



Effects of Hemodilution and Transfusion on Acute Renal Injury and Neutrophil Gelatinase-Associated Lipocalin

Jülide Sayın Kart, Fevzi Toraman

Department of Anaesthesiology and Reanimation, Acibadem University Faculty of Medicine, İstanbul, Turkey

Dear Editor,

We read the article titled “The Value of Urinary Neutrophil Gelatinase-Associated Lipocalin for Early Detection of Acute Renal Injury in Patients Undergoing Cardiopulmonary Bypass “ with a great interest (1). The fact that early diagnosis and treatment of acute renal injury can prevent delay-induced increase in morbidity and mortality is known and also specified by the authors. As stated by the authors, impaired renal perfusion and development of renal injury are resulted from many reasons. It has been reported in some studies that decreased haematocrit value associated with hemodilution developing during cardiopulmonary bypass leads to renal injury (2-4). The authors mentioned that extended time of cardiopulmonary bypass, cross-clamp, and intubation increased the risk of the possibility for the development of acute renal injury. However, they did not tell about preoperative haemoglobin, haematocrit, cardiac output values, and hemodynamic factors, which are known to be the most important parameters affecting renal perfusion of patients, and also about their changes in perioperative period and their effect on the development of acute renal injury.

Moreover, studies have demonstrated that blood transfusions performed to patients in perioperative period also cause acute renal injury and an increase in the values of neutrophil gelatinase-associated lipocalin (NGAL) in early period (3, 5). In this study, whether patients received transfusion or not and if received, its effect on the development of acute renal injury were not explained in this study. We think that if the study aims to detect the risk factors in patients with renal injury development and altered NGAL, the evaluation of the relationship between the development of renal injury and the changes in haemoglobin, haematocrit, cardiac output, and haemodynamic

parameters during perioperative period influencing renal perfusion will contribute to the determination of risk factors. We congratulate the authors on this current study that draws attention on an important issue. We suggest that further studies should be performed on acute renal injury and its early markers. In the light of data obtained in these studies, the frequency of acute renal injury can be reduced by detecting the factors leading to acute renal injury and early diagnostic markers.

References

1. Bayram M, Ezelsoy M, Usta E, Oral K, Saraçoğlu A, Bayramoğlu Z, et al. Kardiyopulmoner Bypass Geçiren Hastalarda Akut Böbrek Hasarının Erken Dönemde Belirlenmesinde İdrar Nötrofil Jelatinaz İlişkili Lipokalin'in Değeri. Turk J Anaesth Reanim 2014; 42: 239-44. [\[CrossRef\]](#)
2. Karkouti K, Beattie WS, Wijeyesundera DN, Rao V, Chan C, Dattilo KM, et al. Hemodilution during cardiopulmonary bypass is an independent risk factor for acute renal failure in adult cardiac surgery. J Thorac Cardiovasc Surg 2005; 129: 391-400. [\[CrossRef\]](#)
3. Habib RH, Zacharias A, Schwann TA, Riordan CJ, Engoren M, Durham SJ, et al. Role of hemodilutional anemia and transfusion during cardiopulmonary bypass in renal injury after coronary revascularization: implications on operative outcome. Crit Care Med 2005; 33: 1749-56. [\[CrossRef\]](#)
4. Swaminathan M, Phillips-Bute BG, Conlon PJ, Smith PK, Newman MF, Stafford-Smith M. The association of lowest hematocrit during cardiopulmonary bypass with acute renal injury after coronary artery bypass surgery. Ann Thorac Surg 2003; 76: 784-91. [\[CrossRef\]](#)
5. Perry TE, Muehlschlegel JD, Liu KY, Fox AA, Collard CD, Sherman SK, et al. Plasma Neutrophil Gelatinase-Associated Lipocalin and Acute Postoperative Kidney Injury in Adult Cardiac Surgical Patients. Anesth Analg 2010; 110: 1541-7. [\[CrossRef\]](#)

Author`s Reply

Dear Editor,

We thank you for your interest in our article titled ‘The Value of Urinary Neutrophil Gelatinase-Associated Lipocalin for Early Detection of Acute Renal Injury in Patients Undergoing Cardiopulmonary Bypass’.

In literature, there are many studies showing the relationship between acute kidney injury (AKI) and heart surgery and other parameters stated in your comment. In our study, for patients who did not have a history of preoperative renal injury but who developed AKI that was postoperatively diagnosed based on laboratory findings, NGAL and the value of creatine that was routinely used were compared for the early detection of AKI, and it was revealed that the level of NGAL increased during the early period in patients diagnosed with AKI. In the study, the possibility of the early determination of AKI, irrespective of how it developed during the postoperative period, via urinary NGAL levels was investigated. The statistical significance of cardiopulmonary bypass, duration of aortic cross-clamp and duration of tracheal intubation in favour of the patients developing postoperative AKI is supported by literature, showing that these variables affect the development of AKI. The aim of our study is not to compare the variables affecting the development of AKI after heart surgery but to investigate the existence of a biomarker that can be demonstrated during the early period in case of the development of AKI.

Ayten Saraçoğlu

Department of Anaesthesiology and Reanimation,
Bilim University Faculty of Medicine, İstanbul, Turkey

References

1. Bayram M, Ezelsoy M, Usta E, Oral K, Saraçoğlu A, Bayramoğlu Z, et al. Kardiyopulmoner bypass geçiren hastalarda akut böbrek hasarının erken dönemde belirlenmesinde idrar nötrofil jelatinaz ilişkili lipokalin'in değeri. Turk J Anaesth Reanim 2014; 42: 239-44. [\[CrossRef\]](#)
2. Karkouti K, Beattie WS, Wijeyesundera DN, Rao V, Chan C, Dattilo KM, et al. Hemodilution during cardiopulmonary bypass is an independent risk factor for acute renal failure in adult cardiac surgery. J Thorac Cardiovasc Surg 2005; 129: 391-400. [\[CrossRef\]](#)
3. Habib RH, Zacharias A, Schwann TA, Riordan CJ, Engoren M, Durham SJ, et al. Role of hemodilutional anemia and transfusion during cardiopulmonary bypass in renal injury after coronary revascularization: implications on operative outcome. Crit Care Med 2005; 33: 1749-56. [\[CrossRef\]](#)
4. Swaminathan M, Phillips-Bute BG, Conlon PJ, Smith PK, Newman MF, Stafford-Smith M. The association of lowest hematocrit during cardiopulmonary bypass with acute renal injury after coronary artery bypass surgery. Ann Thorac Surg 2003; 76: 784-792. [\[CrossRef\]](#)
5. Perry TE, Muehlschlegel JD, Liu KY, Fox AA, Collard CD, Sherman SK, et al. Plasma neutrophil gelatinase-associated lipocalin and acute postoperative kidney injury in adult cardiac surgical patients. Anesth Analg 2010; 110: 1541-7. [\[CrossRef\]](#)