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Urologic Oncology: Seminars and Original Investigations ▮ (2017) ▮▮▮–▮▮▮

UROLOGIC ONCOLOGY

Original article

Influence of renal biopsy results on the management of small kidney cancers in older patients: Results from a population-based cohort

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Received 27 January 2017; received in revised form 22 May 2017; accepted 30 May 2017

Abstract

Background and objective: Small kidney cancers are a heterogeneous group with varying malignant potential. Pathologic information obtained from a renal biopsy may guide decision-making for small kidney cancers. We sought to assess the effect of pathologic information from renal biopsy on the nonsurgical management of small kidney cancers in a population-based cohort of patients over 65 years of age.

Methods: In the Surveillance, Epidemiology and End Results-Medicare dataset, we identified patients ≥66 years diagnosed with a kidney cancer <4 cm between 2002 and 2011. Diagnostic biopsy was defined by a Medicare claim within 1 month prior through 6 months following cancer diagnosis or before surgery. Nonsurgical management was defined by the absence of a claim for partial or radical nephrectomy or tumor ablation in the first 6 months following diagnosis. The relationship between patient and tumor characteristics and the likelihood of nonsurgical management by receipt of diagnostic biopsy was assessed by multivariable logistic regression models.

Results: From 8,933 patients, 2,782 (31%) had a diagnostic renal biopsy of whom 616 (22%) were managed nonsurgically. Controlling for patient, disease, and provider specialty, biopsy was associated with nonsurgical management (adjusted odds ratio = 1.61, 95% CI: 1.43–1.82) in patients with low-grade tumors but also with more aggressive histology (clear cell renal cell carcinoma). Older age (85+) and geographic region were significantly associated with greater odds of diagnostic biopsy. Patients whose initial renal tumor diagnosis was made by a urologist (vs. other type of provider) were less likely to receive a biopsy (adjust odds ratio = 0.73, 95% CI: 0.60–0.89).

Conclusions: Although the use of renal biopsy has increased over time and is associated with the use of nonsurgical management of small kidney cancers, the use of the pathologic findings remains limited. Further advances, particularly with prognostic markers, are necessary before renal biopsy can be routinely implemented for treatment decision-making for small kidney cancers.

Keywords: Surgery; Small kidney cancer; Renal biopsy; Management; Risk stratification; Nonoperative management

1. Introduction

Current patient evaluation for management of small kidney cancers (<4 cm) is based largely on age, comorbidities, radiographic tumor characteristics, and patient preference, where the role of renal mass biopsy is controversial [1–4]. Some high-volume centers where biopsy is incorporated into the diagnostic and management algorithm suggest that all patients should undergo renal mass biopsy to aid management decisions [3,5,6]. Other centers favor a more judicious patient-centered approach to the management of small kidney cancers, balancing radiographic indeterminate tumors, patient preferences, and quality of life with the potential benefit of information from a renal biopsy to reduce uncertainty regarding cancer management for select patients [2,7].

To date, there has been no large population-based study evaluating whether the pathologic information obtained from a renal biopsy influences the management of small kidney cancers. Outside of determining whether a renal tumor is benign or malignant, it is unknown if and how the

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http://dx.doi.org/10.1016/j.urolonc.2017.05.025
1078-1439/

knowledge of Fuhrman grade and histologic subtype obtained through biopsy may affect the decision to manage small kidney cancers nonoperatively. With the improved safety and accuracy and resurgence of renal biopsy [2], this information may be easily incorporated into management decisions, allowing for surveillance in patients with low-risk kidney cancers and reserving surgical management for those who are good surgical candidates with intermediate- and high-risk cancers.

To address the influence of renal biopsy on the management of small kidney cancers, our objectives were to identify patient and provider characteristics associated with receipt of diagnostic renal biopsy, and the influence of pathologic biopsy findings on the likelihood of nonsurgical management of older adults with small kidney cancers. We hypothesized that patients with high-grade kidney cancers as well as those with more aggressive histologic subtype (i.e., clear cell renal cell carcinoma) on biopsy would be more likely to be managed surgically, whereas low-grade tumors and those less aggressive would be associated with nonsurgical management.

2. Methods

2.1. Data

The primary data source was Surveillance, Epidemiology and End Results (SEER) cancer registry records linked with Medicare claims. SEER, a consortium of population-based cancer registries sponsored by the National Cancer Institute, currently includes 18 registries covering approximately 28% of the US population. For all incident cancers in their coverage areas, the SEER registries collect information regarding site and extent of disease, the first course of cancer-directed therapy, and sociodemographic characteristics, with active follow-up for date and cause of death. For adults 65 years or older who are diagnosed with cancer and reside in or receive their diagnosis in a SEER area, Medicare claims have been linked to SEER records. Compared with the elderly population in the United States, the SEER-Medicare population has a similar age and sex distribution, is somewhat more likely to live in urban and affluent areas, and has a smaller proportion of nonwhite individuals [8].

2.2. Study cohort

In the SEER-Medicare database, we identified patients diagnosed with a primary renal-cortical tumor (ICD-O-2 topography codes C64 and C64.9) between 2002 and 2011. The cohort was restricted to patients 66 years or older with a primary tumor less than 4 cm. We excluded patients whose diagnosis was made only at the time of death, who died within 6 months of diagnosis, who were enrolled in a Medicare managed care plan, and those with incomplete Medicare coverage. We also excluded patients who received chemotherapy or radiation therapy within 6 months of diagnosis. Patients with urothelial cancers were also excluded.

2.3. Outcomes

The primary outcome was receipt of a diagnostic renal biopsy identified in Medicare claims up to 1 month before diagnosis through 6 months following diagnosis, or before surgery in this same period. Receipt of biopsy was identified by CPT codes for percutaneous renal biopsy or cytopathology (fine-needle aspiration, see codes in Appendix). Claims for renal biopsy on the day of a definitive surgical procedure (radical or partial nephrectomy or ablation) were excluded from the end point, as they were presumably performed after the treatment decision was made.

The secondary outcome was receipt of nonsurgical management within 6 months following diagnosis. Nonsurgical management was defined by the absence of a claim for partial or radical nephrectomy or tumor ablation in the first 6 months following diagnosis (see codes in Appendix).

2.4. Predictors

Demographic characteristics obtained from SEER and Medicare records included age at diagnosis, sex, race, marital status, geographic region, urban-rural location, and median income in the census tract of residence. Clinical covariates were tumor grade and size, histologic subtype, and year of diagnosis. We used the Romano modification of the Charlson Comorbidity Index, based on inpatient and outpatient claims in the year before cancer diagnosis, as a summary measure of comorbidity burden [9,10]. We also created an indicator for preexisting renal insufficiency based on inpatient claims in the year before diagnosis. The specialty of the health care provider associated with the first claim for a renal mass or tumor was also identified, based on the Medicare provider specialty code indicated on that claim, for the subset of patients where this information was available.

2.5. Statistical analysis

Unadjusted associations between each end point (diagnostic renal biopsy and nonsurgical management) and patient characteristics were assessed using chi-square statistics. Trends over time in the use of diagnostic biopsy and nonsurgical management were examined with Cochran-Armitage trend tests. In separate multivariable logistic regression models, we estimated the effect of demographic and disease characteristics and provider specialty on the likelihood of receiving a diagnostic renal biopsy and nonsurgical management. We also performed stratified analyses to assess whether the relationship