

Influence of bypass time and systemic inflammatory response after cardiopulmonary bypass on the increase of neutrophil gelatinase-associated lipocalin in infants after cardiac surgery

Ruf B. (1), Bonelli V. (2), Balling G. (1), Hörer J. (3), Reiter K (4), Braun S.L. (5), Ewert P. (1)
Department of Pediatric Cardiology and Congenital Heart Disease, Deutsches Herzzentrum München,
Technische Universität, Germany (1)

Department of Anesthesiology, Deutsches Herzzentrum München, Technische Universität, Germany
(2)

Department of Thoracic and Cardiovascular Surgery, Deutsches Herzzentrum München, Technische
Universität, Germany (3)

Department of Pediatric Intensive Care, von Haunersche Kinderklinik, Ludwig-Maximilians Universität,
Munich, Germany (4)

Institute of Laboratory Medicine, Deutsches Herzzentrum München, Technische Universität, Germany
(5)

Introduction: Acute kidney injury (AKI) after cardiopulmonary bypass (CPB) surgery in infants is a frequent complication. Currently the diagnosis of AKI in children is defined by the pediatric RIFLE classification. In the last decade neutrophil gelatinase-associated lipocalin (NGAL) becomes a promising early biomarker for the development of AKI. The aim of this study was to investigate the influence of bypass time and systemic inflammatory response after CPB on the increase of NGAL in infants after cardiac surgery.

Methods: We enrolled consecutively infants undergoing surgery on cardiopulmonary bypass because of congenital heart disease in this prospective study. NGAL in serum and urine and interleukin6 (IL6) were checked before CPB, 2 – 4 h after CPB and on postoperative day 1 (POD 1). AKI was defined by the pRIFLE classification. We compared NGAL, IL 6 and bypass time between infants with and without AKI.

Results: In the 59 infants the median NGAL in urine and plasma and IL 6 increased significantly from before CPB to 2-4 h after CPB (NGAL in plasma: 35 vs. 41 ng/ml, $p = 0.05$; NGAL in urine: 2.4 vs. 25 ng/ml, $p > 0,0001$; IL 6: 2.2 vs. 89 pg/ml, $p < 0.0001$). After the pRIFLE classification 27 infants developed AKI, 32 don't. The median bypass time between infants with and without AKI was comparable (75 min vs. 77 min, $p = 0.9$). There was no significant difference in NGAL in urine or plasma or IL 6 between infants with and without AKI to any time point. 27 infants have bypass times below 75 min and 32 infants ≥ 75 min. The infants with a bypass time more than 75 min showed significant higher NGAL values in urine 2 – 4 h after CPB and on POD 1 as infants with bypass times below 75 min (42 vs.9 ng/ml, $p = 0.01$ and 17 vs. 2 ng/ml, $p = 0.01$).

Conclusion: In our study NGAL is depending on bypass time and systemic inflammatory response after CPB and couldn't be used as reliable early biomarker for the development of AKI after surgery on CPB in infants.