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**ARTICLE OF THE MONTH**

Kim WH, Oh HW, Yang SM, Yu JH, Lee HC, Jung CW, et al. Intraoperative Hemodynamic Parameters and Acute Kidney Injury After Living Donor Liver Transplantation. *Transplantation*. 2019; 103 (9): 1877- 1886

**Abstract:**

“**Background.** Acute kidney injury (AKI) after living donor liver transplantation (LDLT) is associated with increased mortality. We sought to identify associations between intraoperative hemodynamic variables and postoperative AKI.

**Methods**. We retrospectively reviewed 734 cases of LDLT. Intraoperative hemodynamic variables of systemic and pulmonary arterial pressure, central venous pressure (CVP), and pulmonary artery catheter–derived parameters including mixed venous oxygen saturation (SvO2), right ventricular end-diastolic volume (RVEDV), stroke volume, systemic vascular resistance, right ventricular ejection fraction, and stroke work index were collected. Propensity score matching analysis was performed between patients with (n = 265) and without (n = 265) postoperative AKI. Hemodynamic variables were compared between patients with AKI, defined by Kidney Disease Improving Global Outcomes criteria, and those without AKI in the matched sample.

**Results.** The incidence of AKI was 36.1% (265/734). Baseline CVP, baseline RVEDV, and SvO2 at 5 minutes before reperfusion were significantly different between patients with and without AKI in the matched sample of 265 pairs. Multivariable logistic regression analysis revealed that baseline CVP, baseline RVEDV, and SvO2 at 5 minutes before reperfusion were independent predictors of AKI (CVP per 5 cm H2O increase: odds ratio [OR], 1.20; 95% confidence interval [CI], 1.09-1.32; SvO2: OR, 1.45; 95% CI, 1.27-1.71; RVEDV: OR, 1.48; 95% CI, 1.24-1.78).

**Conclusions.** The elevated baseline CVP, elevated baseline RVEDV after anesthesia induction, and decreased SvO2 during anhepatic phase were associated with postoperative AKI. Prospective trials are required to evaluate whether the optimization of these variables may decrease the risk of AKI after LDLT.”

COMMENTS MADE BY CROUCH, CARA MD

**Summary:**

This article was chosen from the September issue of *Transplantation*, the authors attempt to identify intraoperative hemodynamic parameters that are associated with postoperative AKI, this is obviously a very relevant study for transplant anesthesiologists. With living donor liver transplantation (LDLT) programs expanding across the country, these cases are becoming more frequent and the effect of LDLT vs. deceased donor transplant on outcomes is starting to be further evaluated. The incidence of AKI after liver transplantation is quoted within the article at 63%, however, AKI after LDLT is noted to range from 21-68%. The authors attempt to identify any intraoperative hemodynamic variables that are associated with the development of postoperative AKI after LDLT in an attempt to allow modification of these variables to improve outcomes. Given the association of post-operative AKI with reduced graft survival and increased mortality, this is a very relevant study for the entire transplant community.

The authors perform a retrospective observational study at Seoul National University by reviewing 734 LDLT cases (after excluding those with missing data, pediatric cases or patients with baseline renal dysfunction) over an 11-year period. The authors reviewed intraoperative hemodynamic variables at eight different time points throughout the case and recorded eleven different variables from invasive monitors. The overall incidence of postoperative AKI (within the first 7 postoperative days) within this study was found to be 36.1%, which is in line with what has been previously reported. As expected, the authors found that length of hospital stay was longer and in-hospital mortality was higher in those who developed post-operative AKI.

Interestingly, there are several significant associations with preoperative patient characteristics and the development of postoperative AKI, as evidenced in Table 1 of this article. Low preoperative hemoglobin and albumin as well as elevated preoperative INR were highly associated with the development of postoperative AKI; additionally, higher transfusion requirements and blood loss per body weight were found to have a strong association. These associations are not surprising given that these parameters are associated with overall “sicker” patients with more complex perioperative courses.

In review of the intraoperative hemodynamic data, the three values that were statistically significant for the association with postoperative AKI were an elevated baseline CVP, elevated baseline RVEDV and decreased SvO2 during the anhepatic phase (measured at 5 min prior to reperfusion). Unfortunately, baseline CVP and RVEDV represent the patient’s baseline volume status and are not likely amenable to intervention intraoperatively. The authors do recognize that these elevated baseline parameters “may suggest baseline systemic and hepatic vascular congestion, which may indicate poor systemic oxygen delivery and major organ perfusion.” They also point out that “increased preload at baseline may reflect the preexisting renal dysfunction rather than a true predictor of postoperative AKI.” On the other hand, decreased SvO2 during the anhepatic phase is something that anesthesiologists can monitor and have the ability intervene on to avoid decreased oxygen delivery to the kidneys during this tenuous portion of surgery. More studies are needed to determine if this would reduce the incidence of post-operative AKI.

**References:**

1. Kim WH, Oh HW, Yang SM, Yu JH, Lee HC, Jung CW, et al. Intraoperative Hemodynamic Parameters and Acute Kidney Injury After Living Donor Liver Transplantation. *Transplantation*. 2019; 103 (9): 1877- 1886

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