

開心術における人工心肺回路充填量の急性腎不全発症に与える影響評価

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BACKGROUND. Acute renal failure, a complication after open heart surgery, is an important condition that is associated with short- and long-term prognosis. The incidence was reported to be as high as 20-30%, although it varies depending on criteria used for diagnosis. It is thought that many factors are involved in the onset, such as the induction of an inflammatory response by the cardiopulmonary bypass circuit and ischemia-reperfusion associated with microcirculatory disturbance. If acute renal failure occurs, dialysis therapy is needed with a probability of 1-2%. However, previous studies have not examined the effect of reducing the size of the cardiopulmonary bypass circuit on postoperative acute renal failure.

OBJECTIVE. The purpose of this study is finding the risk of acute renal failure by examining the effect of the cardiopulmonary bypass circuit volume in open heart surgery on the onset of acute renal failure caused by hemodilution or blood transfusion.

Methods. We conducted a retrospective cohort study using medical records in adult patients who taken open heart surgery using cardiopulmonary bypass at three hospitals A, B, and C in the Kanto area. We excluded surgical cases under 18 years of age, cases that had undergone blood purification before surgery, and deaths. The following data were collected from medical records. For analysis of the collected data, descriptive statistics were obtained for each item, and then the relationship between each item and the onset of postoperative acute renal failure was evaluated using a test according to the scale. After that, a multivariate analysis was performed with items suspected of being associated with the development of postoperative acute renal failure as explanatory variables and items related to the development of postoperative acute renal failure as objective variables.

Results. Multiple regression analysis was performed with preoperative and intraoperative items suspected of being related to ΔCr as explanatory variables and ΔCr as the objective variable. Factors that increased ΔCr during cardiopulmonary bypass were high filling volume (multiple regression coefficient 0.000215, $P=0.0171$), long perfusion time (multiple regression coefficient 0.001394, $P=0.0017$), high minimum blood pressure (multiple regression Coefficient 0.01025, $P=0.0012$), low minimum perfusion (multiple regression coefficient -0.112464, $P=0.0156$), and Low volume of red blood cell transfusion (estimated value -0.000248, $P<0.0001$), was suggested.

Conclusions. When the filling volume of the cardiopulmonary bypass circuit in open heart surgery increases, hemodilution in the cardiopulmonary bypass progresses, and the hemoglobin concentration decreased without blood transfusion, increased the risk of AKI.