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European Association of Urology

Brief Correspondence

Prevalence of Inflammation and Benign Prostatic Hyperplasia on Autopsy in Asian and Caucasian Men

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Article info

Article history:
Accepted June 17, 2014

Keywords:
Inflammation
BPH
Autopsy
Asian
Caucasian
Prevalence

Abstract

Inflammation has been suggested to be involved in the pathogenesis of benign prostatic hyperplasia (BPH). We studied the prevalence of inflammation and BPH in Asian and Caucasian men on prostate glands ($n = 320$) obtained during autopsy in Moscow, Russia (Caucasian men, $n = 220$), and Tokyo, Japan (Asian men, $n = 100$). We correlated the presence and grade of acute inflammation (AI) or chronic inflammation (CI) and BPH. AI, CI, and histologic BPH were analyzed in a blinded fashion using a grading system (0–3). We used the Cochran-Armitage test for associations between the degree of BPH and clinical variables and proportional odds logistic regression models in multivariable analysis. Histologic BPH was observed in a similar proportion of Asian and Caucasian men ($p = 0.94$). CI was found in $> 70\%$ of men in both the Asian and Caucasian groups ($p > 0.05$). Higher BPH scores were associated with more CI ($p < 0.001$). In multivariate analyses, individuals with CI were 6.8 times more likely to have a higher BPH score than individuals without ($p < 0.0001$). Men included in this study presented at the hospital and their symptomatic status was not known. The prevalence of CI and BPH on autopsy is similar in Asian and Caucasian men despite very different diet and lifestyle. CI is strongly associated in both groups with BPH.

Patient summary: In this study, we looked at the prevalence of inflammation and benign prostatic hyperplasia (BPH) on autopsy in Asian and Caucasian men. We found chronic inflammation in $> 70\%$ of men on autopsy. More chronic inflammation was associated with more BPH.

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http://dx.doi.org/10.1016/j.eururo.2014.06.026
0302-2838/

Benign prostatic hyperplasia (BPH) is a very common chronic condition in aging men [1]. Prostatic inflammation has been incriminated in the development or progression of BPH [1,2]. Inflammatory infiltrates are commonly found in BPH lesions. These inflammatory cells release cytokines and growth factors that can stimulate the stroma and epithelial cells to hyperproliferate [2]. Alternatively, chronic inflammation (CI) could be the consequence of bladder outlet obstruction. It remains unclear whether this association reflects a causal link, shared risk factors, pathophysiologic mechanisms, or detection bias. CI has been proposed as a new target in the medical therapy of BPH to prevent its progression [1,2]. CI is commonly observed on prostate biopsies (eg, in the REDUCE trial [77.4%]) [3].

To gain further insight into the relationship between inflammation (acute and chronic) and BPH, we analyzed their prevalence on autopsy prostates in both Caucasian and Asian men. Age-related autopsy prevalence of histologic BPH is reported to be similar in diverse countries but no study had compared CI in Asian and Caucasian prostates [4].

The study population and methodology was previously described in detail including comorbidities [5]. In brief, prostates were prospectively collected during autopsy in men 30–80 yr of age with no known history of prostate cancer (PCa) between 2008 and 2011 at Jikei University, Tokyo, Japan (Asian men), and Moscow University, Moscow, Russia (Caucasian men). Ethics approval from each site and consent from relatives were obtained. Prostate glands were removed within 24 h of death, immediately injected with buffered formalin (pH 7.3), and placed in solution for 2 d.

All pathologic assessments were performed by an experienced uropathologist (T.vdK.) in a blinded fashion. The prevalence of acute inflammation (AI; grade 0–3) and CI, grade 0–3, was analyzed using histologic grading on the basis of extension of inflammatory cells [6]. The degree of prostatic inflammation was based on the mean number of inflammatory cell aggregates in the prostate stroma in $\times$40 microscopic field (0, no inflammation; 1, mild inflammation with one to three aggregates of inflammatory cells; 2, moderate inflammation with four to seven aggregates of inflammatory cells; 3, pronounced inflammation with more than seven large aggregates of inflammatory cells) [6]. Histologic BPH was assessed using a 0–3 scoring system, based on the number of circumscribed BPH nodules.

For statistical analysis (R software v.2.12.1 using the MASS package), prevalence of BPH, CI, and AI was calculated as a proportion. The association between BPH, CI, and AI scores and known prognostic variables (ie, age, race, incidence of PCa, and prostate weight) was assessed using the Cochran-Armitage test for trend. The effect of CI on BPH, adjusting for age and race, was modeled using proportional odds logistic regression.

Table 1 shows the cohort characteristics. CI was observed in 74.5% of prostates without significant difference between Asian and Caucasian men ($p = 0.71$). There was an increasing relationship between CI and prostate weight ($p < 0.0001$).

Table 1 – Clinical and pathologic demographics among all cases ($n = 320$)

Characteristics	Asian ($n = 100$)	Caucasian ($n = 220$)	All ($n = 320$)	p value
Age, yr, mean (range)	68.5 (24-89)	62.5 (22-80)	64.4 (22-89)	<0.001*
Prostate weight, g, mean (range)	31.9 (10.2–144.5)	40.0 (13.2–150.6)	37.5 (10.2–150.6)	0.001*
PCa, *n* (%)	35 (35)	82 (37.3)	117 (36.6)	0.70
History of cancer (non-PCa), *n* (%)	59 (59)	26 (11.8)	85 (26.5)	<0.001
Cause of death, *n* (%)				
Cancer (non-PCa)	56 (56)	26 (22.8)	82 (25.6)	<0.001
Other***	44 (44)	181 (82.3)	225 (70.3)	<0.001
Acute inflammation, *n* (%)				
0	69 (69.0)	137 (62.8)	206 (64.8)	0.40**
1	11 (11.0)	37 (17.0)	48 (15.1)	
2	13 (13.0)	20 (9.2)	33 (10.4)	
3	7 (7.0)	24 (11.0)	31 (9.7)	
Unknown	0	2	2	
Chronic inflammation, *n* (%)				
0	28 (28.0)	53 (24.3)	81 (25.5)	0.71**
1	32 (32.0)	77 (35.3)	109 (34.3)	
2	28 (28.0)	61 (28.0)	89 (28.0)	
3	12 (12.0)	27 (12.4)	39 (12.3)	
Unknown	0	2	2	
BPH, *n* (%)				
0	27 (27.0)	53 (24.3)	80 (25.2)	0.94**
1	16 (16.0)	40 (18.3)	56 (17.6)	
2	19 (19.0)	51 (23.4)	70 (22.0)	
3	38 (38.0)	74 (33.9)	112 (35.2%)	
Unknown	0	2	2	

BPH = benign prostatic hyperplasia; PCa = prostate cancer.
All p values were calculated using the chi-square test for association except as follows:
* Used the Mann-Whitney test.
** Used the Cochrane-Armitage test for trend.
*** Including acute cardiac failure, stroke, myocardial infarction, organ failure, renal failure, hepatic failure, sepsis, and so on.