

The reasonable control range of short-term blood pressure variability in CKD patients

Jiawei Yu^{a#}, Jiarui Xu^{a#}, Yang Li^{a#}, Zhouping Zou^a, Yeqing Xie^a, Wuhua Jiang^a, Liachang Hu^a, Bo Shen^a, Chunsheng Wang^b, Zhe Luo^c, Jie Teng^{a,d}, Xiaoqiang Ding^{a,d}

^a Department of Nephrology, Zhongshan Hospital, Fudan University, Shanghai, China;

^b Department of Cardiovascular Surgery, Zhongshan Hospital, Fudan University, Shanghai, China;

^c Department of Critical Care Medicine, Zhongshan Hospital, Fudan University, Shanghai, China

^d Department of Nephrology, Xiamen Branch, Zhongshan Hospital, Fudan University, Xiamen, Fujian, China.



Introduction

CKD patients are the high-risk population of blood pressure variability and the control range of short-term BPV after cardiac surgery is very important. On this basis, the appropriate range of blood pressure variability in this high-risk groups was analyzed to reduce the incidence of AKI and guide the clinical control of blood pressure variability after cardiac surgery.

Methods and Materials

All patients who underwent cardiac surgery in our hospital from August 1, 2019 to December 31, 2019 were included. AKI is defined according to KDIGO guidelines. 24h BPV uses three commonly used indicators: Standard deviation (SD), Coefficient of Variation (CV), and average real variability (ARV). The study population was grouped according to risk factors, and the ROC curve determined the optimal cut-off point for increasing the incidence of AKI at 24h after cardiac surgery. On the basis of multivariate regression, the restricted cubic spline function was used to further visualize the relationship between 24h BPV and AKI after cardiac surgery.

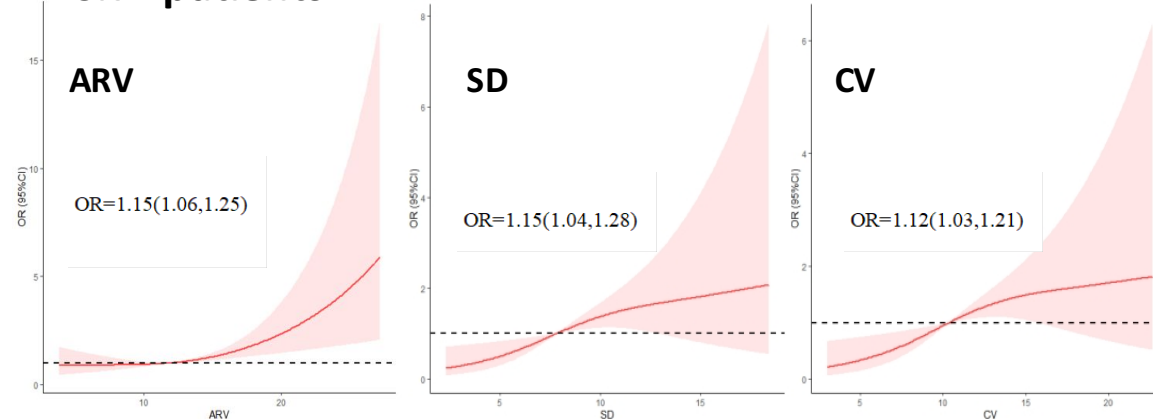
Results

1. A total of 1380 patients were included in the study. According to the 24h BPV quartile after operation, they were divided into four groups, namely Q1, Q2, Q3, and Q4. The risk factors with significant difference in 24h BPV after operation were age ≥ 65 , history of hypertension, and preoperative eGFR <60 (24h ARV: P=0.005, P=0.032, P<0.001; 24h SD: P=0.038, P=0.011, P<0.034; 24h CV: P=0.012, P=0.026, P=0.024).
2. Using a restricted cubic spline function on the general population to visualize the dose-response relationship between postoperative 24h BPV and CSA-AKI incidence, the risk of CSA-AKI was relatively stable when the 24h BPV was less than around the median, and then began to increase rapidly. (24h ARV: OR=1.11 per unit, 95%CI 1.01, 1.15; 24h SD: OR=1.13, 95%CI 1.07, 1.19 per unit; 24h CV: OR=1.12, 95%CI 1.07,1.16 per unit).
3. In contrast, no significant association was found below the median, with a clear "J"-shaped curve relationship. There were 160 chronic kidney disease patients (11.6%). In the ROC curve, the optimal critical value of 24h BPV was significantly lower than that of non-elderly population, non-hypertensive population and non-chronic kidney disease population. Similar "J"-shaped curves were observed in both elderly and non-elderly populations.

Results

4. The 24h ARV after surgery was divided into 9 groups. The association between postoperative 24h BPV and the occurrence of AKI was linear in the CKD population, but a nonlinear "J"-shaped curve in the non-CKD population. Taking 24hARV 0~4.99mmHg as a reference, the risk of AKI in the higher ARV group continued to increase (adjusted OR value increased from 3.59 to 12.83), and the incidence of AKI in the non-CKD population increased significantly from 24.5% in the reference group to 51.4% in the highest group. (adjusted OR increased from 1.29 to 3.17). The incidence of AKI was about 25% when the 24h ARV was 0~9.99mmHg.

CKD patients



Non-CKD patients

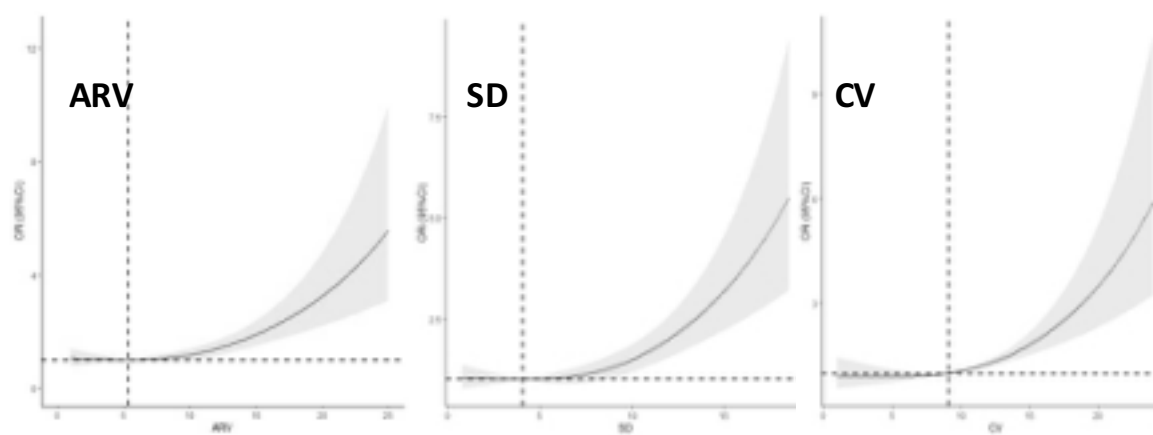


Figure 1. Dose-response relationship between postoperative 24h BPV and CSA-AKI incidence in CKD and non-CKD patients

Conclusions

Preoperative eGFR $<60\text{ml/min}/1.73\text{m}^2$ are risk factors for short-term blood pressure variability after cardiac surgery. In the CKD population, there is a linear relationship between 24h BPV and AKI incidence. The 24h postoperative blood pressure fluctuation needs to be strictly controlled.



THE 29TH INTERNATIONAL CONFERENCE ON
ADVANCES IN CRITICAL CARE NEPHROLOGY
AKI & CRRT 2024

MARCH 12-15, 2024 SAN DIEGO, CALIFORNIA