

The impact of aortic arch repair with lower body circulatory arrest on the incidence of acute kidney injury in neonates

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Introduction:

Acute kidney injury (AKI), which is associated with increased mortality, is a common complication in children undergoing complex cardiac surgery for congenital heart disease. Aortic arch repair with lower body circulatory arrest in neonatal patients might be associated with a higher risk of AKI after cardiac surgery.

The aim of the present study was to assess the incidence of AKI using the Acute Kidney Injury Network (AKIN) system in neonates with complex congenital heart disease who underwent aortic arch surgery with lower body circulatory arrest. We also sought to describe the risk factors for the development of AKI, as well as the association of AKI with the clinical outcomes, including the duration of mechanical ventilation, the length of stay, and in-hospital mortality.

Methods:

The cases of 126 neonates who underwent aortic arch repair under cardiopulmonary bypass with lower body circulatory arrest between January 2006 and December 2014 were reviewed. AKI was classified, according to the Acute Kidney Injury Network (AKIN) system, as stage I-III. We analyzed the incidence, clinical outcomes and risk factors for AKI.

Results:

Postoperative AKI was observed in 66 patients (52%). The classifications were as follows: stage I, n=31 (25%); stage II, n=6 (5%); and stage III, n=29 (23%); 21.4% of the patients required renal replacement therapy within 3 days after surgery.

The age at the time of surgery, the surgical procedure (palliative or collective), a RACHS-1 score of ≥ 4 , the intraoperative use of epinephrine, the duration of CPB and the 75th percentiles of lower body circulatory arrest (odds ratio [OR]:2.396, 95% confidence interval [CI]: 1.016-5.652) were significantly associated with the development of a stage III AKI. The development of an AKI was associated with a longer duration of mechanical ventilation and a prolonged intensive care unit stay.

Conclusions:

Longer durations of lower body circulatory arrest were associated with a high incidence of AKI in neonates who underwent aortic arch repair under cardiopulmonary bypass with lower body circulatory arrest and may be a marker of case complexity.