Acute Kidney Injury Risk in Liver Transplant Recipients Is Associated with Low Mean Arterial Pressure

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A
cute kidney injury (AKI) is a common compli-
cation following liver transplantation and can
have a negative impact on immediate and long-
term transplant outcomes (1). Studies focusing
on defining the risk and pathophysiology of AKI are critical
to developing interventions to modify the incidence of AKI
in this high-risk population.

In their recent work, Caragata et al. (2) investigated the
relationship between the magnitude, stratified by different
levels of mean arterial pressure (MAP), and the duration of
hypotension (in minutes) during the liver transplant and risk
of AKI in the first 2 days following surgery. The study
included 1292 patients from a single center in Canada. The
primary outcome, AKI, was defined as an increase in creati-
nine by 0.3 mg/dL or 1.5 times above the baseline value; in
the secondary outcome, the authors divided AKI into stages
based on the Kidney Disease: Improving Global Outcomes
(KDIGO) definition (3). Forty percent of patients experi-
cenced AKI (based on the creatinine component only). Stage
1 AKI occurred in 28% of patients, whereas stages 2 and 3
were observed in 8.4% and 3.7% of patients, respectively.
Fifty-two patients (4%) initiated hemodialysis. Prolonged
intraoperative hypotension was independently associated
with AKI. Patients who experienced MAP levels below 55
mm Hg and 50 mm Hg for 20 minutes or longer were
at the highest risk for AKI (Figure 1). These results were
consistent across different baseline estimated glomerular
filtration rates (eGFRs), including patients with a preopera-
tive eGFR greater than 60 mL/min/1.73 m². Interestingly,
these patients were actually more susceptible to developing
postoperative AKI. These findings are not surprising and
are consistent with previous research linking intraoperative
hypotension and postoperative AKI (4–6).

In the general population, hypotension is defined as a
MAP below 65 mm Hg. The study by Caragata et al. (2)
suggests that liver transplant recipients may be able to bet-
ter tolerate low blood pressure in terms of developing AKI,
unless the MAP drops below 55 mm Hg for at least 20
minutes. Experimental studies have suggested that cirrhosis
is associated with disruption of renal blood flow autoregula-
tion. These patients have low systemic vascular resistance
and, in general, have lower MAPs than other surgical pa-
tients. Therefore, they may not be as susceptible to AKI
with a MAP greater than 55 mm Hg. Previous small-scale
studies in liver transplant recipients have also demonstrated
lower MAP thresholds for hypotension-associated kidney
injury (7, 8).

Limitations in the Caragata et al. (2) study include its
retrospective single-center design and the small number of
patients. Additionally, the study did not investigate the spe-
cific mechanisms underlying the association between intra-
operative hypotension and AKI during liver transplant sur-
gery. Further research involving larger prospective studies is
warranted to validate this study’s findings and to confirm
potential benefits or harm from targeting higher or lower
intraoperative MAPs during liver transplant surgery.

The authors report no conflicts of interest.

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Figure 1. Infographic summary of the study findings

Intraoperative Hypotension and Acute Kidney Injury
after Liver Transplant

Mean arterial pressure <55 mm Hg

Acute kidney injury

OR 1.87
95% C.I. (1.04, 3.44) p=0.04

Mean arterial pressure <50 mm Hg

Hemodialysis was only required in 4% of the

C.I., confidence interval; OR, odds ratio.