

Clinical Outcome and Risk Factors Associated with Colistin-induced Acute Kidney Injury

Woo Yeong Park^{1,2}, Sang Mok Yeo¹, Ha yeon Park¹, Seong Sik Kang^{1,2}, Kyubok Jin^{1,2}, Sung Bae Park^{1,2}, Seungyeup Han^{1,2,*}

¹Department of Internal Medicine, Keimyung University School of Medicine, ²Keimyung University Kidney Institute, Daegu, Korea, Republic of

INTRODUCTION

Colistin is an important antibiotic in the treatment of multidrug resistant organisms such as *Acinetobacter baumannii* and *Pseudomonas aeruginosa*, but acute kidney injury (AKI) due to nephrotoxicity is still a problem.

OBJECTIVES

We investigated the incidence of colistin-induced AKI by KDIGO guideline, clinical outcome, and risk factors associated with AKI after colistin treatment.

METHODS

We retrospectively analyzed 96 patients with the use of colistin during hospitalization between December 2014 and July 2015. We compared clinical findings between AKI group and non-AKI group matched age, baseline kidney function, and diabetes mellitus as a co-morbidity.

RESULTS

Table 1. Baseline demographic characteristics of colistin-induced nephropathy

Variables	All patients (n = 96)
Age (years)	68 ± 12
Male gender, n (%)	62 (64.6)
Body mass index (kg/m ²)	22.6 ± 3.6
Duration of hospital stay (days)	36 (23, 69)
Hospitalization cause, n (%)	
Medical admission	67 (69.8)
Surgical admission	29 (30.2)
Hospitalization of ICU, n (%)	69 (71.9)
Duration of ICU stay (days)	12 (0, 33)
Patient death, n (%)	37 (38.5)
Recovery period of AKI (days)	12 (6, 27)
Comorbidities, n (%)	
Hypertension	41 (42.7)
Diabetes mellitus	30 (31.3)
Cardiovascular disease	21 (21.9)
Malignancy	18 (18.8)
Others	37 (38.5)
Infection type at colistin use, n (%)	
Pneumonia	56 (58.3)
Urinary tract infection	23 (24.0)
Catheter-related infection	5 (5.2)
Surgical wound infection	7 (7.3)
Bacteremia	9 (9.4)
Others	11 (11.5)
KDIGO stage, n (%)	
I	13 (13.4)
II	20 (20.6)
III	38 (39.2)
APACHE II score	22.7 ± 5.9
Vasopressor, n (%)	56 (58.3)
Mechanical ventilator, n (%)	56 (58.3)
CRRT, n (%)	8 (8.3)
Colistin dose	
Daily dose (mg)	293 ± 98
Cumulative dose (mg)	3,066 ± 2,138
Microorganism at culture, n (%)	
Acinetobacter baumannii	70 (72.9)
Pseudomonas aeruginosa	26 (27.1)
Combined nephrotoxic drugs, n (%)	
Vancomycin	52 (54.2)
Aminoglycoside	6 (6.3)
NSAID	21 (21.6)
Diuretics	27 (27.8)
Radiocontrast	19 (19.6)

Values are expressed as means ± SDs, n (%). ICU = intensive care unit, CRRT = continuous renal replacement therapy, NSAID = non-steroidal anti-inflammatory drug

Table 2. Comparison of clinical and laboratory parameters between acute kidney injury group and non-acute kidney injury group (n=96)

