Early postoperative albumin level is associated with AKI following TKA a retrospective analysis of 1309 consecutive patients based on KDIGO criteria

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BACKGROUND

- Hypoalbuminemia has been reported to be an independent risk factor for acute kidney injury (AKI). However, little is known about the relationship between albumin level and the incidence of AKI in patients undergoing total knee arthroplasty (TKA). The aim of our study was to assess incidence and risk factors for AKI and to evaluate the relationship between albumin level and AKI following TKA.

METHODS AND MATERIALS

- The study included a retrospective review of medical records of 1,309 consecutive patients who underwent TKRA between January 2008 and December 2014. The patients were divided into 2 groups according to the lowest serum albumin level within 2 postoperative days (POD2_alb level < 3.0 g/dL vs. $\geq$ 3.0 g/dL). Multivariate logistic regression analysis was used to assess risk factors for AKI. A comparison of incidence of AKI, hospital stay, and overall mortality in the 2 groups was performed using propensity score analysis.

RESULT

- Of 1,309 patients, 57 (4.4%) developed AKI based on Kidney Disease Improving Global Outcomes criteria. Factors associated with AKI included age (odds ratio [OR] 1.05; 95% confidence interval [CI] 1.01 - 1.09; $p = 0.030$), diabetes (OR 3.12; 95% CI 1.65 - 5.89; $p < 0.001$), uric acid (OR 1.51; 95% CI 1.26 - 1.82; $p < 0.001$), beta blocker use (OR 2.65; 95% CI 1.48 - 4.73; $p = 0.001$), diuretics (OR 16.42; 95% CI 3.08 - 87.68; $p = 0.001$), and POD2_alb level < 3.0 g/dL (OR 1.92; 95% CI 1.09 - 3.37; $p = 0.023$).

Table 1. Risk factors of acute kidney injury

	Univariate				Multivariate			
	OR	95% CI		P value	OR	95% CI		P value
Age	1.07	1.03	1.11	0.002	1.05	1.01	1.09	0.030
Sex	1.86	0.94	3.66	0.075				
DM	2.82	1.56	5.09	0.001	3.12	1.65	5.89	<0.001
Hypertension	2.17	1.27	3.69	0.004				
CVA	2.29	1.01	5.24	0.049				
ACEi / ARB	1.81	1.07	3.09	0.028				
Beta blocker	3.65	2.11	6.31	<0.001	2.65	1.48	4.73	0.001
Aspirin	1.91	1.10	3.32	0.022				
Hemoglobin	0.79	0.64	0.99	0.041				
Creatinine	8.08	2.35	27.80	0.001				
Uric acid	1.55	1.30	1.85	<0.001	1.51	1.26	1.82	<0.001
Intraoperative Diuretics	5.02	1.06	23.80	0.042	16.42	3.08	87.68	0.001
POD2_alb < 3.0 g/dL	1.77	1.04	3.01	0.036	1.92	1.09	3.37	0.023

- After propensity score analysis, POD2_alb level < 3.0 g/dL was associated with AKI occurrence (OR 1.82; 95% CI 1.03 - 3.24, $p = 0.041$) and longer hospital stay ($p = 0.001$).

Table 3. Risk factors of mortality

	Univariate				Multivariate			
	OR	95% CI		P value	OR	95% CI		P value
Age	1.11	1.07	1.15	<0.001	1.09	1.05	1.13	<0.001
Body mass index	0.90	0.84	0.97	0.004				
Hypertension	1.63	0.98	2.72	0.063				
CVA	3.08	1.46	6.50	0.003				
ACEi / ARB	1.58	0.94	2.64	0.083				
Beta blocker	2.15	1.24	3.74	0.007				
Hemoglobin	0.83	0.68	1.00	0.052				
Creatinine	4.94	1.65	14.83	0.004				
General anesthesia	3.50	1.67	7.34	0.001	2.27	1.09	4.72	0.028
Acute kidney injury	5.23	2.65	10.33	<0.001	3.41	1.69	6.86	0.001
POD2_alb < 3.0 g/dL	1.67	1.00	2.77	0.050				

Table 4. Comparison of the clinical outcome by POD2_alb

Outcome	POD2_alb	Event / N	Crude			IPTW		
			OR	95% CI	P	OR	95% CI	p
AKI	≥ 3	29 / 839	1			1		
	<3	28 / 470	1.77	1.04 - 3.01	0.036	1.82	1.03 - 3.24	0.041
			HR	95% CI	P	HR	95% CI	p
Overall mortality	≥ 3	29 / 839	1			1		
	<3	31 / 470	1.67	1.00 - 2.77	0.050	0.99	0.58 - 1.68	0.973

Figure 1. Kaplan-Meire Curve

CONCLUSION

- In this study, incidence of AKI following TKA was 4.4%. We demonstrated that POD2_alb level < 3.0 g/dL was an independent risk factor for AKI and lengthened hospital stay in patients undergoing TKA.