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Original article

National treatment trends among older patients with T1-localized renal cell carcinoma[1]

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Abstract

Objective: To assess the national trends in treatment of localized renal tumors among older patients with limited life expectancy.

Materials and methods: Using the National Cancer Database, we identified older patients (≥70 y) diagnosed with T1 renal cell carcinoma from 2002 to 2011. Primary outcome was the initial treatment—partial nephrectomy (PN), radical nephrectomy, EM, and ablation. Multivariable logistic regression analysis stratified by tumor size (<2, 2–3.9, or 4–7 cm) and age groups (70–79 and ≥80 y) was used to identify covariates associated with different treatments.

Results: Among 41,518 older patients with T1 renal cell carcinoma renal tumors, most were treated with radical nephrectomy (59.0%) followed by PN (20.0%) and ablation (8.4%). Only 12.6% were managed by EM. Among older patients aged 70 to 79 years with renal tumors 2 to 3.9 cm, PN was used more frequently in 2008 to 2009 (odds ratio [OR] = 1.32; $P = 0.001$) and 2010 to 2011 (OR = 1.87; $P < 0.001$) compared to 2002 to 2003 and at academic hospitals (OR = 1.91; $P < 0.001$) compared to community hospitals. Similar trends were observed for patients aged 70 to 79 years with 4 to 7 cm tumors and for patients aged ≥80 years across renal tumor sizes.

Conclusions: Among older patients with localized renal tumors and limited life expectancy, most are treated surgically with a growing use of PN. A smaller proportion of older patients are managed by EM in the United States.

Keywords: Advanced age; Kidney cancer; Nephrectomy; Renal cell carcinoma; Treatment decisions

1. Introduction

Two population trends are occurring in the United States that would increase complexity of treatment decisions for small renal masses (SRMs). The incidence of SRMs has been gradually rising such that clinical T1 renal tumors represent most incident cases, which has been attributable to the growing use of imaging [1,2]. Approximately 60,000 patients would face a diagnosis of renal cell carcinoma (RCC) making it the sixth most common cancer in the United States this year [3]. Against this backdrop, the U.S. population is growing older. The average life expectancies for both men and women have been steadily increasing such that a fifth of the U.S. population would be aged 65 years or older by 2030 [4]. As a result, the rising

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proportion of elderly patients with incidentally detected localized renal tumors with uncertain malignant potential represents a management challenge with significant health policy implications.

Clinical practice guidelines currently endorse partial nephrectomy (PN) for SRMs amenable to surgical resection [5–7]. Other possible treatment options for SRMs include radical nephrectomy (RN), ablation, or expectant management (EM). Although PN has become more technically feasible and safer with minimally invasive surgery, such as robotic PN, it still carries some morbidity and bleeding risks that may be poorly tolerated among older patients [8,9]. With the changes in clinical practice guidelines and rapid dissemination of robotic surgery, the national rates of PN have been gradually rising in the United States [10]. However, EM has become an increasingly accepted disease management strategy for SRMs based on the growing number of studies suggesting the modest annual growth rates of the renal tumor and low risk of metastatic potential and cancer-related mortality, in particular among patients with a limited life expectancy [11–13] Yet, an important knowledge gap is the contemporary trends in the treatment of SRMs among older patients in the United States, as some older patients may be exposed to aggressive treatments and its associated morbidities without receiving a survival benefit. In this context, we assessed the contemporary national treatment trends of older patients (>70 y) diagnosed with SRMs.

2. Material and methods

2.1. Data source

We queried the National Cancer Database (NCDB), a joint project of the Commission on Cancer of the American College of Surgeons and the American Cancer Society, to examine surgical treatment in elderly patients with SRMs [14]. The NCDB is a national oncology dataset obtained from more than 1,500 hospitals that contains no patient- or physician-identifying information. Approximately 70% of newly diagnosed malignancies are captured in the NCDB.

2.2. Study population

We identified all adult patients aged ≥ 70 with kidney masses identified as ≤ 7 cm or stage T1a or T1b from the years 2002 to 2011. Patients were only included if RCC was their first and solitary cancer diagnosis. Exclusion criteria also included the presence of clinical nodal (N1–3) or metastatic disease (M1), age less than 70 years, and primary tumor in the renal pelvis or ureter.

2.3. Covariates and outcomes

Age at diagnosis, race, sex, 2000 census tract annual median income, insurance status (private, Medicare, Medicaid, and other), geographic region (East, Midwest, West, and South), location (urban, rural, and metro), Charlson-Deyo comorbidity score, education status, and year of treatment were assigned for each patient using NCDB data [15]. Hospital types were stratified using the standard NCDB codes for hospitals. Per NCDB guidelines, academic/research hospitals must be primarily affiliated with a medical school or be a National Cancer Institute-designated comprehensive cancer center. The distinction between comprehensive community and community cancer programs is based on overall case volume and the number of ancillary staff available to help treat oncology patients [16]. The NCDB classifies approximately 20% of institutions as academic/research hospitals, 39% as comprehensive community cancer centers, 35% as community cancer centers, and 6% as other cancer centers [17]. Treatment modalities were defined using NCDB codes for surgical treatment of the primary site to determine receipt of PN, RN, local ablative therapy, or EM. We classified patients who did not receive active treatment as undergoing expectant management.

2.4. Statistical analysis

The primary outcome was the initial treatment administered—EM, PN, RN, and ablation. Bivariate associations between treatment type (EM, local ablation, or surgery) and patient characteristics were analyzed using Pearson's chi-square test. Multivariable logistic regression analysis stratified by tumor size (<2 cm, 2–3.9 cm, or 4–7 cm) and age groups (70–79 and ≥ 80 y) was used to identify covariates associated with different treatments adjusting for patient demographic and clinical characteristics. Stata MP version 11.2 was used to perform all statistical analyses, and a 2-sided $P < 0.05$ was used to determine statistical significance [18].

3. Results

From 2002 to 2011, we identified 41,518 patients diagnosed with RCC in the NCDB. As shown in Table 1, most patients were aged between 70 and 79 years (71.4%), white (77.3%), and relatively healthy with no Charlson comorbidities (63.0%). Most patients were treated in urban locations (80.8%) and at comprehensive community hospitals (55.3%), whereas only a third of patients were treated at academic hospitals (32.6%). During the study interval, most patients had a clear cell RCC histology (83.0%) with most patients receiving some form of treatment with RN (59.0%), PN (20.0%), and ablation (8.4%). Only 12.6% of patients were managed with EM.

Significant temporal trends in the national utilization of different treatments and EM were found from 2002 to 2011 (Fig.). From 2002–2003 to 2010–2011, there was marked decrease in the proportion of patients undergoing RN from 73.5% to 47.3%, respectively, whereas the national utilization of PN rose from 15.2% to 27.4%, respectively (both