LETTER TO THE EDITORS

Delayed kidney transplantation in combined liver–kidney transplantation for polycystic liver and kidney disease

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Dear Editors,

Patient survival after combined liver–kidney transplant (CLKT) is lower compared with liver transplantation (LT) alone. As well as the more complex surgical procedure, coagulopathy, significant peri-operative hypotension requiring high vasopressor doses, and hepatic ischemia–reperfusion injury, all compromise kidney allograft function.

In addition, delayed graft function (DGF) of the kidney graft has been reported to be a negative predictor of patient survival [1].

We report our preliminary experience in delayed kidney transplantation (KT) after a very long cold ischemia time in CLKT first performed in Italy, and to our knowledge reported in Europe on patients with polycystic liver and kidney disease (PLKD). This indication was not clearly discussed in the previous works by Ekser *et al.* [2,3].

Patients with polycystic liver disease show increased risk of peri-operative mortality as a consequence of the much more complicated hepatectomy procedure in the case of a huge liver [4,5].

To minimize the recipient's risk of bleeding and the inferior vena cava (IVC) torsion during liver mobilization, we routinely use the standard technique with IVC replacement and venovenous bypass. However, we usually perform primary abdominal closure, given the low risk of abdominal compartment syndrome in these recipients.

Among the over 2000 liver transplants performed in our high-volume center, the two last consecutive PLKD patients underwent a CLKT with a delayed KT from brain-dead donors in March 2019. The kidney grafts were maintained on continuous hypothermic pulsatile machine perfusion (MP) at 4 °C for 45 and 46 h, respectively, until KT. Continuous venovenous hemodialysis was maintained throughout this period, and recipients were completely weaned from vasopressors before kidney implantation. The delayed KT was performed extraperitoneally in the right iliac fossa through a separate incision. Native nephrectomy was not required in these two recipients.

Donor and recipient characteristics and peri- and postoperative outcomes are reported in Table 1. Patients were discharged with normal liver and kidney function, and neither suffered kidney DGF, defined as the need for dialysis within the first week after KT. No surgical complications related to the dual organ transplantation occurred, and patients are still alive and well 5 months after CLKT. The delayed KT approach was feasible in both two cases and the results of our first experience with the procedure, after an admittedly short follow-up, seem encouraging.

We would like to point out that all strategies aimed at avoiding kidney allograft futility in CLKT should be evaluated and, if feasible, adopted, especially in the uncommon setting of PLKD.

Prompt reporting of all applications of this novel approach would accelerate its widespread use and allows better understanding of whether synergy between the use of hypothermic MP and delayed KT optimizes kidney allograft function in CLKT, and might also allow safe expansion of the kidney donor pool on the basis of extended donor criteria, including kidney donation after circulatory death.

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Table 1. Donor and recipient characteristics and peri- and postoperative outcomes.

	Donor characteristics	Recipient characteristics	Peri-operative outcome	Postoperative outcome
	Age, year; sex, male/female	Age, year; sex, male/female	SCS liver, min	Peak AST/ALT
	Cause of death	BMI, kg/m^2	SCS kidney, min	Peak bilirubin, mg/dl
	BMI, kg/m^2	MELD score	HMP kidney, h	DGF kidney, yes/no
	KDRI	Total native liver weight, g	Total CIT kidney (SCS + HMP)	UOP <40 ml (within 24 h after KT)
	KDPI	s-Cre, mg/dl	Peri-transplant CVVH, yes/no	ICU stay, days
		Dialysis before transplant	Venovenous bypass, yes/no	Hospital stay, days
		Duration of dialysis, months	Transplant technique	s-creatinine, mg/dl
		eGFR before transplant	Operative time (LT), min	1 week
		Duration of eGFR <30, days	Operative time (KT), min	1 month
			Blood loss (LT), ml	3 months
			Transfusion requirements, units	
Case no. 1	44; male	54; female	480 min	2830/3108
	28 kg/m^2	23 kg/m^2	510 min	4.2 mg/dl
	Head trauma	21	45 h	No
	0.96	7840 g	53 h, 30 min	No
	46%	NA	Yes	9 days
		Yes	Yes	28 days
		18 months	Starzl technique	2.12 mg/dl
		NA	560 min	1.78 mg/dl
		NA	165 min	1.2 mg/dl
			2200 ml	
			4 RBC	
			5 FFP	
			1 platelets	
Case no. 2	54 years; female	40 years; female	520 min	535/680
	Stroke	20 kg/m^2	380 min	5.8 mg/dl
	27 kg/m^2	12	46 h	No
	1.21	9860 g	52 h, 20 min	No
	69%	2.64 mg/dl	Yes	5 days
		No	Yes	32 days
		NA	Starzl technique	1.87 mg/dl
		22	600 min	2.05 mg/dl
		180 days	180 min	1.25 mg/dl
			5400 ml	
			14 RBC	
			11 FFP	
			1 platelets	

BMI, body mass index; CIT, cold ischemia time; CVVH, continuous venovenous hemodialysis; DGF, delayed graft function; FFP, fresh frozen plasma; eGFR, estimated glomerular filtration rate; HMP, hypothermic machine perfusion; ICU, intensive care unit; KDPI, kidney donor profile index; KDRI, kidney donor risk index; KT, kidney transplantation; LT, liver transplantation; MELD, model for end-stage liver disease; NA, not available; RBC, red blood cell; SCS, static cold storage; UOP, urine output.

Conflicts of interest

The authors have declared no conflicts of interest.

Informed consent

Informed written consent to publish these clinical cases were obtained from the patients.

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