PD11: Elevated C-reactive Protein is Associated with Postoperative Development of Proteinuria and Subsequent Renal Functional Decline and Mortality

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Introduction

- Proteinuria is associated with renal functional decline in kidney cancer patients.[1]
- C-reactive protein has emerged as a predictor of survival outcomes in renal cell carcinoma.[2]

[1]JK O'Donnell, M Tourojman, CM Tobert, SW Kirmiz, CB Riedinger, S Demirjian, *et al.***Proteinuria is a predictor of renal functional decline in patients with kidney cancer**
[2]Jagdev, S., Gregory, W., Vasudev, N. *et al.* Improving the accuracy of pre-operative survival prediction in renal cell carcinoma with C-reactive protein. *Br J Cancer* **103,** 1649–1656 (2010). https://doi.org/10.1038/sj.bjc.6605973

Objective

- We examined the relationship of CRP and proteinuria and renal functional decline in patients with RCC.

Patients and Methods

- Multi-center, international, retrospective analysis of patients with RCC managed with partial or radical nephrectomy
  - UC San Diego
  - Emory Medical Center
  - Tokyo Medical and Dental University
  - St. Louis School of Medicine
- 2105 patients, mean follow up 41months

Patients and Methods

- **Primary outcome**: Non-cancer mortality (NCM)

- **Secondary outcomes:**
  - De novo eGFR <45 mL/min/m^2
  - De novo post-operative proteinuria

- Multivariable Logistic Regression analysis and Kaplan-Meier survival analyses were utilized for outcomes

Clinical Descriptives

Variable	n=2105
Mean Age (years, ± SD)	59.53 ± 12.72
Gender % (n)	
Male	34.0% (716)
Female	64.0% (1389)
Mean BMI (± SD)	27.5 ± 7.36
Race % (n)	
African-American	16.0% (337)
Other	84.0% (1768)
PMH % (n)	
HTN	37.4% (787)
DM	30.4% (639)
Clinical Tumor Size (cm ± SD)	4.0 (4.23)
CRP % (n)	
≤0.5	49.0% (1031)
>0.5	51.0% (1074)

Outcomes

Variable	n=2105
Treatment Mode % (n)	
Partial Nephrectomy	43% (905)
Radical Nephrectomy	57% (1200)
De novo Proteinuria % (n)	16.0% (336)
De novo eGFR <60 % (n)	38.1% (803)
De novo eGFR <45 % (n)	11.9% (251)
De novo eGFR <30 % (n)	9.2% (195)
NCM % (n)	16.2% (340)

MVA: De novo post-operative proteinuria

Variable	OR	95% CI	p-value
Age (Continuous)	1.003	0.992-1.059	0.772
Sex (Male vs. Female)	1.230	0.769-3.867	0.368
Race (African American vs. other)	2.822	1.085-3.045	*0.001*
Treatment mode (RN vs. PN)	1.906	1.783-2.132	*0.006*
CRP (>0.5 vs. ≤0.5)	1.708	1.042-2.543	*0.035*
DM (Yes vs. No)	1.127	0.812-3.652	0.652

MVA: Functional Decline

De novo eGFR <60 mL/min/m²			
Variable	**OR**	**95% CI**	**p-value**
Age (Continuous)	1.072	1.010-1.106	*<0.001*
Sex (Male vs. Female)	0.977	0.776-1.450	0.887
Race (African American vs. other)	1.017	0.990-1.145	0.937
BMI	1.025	1.003-1.378	*0.036*
Treatment mode (RN vs. PN)	2.599	2.126-3.494	*<0.001*
Post-operative Proteinuria (Yes vs. No)	1.689	1.358-1.920	*0.001*
CRP (>0.5 vs. ≤0.5)	0.998	0.649-2.030	0.141
Clinical Tumor Size (continuous)	0.975	0.728-1.873	0.293

