The Relationship between Short-term Blood Pressure Variability and Acute Kidney Injury After Cardiac Surgery

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Introduction

To explore the effect of short-term blood pressure variability (BPV) after cardiac surgery on the pathogenesis of acute kidney injury (AKI), in order to improve the prevention and treatment strategy of cardiac surgery associated AKI.

Methods and Materials

All patients after cardiac surgery in our hospital from August to December, 2019 were included. The diagnosis of AKI was defined according to the KDIGO 2012 guidelines. The 24h blood pressure variability was measured by three commonly used indicators: Standard deviation (SD), Coefficient of Variation (CV), and average real variability (ARV).

Results

A total of 1380 patients were enrolled, of which 452 patients developed postoperative AKI (32.75%). The 24h BPV, including 24h ARV, 24h SD, and 24h CV, in the AKI group were significantly higher than those in the non-AKI group (9.64±6.03 vs 8.57±4.80mmHg, P=0.001; 8.16±4.47 vs 7.22±3.65mmHg, P<0.001; 10.63±5.78 vs 9.23±4.64, P<0.001). The AKI incidence increased with the increase of postoperative 24h BPV (24h ARV, c2=11.046, P=0.011; 24h SD, c2=13.923, P=0.003; 24h CV, c2=13.555, P=0.004). The dose-response relationship between 24h postoperative BPV (AVR,SD,CV) and the risk of AKI showed "J"-shaped curve.**(Fig 1)**

After adjusted for the confounding factors by multivariate logistic regression analysis, the risk of AKI in the Q4 group was significantly higher than that in the Q1 reference group. The AKI risk of ARV.Q4 group (24h ARV>11.67mmHg) was 1.61 (95%CI: 1.13, 2.29, P=0.008), the AKI risk of SD.Q4 group (24h SD>9.67mmHg) was 1.69 (95%CI: 1.18, 2.40, P=0.004), and AKI risk in the CV.Q4 group (24h CV>12.45%) was 1.73 (95%CI: 1.21, 2.46, P=0.003). **(Table 1)**

Figure 1. dose-response relationship between 24h BPV and the risk of AKI

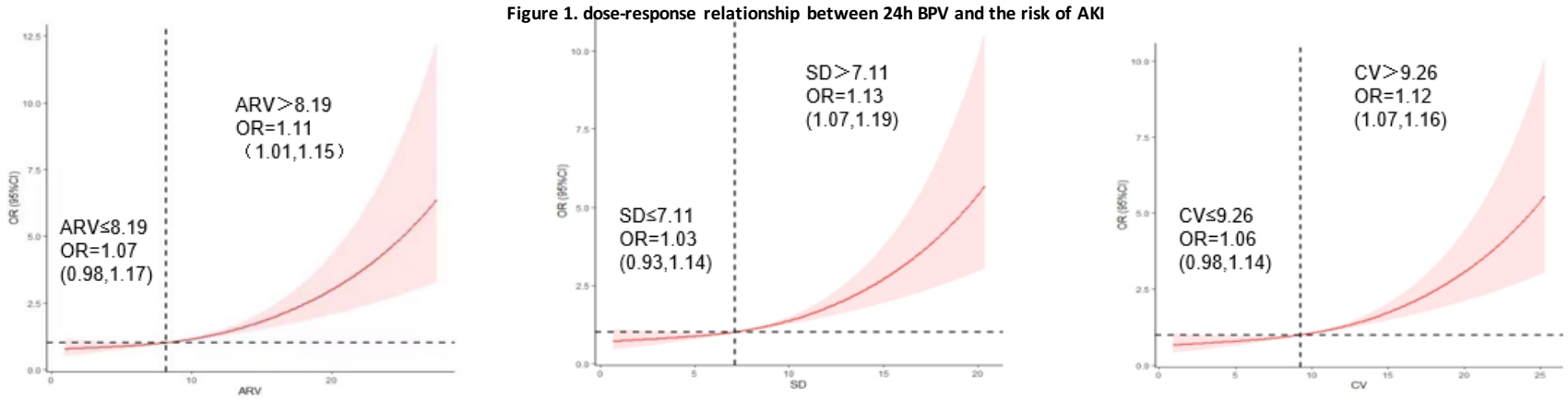

Table 1.Relationship between 24h BPV and the risk of AKI based on logistic models.

	IQR	Model	
		OR(95%CI)	P
ARV (mmHg)	Q1(<5.17)	1.00	-
	Q2(5.17-8.11)	1.08(0.75,1.55)	0.672
	Q3(8.11-11.67)	0.97(0.68,1.40)	0.867
	Q4(>11.67)	1.61(1.13,2.29)	0.008
SD (mmHg)	Q1(<4.67)	1.00	-
	Q2(4.67-7.08)	0.92(0.64,1.33)	0.654
	Q3(7.08-9.67)	1.25(0.88,1.80)	0.214
	Q4(>9.67)	1.69(1.18,2.40)	0.004
CV (%)	Q1(<6.02)	1.00	-
	Q2(6.02-9.26)	1.07(0.74,1.54)	0.738
	Q3(9.26-12.45)	1.28(0.89,1.83)	0.177
	Q4(>12.45)	1.73(1.21,2.46)	0.003

Conclusions

For cardiac surgery patients, the increased postoperative BPV significantly increased the risk of AKI. This remained statistically significant after adjusted for other potential confounders, which suggested that physicians should monitor the postoperative blood pressure at real time.

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