some studies have directly compared the aggressiveness of PCa diagnosed in Asian men with those of Western men, to date no studies have compared the pathologic characteristics of these cases after adjusting these important demographic and clinical variables [9,12,13]. In this context, we have here conducted a retrospective cohort study to compare the pathologic grade and stage of clinically localized PCa receiving radical prostatectomy (RP) for Korean and Western men (both Caucasian and African American [AA]) using the data from representative hospitals in the capitals of Korea (Seoul) and the United States (Washington, DC).

2. Materials and methods

2.1. Study population

After obtaining institutional review board approval, we performed a retrospective cohort study of 2,012 patients who underwent RP consecutively for clinically localized PCa in the Asan Medical Center (Seoul, Korea) and Washington Hospital Center (Washington, DC) from January 2006 to August 2012. After excluding 73 patients with other ethnicity, 785 Western men (Caucasian, $n = 473$ and AA, $n = 314$) from Washington Hospital Center and 1,152 Korean men from Asan Medical Center were finally included in the study cohort. From each hospital, 2 surgeons performed all RPs (C.S.K. at Asan Medical Center and J.H. at Washington Hospital Center). Patients who had received hormonal therapy or radiotherapy before RP were excluded from the analysis. We restricted eligibility to men diagnosed since 2006 because of significant changes in the Gleason scoring system by the International Society of Urological Pathology [14].

2.2. Measures

Preoperative staging and evaluation were performed using history and physical examination, digital rectal examination, and serum PSA measurement. All men were diagnosed via standard 12-core ultrasonography-guided prostate biopsy before RP. RP was performed by a single surgeon from each of the 2 institutions, and pelvic lymph node dissection was performed at the discretion of the surgeon. All RP specimens were submitted for histologic examination. All slides were reviewed by experienced genitourinary pathologists from each institution. All RP specimens were graded using a modified Gleason scoring system [14]. Staging of PCa was based on the 2010 revision of the American Joint Committee on Cancer/Union for International Cancer Control TNM staging system [15].

2.3. Statistical analysis

Patients were divided into those who have high-grade PCa or advanced-stage PCa. Descriptive statistics were used for demographic and clinical data. The chi-square test was used to make simple associations of categorical variables. Multivariate logistic regression models were used to determine the independent association of race with the presence of aggressive or advanced-stage PCa after adjusting for demographic and clinical variables. All statistical tests were 2-tailed, with $P < 0.05$ being considered to be significant. The SPSS ver.21.0 (SPSS Inc, Chicago, IL) was used for all statistical analyses.

3. Results

We analyzed 1,152 Korean, 473 Caucasian, and 314 AA patients. Table 1 shows significant racial differences in age at surgery, body mass index, preoperative PSA level, and prostate volume ($P < 0.001$). The mean age and preoperative serum PSA were higher in Korean men than in Western (Caucasian or AA) men. However, the body mass index and prostate volume were each lower in Korean men than in Western men.

Overall, high-grade PCa (Gleason score ≥ 8) was more common in Korean patients (19.4%) than AA or Caucasian patients (6.1% and 5.5%, $P < 0.001$). Also, the incidence of advanced-stage PCa (pT3 or higher) was higher in Korean patients (34.8%) than in AA or Caucasian patients (18.2% and 13.3%, $P < 0.001$). Table 2 shows the incidence of high-grade and advanced-stage PCa stratified by patient age and the preoperative level of serum PSA. In 515 men younger than 60-year old, advanced-stage PCa (Korean = 31.5% vs. Caucasian = 7.2% and AA = 14.6%, $P < 0.001$) and high-grade PCa (Korean = 16.9% vs. Caucasian = 3.6% and AA = 2.3%, $P < 0.001$) were more common in Korean men than in AA or Caucasian men. Of 1,539 men with a serum PSA level <10 ng/ml, Korean men had higher incidence of high-grade (Korean = 15.0% vs. Caucasian = 4.9% and AA = 3.5%, $P < 0.001$) and advanced-stage PCa (Korean = 27.3% vs. Caucasian = 11.9% and AA = 13.7%, $P < 0.001$) than Western men.