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Comparing Survival Outcomes and Costs Associated With Radical Cystectomy and Trimodal Therapy for Older Adults With Muscle-Invasive Bladder Cancer

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IMPORTANCE Radical cystectomy is the guidelines-recommended treatment of muscle-invasive bladder cancer, but a resurgence of trimodal therapy has occurred. Limited comparative data are available on outcomes and costs attributable to these 2 treatments.

OBJECTIVE To compare the survival outcomes and costs between trimodal therapy and radical cystectomy in older adults with muscle-invasive bladder cancer.

DESIGN, SETTING, AND PARTICIPANTS This population-based cohort study used data from the Surveillance, Epidemiology, and End Results–Medicare linked database. A total of 3200 older adults (aged ≥ 66 years) with clinical stage T2 to T4a bladder cancer diagnosed from January 1, 2002, to December 31, 2011, and with claims data available through December 31, 2013, were included in the analysis. Patients who received radical cystectomy underwent either only surgery or surgery in combination with radiotherapy or chemotherapy. Patients who received trimodal therapy underwent transurethral resection of the bladder followed by radiotherapy and chemotherapy. Propensity score matching by sociodemographic and clinical characteristics was used. Data analysis was performed from August 1, 2017, to March 11, 2018.

MAIN OUTCOMES AND MEASURES Overall survival and cancer-specific survival were evaluated using the Cox proportional hazards regression model and the Fine and Gray competing risk model. All Medicare health care costs for inpatient, outpatient, and physician services within 30, 90, and 180 days of treatment were compared. The total amount spent nationwide was estimated, using 180-day medical costs between treatments, by the total number of new cases of muscle-invasive bladder cancer in the United States in 2011.

RESULTS Of the 3200 patients who met the inclusion criteria, 2048 (64.0%) were men and 1152 (36.0%) were women, with a mean (SD) age of 75.8 (6.0) years. After propensity score matching, 687 patients (21.5%) underwent trimodal therapy and 687 patients (21.5%) underwent radical cystectomy. Patients who underwent trimodal therapy had significantly decreased overall survival (hazard ratio [HR], 1.49; 95% CI, 1.31-1.69) and cancer-specific survival (HR, 1.55; 95% CI, 1.32-1.83). No differences in costs at 30 days were observed between trimodal therapy (\$15 233 in 2002 vs \$18 743 in 2011) and radical cystectomy (\$17 990 in 2002 vs \$21 738 in 2011). However, median total costs were significantly higher with trimodal therapy than with radical cystectomy at 90 days (\$80 174 vs \$69 181; median difference, \$8964; Hodges-Lehmann 95% CI, \$3848-\$14 079) and at 180 days (\$179 891 vs \$107 017; median difference, \$63 771; Hodges-Lehmann 95% CI, \$55 512-\$72 029). Extrapolating these figures to the total US population revealed \$335 million in excess spending for trimodal therapy compared with the less costly radical cystectomy (\$492 million) for patients who received a muscle-invasive bladder cancer diagnosis in 2011.

CONCLUSIONS AND RELEVANCE Trimodal therapy was associated with significantly decreased overall survival and cancer-specific survival as well as \$335 million in excess spending in 2011. These findings have important health policy implications regarding the appropriate use of high value–based care among older adults with invasive bladder cancer who are candidates for either radical cystectomy or trimodal therapy.

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An estimated 81 190 new cases and 17 240 deaths from bladder cancer will occur in the United States in 2018.¹ Neoadjuvant chemotherapy followed by radical cystectomy with extended pelvic lymphadenectomy is the guidelines-recommended treatment of muscle-invasive bladder cancer.²⁻⁴ Given the concerns regarding the nonnegligible morbidity and mortality associated with radical cystectomy along with patients often being older and having increased comorbidities, clinicians (eg, urologists, radiation and medical oncologists) and patients have sought alternative treatments.

