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Original article

Population-based study of the incidence and survival for intraductal carcinoma of the prostate

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Abstract

Purpose: The degree to which intraductal carcinoma of the prostate (IDC-P) affects clinical course remains poorly understood owing to small sample sizes from single-center studies. We sought to determine prognostic factors and outcomes associated with IDC-P in radical prostatectomy (RP) specimens.

Materials and methods: This is a retrospective study of RP during 2004 to 2013 using Surveillance, Epidemiology, and End Results to compare IDC-P with non-IDC-P. The effect of IDC-P on overall and disease-specific survival was assessed using Cox regression with a median follow-up of 4.8 years (interquartile range [IQR]: 2.6–7.0 y; $P = 0.01$). Median prostate-specific antigen at diagnosis in IDC-P vs. non-IDC-P was similar ($P = 0.23$) at 6.2 (IQR: 4.6–13.0) vs. 6.1 ng/ml (IQR: 4.6–9.8).

Results: We identified 159,777 RP from 2004 to 2013, and 242 (0.002%) had IDC-P pathologic features. IDC-P was associated with a greater likelihood of extraprostatic stage, pT3/T4, 45.9% vs. 21.6% ($P < 0.001$), higher grade, GS≥ 7, 79.3% vs. 62.7% ($P < 0.001$), lymph node metastases, 5.8% vs. 2.4% ($P < 0.001$), and positive surgical margins, 25.6% vs. 19.5% ($P = 0.02$). IDC-P was associated with a 3-fold increase in prostate cancer-specific mortality relative to non-IDC-P (hazard ratio = 3.0, 95% CI: 1.5–5.7; $P < 0.01$). Limitations include retrospective design and potential underreporting of IDC-P that leads to underestimation of the true effect size.

Conclusions: The significance of IDC-P features has been recently recognized by the World Health Organization and it is associated with high-grade, extraprostatic features, and worse prostate cancer-specific mortality. Understanding its prognostic significance better guides adjuvant therapies and clinical trials. © 2017 Published by Elsevier Inc.

Keywords: Intraductal carcinoma; Outcome; Prognosis; Prostate cancer; SEER

1. Introduction

Most of the prostate cancer (CaP) is classified as acinar adenocarcinoma [1], and intraductal carcinoma of the prostate (IDC-P) is a distinct histologic entity that is believed to represent retrograde spread of invasive acinar adenocarcinoma into prostatic ducts and acini with preservation of the basal cells [2]. IDC-P typically represents an advanced stage of tumor progression and is associated with adverse findings at radical prostatectomy (RP) [3–7].

Given that IDC-P was recently defined by the World Health Organization (WHO) in 2016 despite its original description 40 years ago [8], its exact incidence is difficult to ascertain owing to observer variation in identifying and reporting. Recent studies demonstrate that approximately 2.8% of men will have acinar adenocarcinoma of the prostate with concurrent IDC-P, and less than 0.3% will have IDC-P alone on needle core biopsy specimens [2,9]. In single-center RP series, approximately 17% of subjects have IDC-P [6,10,11].

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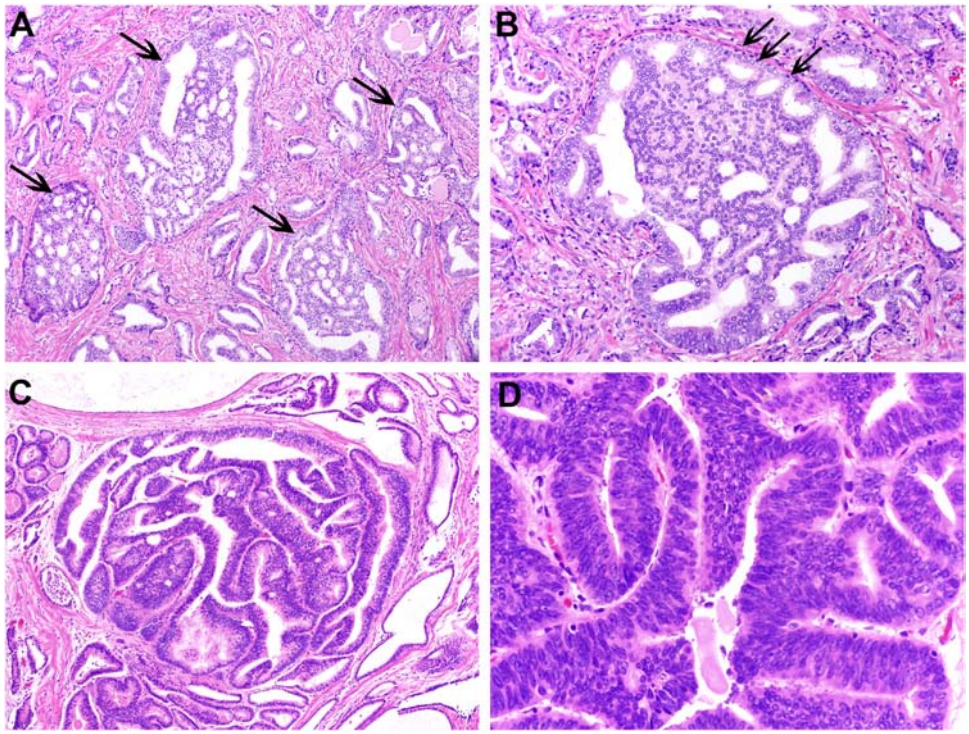