Valuables	AKI (n=65)	Non-AKI (n=31)	P-value
Age (years)	68 ± 12	67 ± 13	0.763
Male gender, n (%)	46 (70.8)	16 (51.6)	0.074
Body mass index (kg/m ²)	22.9 ± 3.3	21.8 ± 4.1	0.181
Duration of hospital stay (days)	64.5 ± 66.4	33.6 ± 21.9	0.001
Hospitalization cause, n (%)			0.814
Medical admission	46 (70.8)	21 (67.7)	
Surgical admission	19 (29.2)	10 (32.3)	
Hospitalization of ICU, n (%)	49 (75.4)	20 (64.5)	0.333
Duration of ICU stay (days)	29.5 ± 54.5	16.1 ± 17.8	0.077
Patient death, n (%)	25 (38.5)	12 (38.7)	1.000
Comorbidities, n (%)			
Hypertension	29 (44.6)	12 (38.7)	0.662
Diabetes mellitus	22 (33.8)	8 (25.8)	0.487
Cardiovascular disease	12 (18.5)	9 (29.0)	0.294
Malignancy	16 (24.6)	2 (6.5)	0.048
Others	23 (35.4)	14 (45.2)	0.378
Infection type at colistin use, n (%)			
Pneumonia	39 (60.0)	17 (54.8)	0.663
Urinary tract infection	14 (21.5)	9 (29.0)	0.451
Catheter-related infection	3 (4.6)	2 (6.5)	0.657
Surgical wound infection	4 (6.2)	3 (9.7)	0.678
Bacteremia	7 (10.8)	2 (6.5)	0.714
Others	7 (10.8)	4 (12.9)	0.743
APACHE II score	23 ± 6	23 ± 7	0.713
Vasopressor, n (%)	42 (64.6)	14 (45.2)	0.081
Mechanical ventilator, n (%)	40 (61.5)	16 (51.6)	0.383
CRRT, n (%)	6 (9.2)	2 (6.5)	1.000
Colistin dose			
Daily dose (g)	297 ± 115	285 ± 45	0.588
Cumulative dose (g)	3,374 ± 2,254	2,419 ± 1,732	0.040
Microorganism at culture			1.000
Acinetobacter baumannii	47 (72.3)	22 (73.3)	
Pseudomonas aeruginosa	18 (27.7)	8 (26.7)	
Combined nephrotoxic drugs			
Vancomycin	36 (55.4)	16 (51.6)	0.827
Aminoglycoside	3 (4.6)	3 (9.7)	0.384
NSAID	14 (21.5)	7 (22.6)	1.000
Diuretics	20 (30.8)	7 (22.6)	0.473
Radiocontrast	16 (24.6)	3 (9.7)	0.105

Values are expressed as means ± SDs, n (%). ICU = intensive care unit, CRRT = continuous renal replacement therapy, NSAID = non-steroidal anti-inflammatory drug

Table 3. Factors associated with the occurrence of acute kidney injury

Variables	Univariate			Multivariate		
	Exp (β)	95% C.I.	P	Exp (β)	95% C.I.	P
Age	1.006	0.970-1.042	0.760			
Male gender	2.270	0.937-5.495	0.069	2.328	0.844-6.421	0.103
Body mass index	1.088	0.961-1.232	0.181			
Duration of hospitalization	1.026	1.006-1.046	0.009	1.021	1.001-1.040	0.036
Hypertension	1.275	0.533-3.052	0.585			
Diabetes mellitus	1.471	0.566-3.821	0.428			
Cardiovascular disease	0.553	0.204-1.500	0.245			
Malignancy	4.735	1.015-22.086	0.048	5.594	1.149-27.224	0.033
Pneumonia	1.235	0.521-2.931	0.632			
Urinary tract infection	0.671	0.253-1.779	0.423			
Bacteremia	1.750	0.342-8.963	0.502			
Vasopressor	2.217	0.928-5.299	0.073			
Mechanical ventilator	1.500	0.642-3.558	0.357			
Colistin daily dose	1.001	0.996-1.006	0.589			
Colistin cumulative dose	1.000	1.000-1.001	0.043	1.000	1.000-1.001	0.081
Vancomycin	1.164	0.494-2.743	0.729			

CONCLUSIONS

The incidence of AKI was higher when the cumulative dose of colistin was higher or hospital stay was longer. We should pay attention to the appropriate dose of colistin and the risk factors of AKI for prevention of colistin-induced AKI.

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