The use of less-invasive trimodal “bladder-sparing” approaches that combine maximal transurethral resection, chemotherapy, and radiotherapy to treat muscle-invasive bladder cancer has increased.⁵ Several organizations, including the American Urological Association and the European Association of Urology, have updated their guidelines to support the use of radiotherapy combined with chemotherapy in select patients with muscle-invasive disease.^{3,4,6,7} No randomized data exist comparing trimodal therapy with radical cystectomy, but 2 single-center studies to date have noted comparable survival outcomes.^{8,9} These studies were limited by small numbers of patients and/or were derived from nonadjusted case-control series. Comparative effectiveness research using cancer registry data has reported conflicting overall survival outcomes between these 2 treatments.¹⁰ Against this backdrop, recent large population-based studies using the National Cancer Database have reported trimodal therapy to have inferior overall survival outcomes when compared with radical cystectomy.^{5,11} Furthermore, the costs associated with these treatments remain to be elucidated.¹² Given this gap in the literature, we examined a nationally representative cohort to compare the survival outcomes and costs of radical cystectomy with those of trimodal therapy.

Methods

Data Source

We extracted data from the Surveillance, Epidemiology, and End Results (SEER)-Medicare linked database. This data set includes information regarding newly diagnosed cancers with 98% case ascertainment from 18 US regions.¹³ The institutional review board at The University of Texas Medical Branch, Galveston, deemed this study to be exempt from review because it used an administrative deidentified database. Patient informed consent was waived by this institutional review board. We performed data analysis from August 1, 2017, to March 11, 2018.

Ascertainment of Study Cohort

We restricted our analysis to patients with stage T2 to T4a bladder cancer that was diagnosed as either transitional cell or urothelial carcinoma between January 1, 2002, and December 31, 2011, and with claims data available through December 31, 2013. The study was restricted to Medicare fee-for-service beneficiaries with Medicare Part A and Part B claims data available. The final cohort consisted of 3200 patients (Figure 1).

Identification of Bladder Cancer Treatments

Radical cystectomy was identified by procedure codes in Medicare claims, including for both open and robot-assisted laparo-

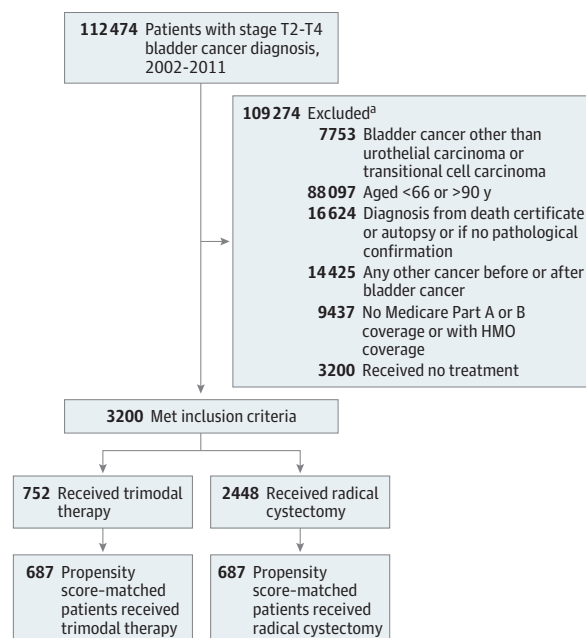
Key Points

Question What are the survival outcomes and costs associated with both radical cystectomy and trimodal therapy for older adults with muscle-invasive bladder cancer?

Findings In this population-based cohort study of Surveillance, Epidemiology, and End Results-Medicare data from 3200 older adults with a clinical stage T2 to T4a bladder cancer diagnosis, patients who underwent trimodal therapy had significantly decreased overall and cancer-specific survival. The median total costs were substantially higher for trimodal therapy than for radical cystectomy (\$827 million vs \$492 million) for patients diagnosed in 2011.

Meaning Compared with radical cystectomy, trimodal therapy was associated with significantly lower overall and cancer-specific survival rates at significantly higher costs.

Figure 1. Patient Selection Process



HMO indicates health maintenance organization.

^a Some patients met more than 1 exclusion criterion.

scopic surgical procedures with or without pelvic lymph node dissection. The radical cystectomy group comprised patients who underwent only surgery or surgery in combination with radiotherapy or chemotherapy. The trimodal therapy group consisted of patients who underwent transurethral resection of the bladder followed by radiotherapy and chemotherapy. Trimodal therapy was identified by diagnosis and procedure codes in Medicare claims for both radiotherapy and chemotherapy in the absence of a concomitant code for radical cystectomy.¹⁴ Radiotherapy dose typically consists of 60 to 66 Gy (39.6-50.4 Gy delivered to the bladder and pelvic lymph nodes with a sequential tumor boost) given in daily fractions of 1.8 to 2.0 Gy.³ Guidelines-recommended trimodal chemotherapy regimens

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