

Intraoperative Continuous Kidney Replacement Therapy (CKRT) Use During Liver Transplantation

Brigati F¹, Parodi A¹, Falqui V¹, Andorno E², Porcile E³, Di Noto A³, Centanaro M³, Picciotto D¹, Gandolfo MT¹, Montagnani L³,
Viazzi F¹, Esposito P¹, Conti N¹

1. UOC Nephrology, Dialysis and Transplant, IRCCS Policlinico San Martino, Genoa;
2. UO Hepatobiliary and Organ Transplant Surgery, IRCCS Policlinico San Martino, Genoa;
3. SS SS Post-Operative Intensive Care, IRCCS Policlinico San Martino, Genoa.

Introduction

Liver transplantation (LT) is often associated with acute perioperative complications such as massive hemorrhage, hemodynamic instability, and electrolyte or acid-base disturbances. These factors can contribute to the development of acute kidney injury (AKI). In this context, continuous kidney replacement therapy (CKRT) may offer several advantages, including removal of water-soluble toxins (e.g., ammonium), correction of electrolyte imbalances, prevention of fluid overload, and management of intracranial hypertension. Although CKRT is commonly employed in the perioperative setting, its intraoperative use remains relatively rare and less well documented.

Methods

In 2024, intraoperative CKRT was performed in 3 out of 41 LT procedures (7.3%) at our center due to concomitant hepatorenal dysfunction. A Fresenius Multifiltrate monitor was used in CVVHD mode with Multibic dialysate. Anticoagulation was managed either with heparin/protamine per institutional protocol (n=2) or omitted altogether (n=1) (Table 1). Timing of CKRT initiation was decided in coordination with the anesthesiology team: in one case, treatment began at anesthesia induction, while in the other two, it started post-hepatectomy.

Jugular venous access was used in all cases. The intraoperative duration of CKRT ranged from 6 to 8 hours. All patients remained hemodynamically stable, and no treatment-related complications were observed. Two patients continued dialysis in the postoperative period, including one who was already on chronic dialysis.

Results

All three patients were alive at 30 days post-transplant. One patient died two months after LT due to infectious complications; another died four months postoperatively due to intestinal perforation.

Conclusion

Intraoperative CKRT during LT appears to be a feasible and safe intervention. It supports hemodynamic stability, fluid balance, and correction of acid-base and metabolic disturbances, potentially reducing complications and contributing to a safer surgical course in complex transplant cases.

Monitor	FRESENIUS Multifiltrate®
Dialysate Bags	MULTIBIC®
Mode	CVVHD
Filter	AV1000 EMIC2
Qb	80-100 ml/min
Qd	1500-2000 ml/h
Anticoagulation	- no one - heparin/protamine according to internal protocol: 1 cc of heparin (5000 U) antagonized by 1 vial (50 mg/5 ml) of protamine. For example: -Pre-filter: 5 cc of heparin (25000 U) in 100 cc of NS at 4 ml/h -Post-filter: 5 vials of protamine (250 mg) in 100 cc NS at 4 ml/h
Vascular Access	- Hemodialysis CVC - 2 single-lumen central venous infusion catheters (1 for inflow, 1 for outflow)

TABLE 1. Example of Intraoperative CKRT Prescription during Liver Transplantation (Local Experience)