Fig. 1. Histologic examples of invasive acinar, intraductal carcinoma, and ductal adenoarcinoma of the prostate. (A) Intraductal carcinoma of the prostate (IDC-P), indicated by arrows, with a dense cribriform pattern of malignant epithelium filling large ducts and acini. Invasive acinar carcinoma with well formed glands (mostly Gleason pattern 3), is also shown infiltrating the stroma in between the large ducts of IDC-P. (B) Single duct at higher magnification with IDC-P in a dense cribriform pattern with basal cells visible at the periphery, indicated by arrows. (C) Prostatic ductal adenocarcinoma showing papillary architecture with some cribriform spaces. (D) Prostatic ductal adenocarcinoma at higher magnification showing tall pseudostratified columnar epithelium with prominent nucleoli [hematoxylin-eosin (A–D), original magnification ×100 (A and C), ×200 (B), ×400 (D)]. (Color version of figure is available online.)

The degree to which the presence of IDC-P affects clinical course remains poorly understood owing to a limited number of studies to date, many of which also include ductal pathology, which is a distinct entity [12,13]. Moreover, studies that include IDC-P alone are small, single-center studies [3,14]. Therefore, the objective of our study was to conduct a retrospective analysis of the Surveillance, Epidemiology, and End Results (SEER) from 2004 to 2013 to identify the population-based rate of IDC-P in largely community settings, its natural history, and associated demographic and pathologic features in men undergoing RP.

2. Methods

We identified subjects from SEER, a national tumor registry sponsored by the National Cancer Institute, which collects incidence, survival, and treatment data from geographically representative cancer registries. The SEER program includes patient demographics from 20 tumor registries, encompasses approximately 28% of the United States population, and captures nearly 97% of incident cancers [15,16].

From SEER, we identified all radical prostatectomies (n = 159,777) from 2004 to 2013 using the International Classification of Diseases for Oncology-03 SEER site/histology validation list. IDC-P (n = 242) was identified by International Classification of Diseases for Oncology -0–3 codes 8500/2, 8503/2, 8503/3, and 8507/2. Sample histologic images of IDC-P are portrayed in Fig. 1A and B. Prostatic ductal carcinoma, examples of which can be seen in Fig. 1C and D, was excluded from analysis. Sociodemographic characteristics included year of diagnosis, age at diagnosis, marital status, and race. Pathologic characteristics included pathologic stage, grade, lymph node status, and surgical margin status. Gleason score (GS) was categorized consistent with from the SEER grade and prior studies [17].

In univariable analysis, we compared prostate-specific antigen at diagnosis and RP pathologic features for men with and without IDC-P. We used logistic regression to identify clinical and pathologic factors associated with IDC-P. Additionally, our primary endpoints of interest were overall and prostate cancer-specific mortality (PCSM). Cox regression was performed to assess the effect of IDC-P on overall and disease-specific survival. Statistical analyses were performed using SAS ver.9.4 (SAS, Cary, NC), and a $P < 0.05$ was considered statistically significant and were generated by 2-sided tests. This study was approved by the Weill Cornell Medicine Institutional Review Board.