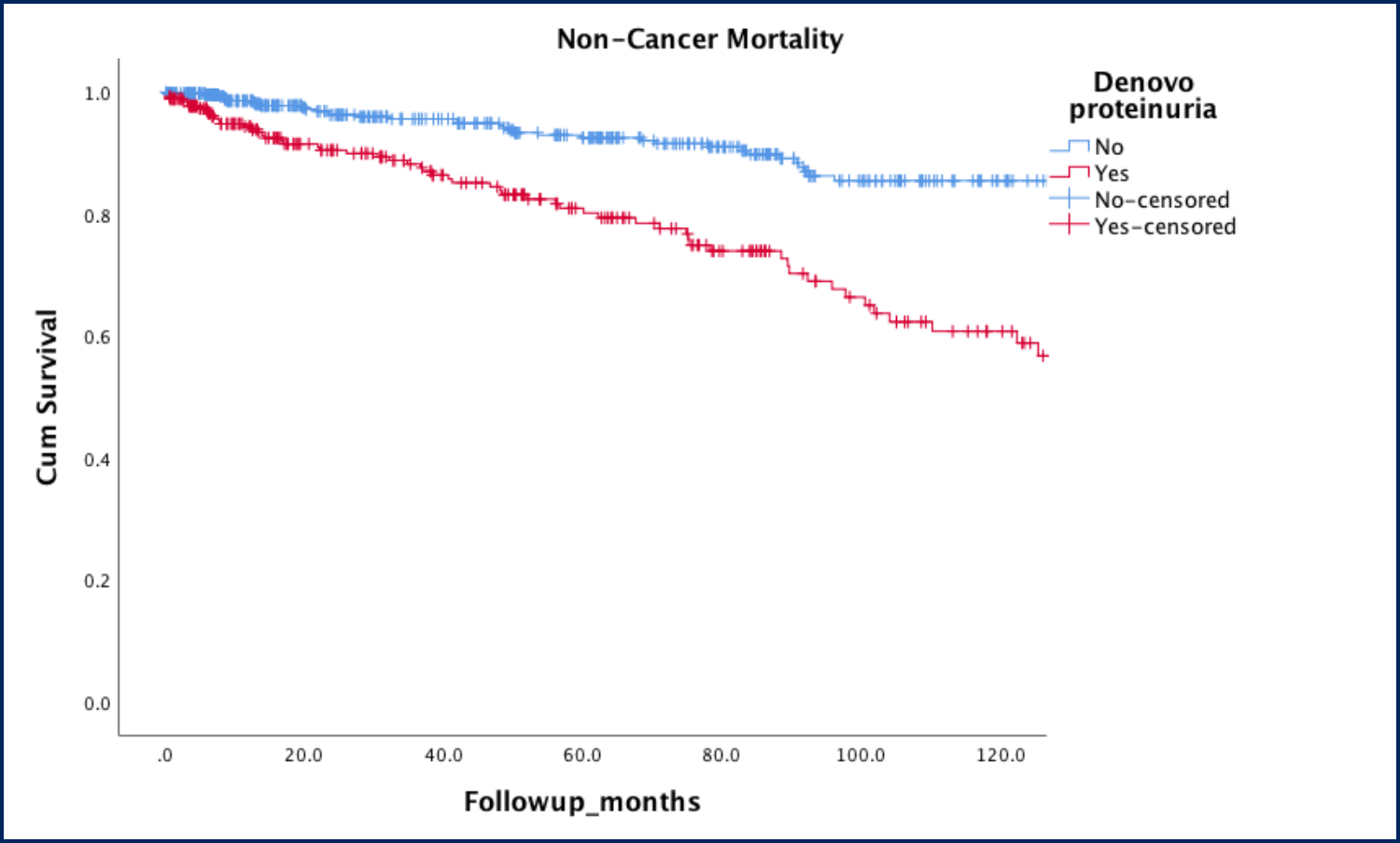
De novo eGFR <45 mL/min/m²			
Variable	**OR**	**95% CI**	**p-value**
Age (Continuous)	1.028	1.012-1.289	*0.005*
Sex (Male vs. Female)	1.224	0.747-1.692	0.364
Race (African American vs. other)	1.296	0.831-1.718	0.315
BMI	1.020	0.736-1.365	0.185
Treatment mode (RN vs. PN)	2.322	1.998-2.541	*0.001*
Post-operative Proteinuria (Yes vs. No)	2.191	2.005-1.479	*<0.001*
CRP (>0.5 vs. ≤0.5)	1.002	0.896-1.652	0.388
Clinical Tumor Size (continuous)	0.958	0.922-1.386	0.165

De novo eGFR <30 mL/min/m²			
Variable	**OR**	**95% CI**	**p-value**
Age (Continuous)	1.039	1.013-1.084	*0.001*
Sex (Male vs. Female)	1.057	0.894-1.789	0.828
Race (African American vs. other)	1.973	1.352-2.072	*0.012*
BMI	0.993	0.743-1.147	0.706
Treatment mode (RN vs. PN)	0.975	0.914-1.628	0.927
Post-operative Proteinuria (Yes vs. No)	4.321	3.157-4.991	*<0.001*
CRP (>0.5 vs. ≤0.5)	0.996	0.671-1.573	0.227
Clinical Tumor Size (continuous)	0.954	0.901-1.035	0.219

MVA: NCM

Variable	OR	95% CI	p-value
Age (Continuous)	1.049	1.016-1.110	*<0.001*
Sex (Male vs. Female)	2.731	1.369-3.004	*0.005*
Race (African American vs. other)	0.952	0.872-1.983	0.896
Treatment mode (RN vs. PN)	1.301	0.874-1.674	0.376
CRP (>0.5 vs. ≤0.5)	3.913	1.862-4.647	*0.003*
Post-operative Proteinuria (Yes vs. No)	1.899	1.412-2.152	*0.024*
BMI (continuous)	0.974	0.783-1.491	0.233

Kaplan-Meier Analysis: 5 year freedom from NCM



No proteinuria: 93%
Proteinuria: 81%
($p<0.001$)

Conclusions

- Development of postoperative proteinuria was associated with renal functional decline and non-cancer mortality across all stages of RCC patients.

- Elevation of CRP and African-American race were independently associated with proteinuria development.

- Consideration of nephron preserving strategies in patients at risk for postoperative proteinuria should be prioritized when feasible.