Renal Morbidity Following Radical Cystectomy in Patients with Bladder Cancer



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INTRODUCTION

- Patients diagnosed with bladder cancer are commonly older and have a high burden of comorbid conditions, including chronic kidney disease (CKD)
- CKD has been associated with increased risk of cardiovascular events, hospitalization, and mortality among all patients
- We hypothesized that Veterans with bladder cancer treated with cystectomy would have a high rate of progression to clinically significant CKD, and that specific clinical characteristics would help stratify the risk of renal morbidity in this population.

METHODS

- Using the national VHA electronic health records, we identified 3,360 patients diagnosed with bladder cancer who underwent radical cystectomy (RC) between 2004-2018.
- Baseline kidney function was assessed by averaging all outpatient serum creatinine measurements in the 6 months prior to the date of surgery and we calculated eGFR using both the MDRD and the CKD-EPI equations
- Primary outcome as the time to develop clinically significant CKD after RC, which we defined as CKD stage IV with eGFR of <30 mL/min/1.73 m2
- Multivariable Cox proportional hazards regression models were used to determine risk factors for the development of clinically significant CKD.

RESULTS

Table 1. Baseline characteristics of patients withbladder cancer treated with radical cystectomy andurinary diversion

Characteristic	Neobladder N = 378	lleal conduit N=2,983	p-value
Age at Surgery (%)			<.0001
<59	100 (26.5)	454 (15.2)	
60 - 69	201 (53.2)	1,402 (47.0)	
70 - 79	70 (18.5)	892 (29.9)	
>80	7 (1.9)	235 (7.9)	
Sex (%)			0.6573
Female	4 (1.1)	27 (0.9)	
Male	374 (98.9)	2,955 (99.1)	
Race/ Ethnicity (%)			<.0001
White	312 (82.5)	2,562 (85.9)	
Black	49 (13.0)	280 (9.4)	
Other/Unknown	17 (4.5)	141 (4.7)	
Charlson Score (%)			<.0001
0	81 (21.4)	614 (20.6)	
1	42 (11.1)	284 (9.5)	
2	97 (25.7)	644 (21.6)	
3	61 (16.1)	475 (15.9)	
4+	97 (25.6)	966 (32.4)	
Clinical T Stage(%)			<.0001
T1	92 (24.3)	679 (22.8)	
T2	165 (43.7)	1,298 (43.5)	
Т3	32 (8.5)	216 (7.2)	
T4	11 (2.9)	155 (5.2)	
Unknown	78 (20.6)	635 (21.3)	
Preoperative Kidney Function			
Creatinine			0.0325
Mean (SD)	1.2(0.7)	1.3(1.0)	
Median (IQR)	1.1 (0.9,1.3)	1.1 (0.9,1.4)	
eGFR MDRD			<.0001
Mean (SD)	73.6(19.5)	68.4(21.4)	
Median (IQR)	72.9 (58.8,88.4)	67.2 (53.5,82.6)	
eGFR CKD-EPI			<.0001
Mean (SD)	74.6(18.8)	68.3(20)	
Median (IQR)	76.2 (60.7,89.0)	68.9 (53.9,84.1)	

RESULTS

Figure 1. Time to develop CKD IV following radical cystectomy



Table 2: Time to develop clinically significant CKD: GFR < 30 after cystectomy by diversion type

Characteristic	Hazard Ratio (univariable)	Hazard Ratio (multivariable)
Age at Surgery, unit=5	1.11 (1.06, 1.15)	1.03 (0.99, 1.08)
Sex M vs F	2.09 (0.87, 5.02)	1.08 (0.40, 2.88)
Hydronephrosis, Y vs N	1.55 (1.32, 1.82)	0.81 (0.68, 0.96)
Baseline kidney function(1/Cr), unit=0.1	0.75 (0.73, 0.78)	0.76 (0.74, 0.79)
Comorbidity Index	1.13 (1.10, 1.16)	1.08 (1.05, 1.11)
Neoadjuvant chemo, Y vs N	1.02 (0.86, 1.20)	1.07 (0.91, 1.26)
Adjuvant chemo, Y vs N	1.20 (1.01, 1.43)	1.14 (0.95, 1.37)
Diversion type		
Neobladder	ref	ref
lleal conduit	1.19 (0.97, 1.46)	1.01 (0.82, 1.24)

Figure 2: Survival by baseline eGFR





CONCLUSIONS

 Baseline kidney function is an important risk factor for progressing to clinically significant CKD following RC and an independent predictor of overall survival for bladder cancer after RC

 Preoperative CKD stage should be incorporated into risk stratification algorithms for patients undergoing radical cystectomy

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