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A Collaborative Approach to Intraoperative Hemodialysis at Keck Hospital of USC

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Background / Aim: The Kidney Transplant Program at our institute is part of the multiorgan transplant program and ranks in the top 10 percent of all transplant centers nationwide in quality.

Liver transplantation surgery with or without simultaneous kidney transplantation for renal dysfunction is a complicated case involving major fluid shifts, electrolyte imbalances and coagulative abnormalities during the perioperative phase. Intraoperative hemodialysis (IOHD) is beneficial for the management of the acute treatment of life-threatening electrolyte abnormalities or metabolic acidosis, which is a frequent occurrence in patients undergoing liver transplant with renal dysfunction.

Hemodialysis during liver transplantation surgery has been the preferred renal replacement therapy since the late 1990's at our institution and has shown benefits to our transplantation program.

Plan / Do: Dialysis nurses play a major role in the multiservice team that cares for the liver and kidney transplant patient and provide a valuable asset of IOHD. The team works closely together to manage the stability of the renal function during the extended surgery.

Orders are written by the renal fellow and called in by the nursing supervisor and /or surgery team. The dialysis nurses review and confirm the placed orders, current lab results, and consents. Designated surgery rooms are utilized for IOHD to accommodate position of hemodialysis machine for accessibility in case of circuit change or access problems and water access.

ACT: Data was gathered as part of a performance quality project to review IOHD. Dialysis machine setup and pretreatment alarms, pressure test, and water checks are completed and passed. The dialysis nurse reviews with the anesthesiologist regarding recent labs, ultrafiltration, and when to commence hemodialysis.

Vital signs are done at a minimum every 15 minutes. Changes on dialysate parameters per ordered standing IOHD sliding scale or by communication with covering nephrology fellow. Ultrafiltration adjustments are ordered by the anesthesiologist.

Order Parameters: For dialysate changes bicarbonate concentration if pH greater than 7.45 or HCO3 greater than or equal to 30, decrease dialysate HCO3 to 25 mEq/L. If pH less than 7.35 or HCO3 less than or equal to 20, increase dialysate HCO3 to 40 mEq/L. For dialysate potassium concentration changes if serum potassium increases to greater than 4.5 mEq/L, change dialysate potassium to 2. Ultrafiltration and termination of hemodialysis is ordered by the anesthesiologist in communication with the nephrology team. Report is given to both the anesthesiologist and operating room nurse.

Cleaning of the hemodialysis machine is thoroughly wiped by approved hospital facility disinfection wipes before transporting out of the surgery room.

Conclusion: The implementation of IOHD during liver transplant and simultaneous liver and kidney transplant has been used safely and effectively in critical patients with high model of end-stage liver disease scores and renal dysfunction. It adequately allows adjustments of the acid-base balance, electrolyte management and intravascular volume adjustments during liver and kidney transplantation surgery. It is best achieved by the collaborative approach of the nephrologist, hepatobiliary surgeon, anesthesiologist, renal transplant surgeon, the surgery team, and the dialysis team. At our facility the one-year survival rate of kidney transplant recipients is approximately 98.5%. Graft survival after one year is approximately 97.5%.

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