

Relationship between Minute-to-minute Variability of Intraoperative Arterial Blood Pressure and Postoperative Acute Kidney Injury in Patients Undergoing Noncardiac Surgery

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Abstract

Aim: To investigate the effects of minute-to-minute variability of intraoperative arterial blood pressure (BP) on development of postoperative acute kidney injury (AKI) in patients undergoing noncardiac surgery.

Methods: This is retrospective observational study, in which a total 2411 patients aged ≥ 20 years) who underwent noncardiac surgery with general anesthesia at Fukuoka University Hospital from 2017 to 2019 were included in the present analysis. Minute-to-minute variability of intraoperative systolic BP based on continuous invasive BP measurement using an arterial catheter was estimated using standard deviation (SD) and coefficient of variation (CV). Postoperative AKI was defined as an increase serum creatinine level by more than 0.3 mg/dL or 1.5 times from preoperation within 48 hours after surgery.

Results: A total of 123 (5.10%) cases developed AKI postoperatively. Incidence of AKI was lowest in the first quartile of SD of intraoperative systolic BP (2.65%) compared with the others (7.48% in the second quartile, 5.14% in the third quartile, and 5.14% in the highest quartile). Similarly, the incidence of AKI was also lowest in the first quartile group of CV of intraoperative systolic BP: 2.82%, 6.63%, 5.64% and 5.31% in first to fourth quartile groups, respectively. These associations were significant after adjustment for other risk factors.

Conclusions: In a large-scale observational study who underwent non-cardiac surgery, the lowest risks of postoperative AKI was observed among patients who achieved small minute-to-minute variability in intraoperative systolic BP measurements using an arterial catheter. These results suggest that stable control of intraoperative BP may provide protection against postoperative AKI.

Key words: blood pressure variability, minute-to-minute variability, acute kidney injury, perioperative period, observational study