Procalcitonin and C-reactive protein as mortality predictors in sepsis-induced acute kidney injury

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Introduction/Objective: Acute kidney injury (AKI) is a frequent and serious sepsis-induced complication in patients in Intensive care unit (ICU). The objective of this study was to evaluate the prognostic value of C-reactive protein (CRP) and procalcitonin (PCT) as predictors of 28-day mortality in patients with sepsis induced AKI.
Methods: We performed a single-center retrospective study of 440 adult surgical and non-surgical patients with AKI and episode of AKI in chronic kidney disease (CKD) who were admitted to the ICU between 2014-2018 and received Renal Replacement Therapy. The day of confirmed diagnosed AKI, laboratory and clinical parameters were analysed.
Results: Out of 440 patients, 249 (56.60%) survivors had significantly less prevalent CKD, less qSOFA score, and lesser need for vasopressor therapy and mechanical ventilation when compared to the deceased ones. There was a significant difference in CRP value (p<0.0454), but not in PCT value (p=0.6735) between survivors and non-survivors. There were significantly more (p<0.0142) surgical patients in the septic group having a significantly greater (p<0.0153) need for vasopressor therapy. The median CRP and PCT values were significantly higher (p<0.001) in septic patients (183.24 vs 33.21) in comparation with non-septic patients (109.74 vs 13.73). A significantly greater number of patients (p<0.001) had a level of CRP>100mg/L and PCT>10ng/ml (59.07% vs 32.01%) in the septic group in comparation to the patients whose values were CRP<100mg/L and PCT<10ng/ml (57.43% vs 25.82%), but no significant difference was found between the CRP and PCT cut-off values between survivors and non-survivors.

Conclusion: CRP value can be used as mortality predictor in sepsis-induced AKI in critically ill patients. This result indicates the necessary monitoring of CRP and PTC values from the day of admission, the day of diagnosis of sepsis and AKI to the time-defined outcome, taking into account all clinical parameters that affect the dynamics of values.

Table 1. Comparison of demographic and clinical parameters between patient groups

	Survivors (n=249)	Non-survivors (n=190)	p	Septic patients (n=205)	Non-septic patients (n=235)	p
	N (%)	N (%)		N (%)	N (%)	
Mean age-years (SD)	61.45 (13.99)	62.57 (12.75)	0.3752	61.89 (13.17)	61.95 (13.74)	0.9625
Female	41 (16.46)	67 (35.07)		70 (34.14)	76 (32.34)	
Male	208 (83.54)	123 (64.93)		135 (65.86)	159 (67.66)	
Surgical patients	74 (29.71)	54 (28.27)	0.3706	80 (34.04)	48 (23.41)	0.0142
qSOFA	0.5662	2.7400	<0.0001	1.6048	1.434042553	0.1432
Urea (mmol)-median (IQR)	26.69	27.41	0.5817	26.4325	27.51	0.3966
Creatinine (µmol)-median (IQR)	396.07	379.65	0.3904	386.2926	391.26	0.7934
Comorbidities N (%)						
CVB	82 (42.93)	107 (42.97)	0.9933	85 (41.46)	104 (44.25)	0.5561
PD	22 (11.51)	36 (14.45)	0.5632	30 (14.63)	28 (11.91)	0.5904
GD	21 (10.99)	34 (13.65)	0.4042	26 (12.68)	29 (12.34)	0.9139
DM	35 (18.32)	35 (18.32)	0.1739	50 (24.39)	44 (18.72)	0.1486
CVD	19 (9.94)	19 (7.63)	0.3922	13 (6.34)	25 (10.63)	0.1099
CKD	4 (2.09)	16 (6.40)	0.0306	9 (4.30)	11 (4.68)	0.8842
Sepsis	108 (43.37)	97 (50.78)	0.1120	97 (47.32)	94 (40.00)	0.1229
Physiological support N (%)						
VT	138 (72.25)	145 (58.23)	0.0022	144 (70.24)	139 (59.14)	0.0153
IMV	136 (54.61)	141 (73.82)	<0.0001	135 (65.85)	142, (60.42)	0.2405

Legend: qSOFA-Quick sepsis related organ failure assessment; CVD-Cardiovascular diseases; PD-Pulmonary diseases; GD-Gastrointestinal diseases; DM-Diabetes mellitus; CVD-Cerebrovascular diseases; CKD-Chronic kidney disease; VT- Vasopressors therapy; IVP-Invasive mechanical ventilation

Table 2. Comparison of CRP and PCT between a groups of patients

	CRP (mg/L)	p	PCT (ng/l)	p
Survivors	133.89	0.0454	21.75	0.6735
Non-survivors	157.15		24.13	
Septic patients	183.24	<0.001	33.21	<0.001
Non-septic patients	109.74		13.73	

Legend: CRP-C reactive protein; PCT-procalcitonin;

Table 3. Comparison of cut-off values of CRP and PCT in septic and non-survivors patients

	Septic patients N(%)	p	Non-survivors N(%)	p
CRP <100 mg/L	65 (32.01)	<0.001	84 (41.37)	0.4277
CRP >100 mg/L	140 (59.07)		107 (45.14)	
PCT <10 ng/ml	39 (25.82)	<0.001	90 (59.60)	0.3580
PCT >10 ng/ml	166 (57.43)		159 (55.01)	

Legend: CRP-C reactive protein; PCT-procalcitonin;