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Preliminary experience with PerLife system for ex-situ liver perfusion and purification

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Background

Liver transplantation is a life-saving treatment. The extended criteria donors (ECD) could increase the number of livers available for transplantation, but these organs are at a higher risk of post-transplant complications. Machine perfusion is a strategy aiming at the recovery of ECD organs. In this report, we show our preliminary experience of ex-situ ECD liver perfusion with PerLife, according to dual hypothermic oxygenated perfusion (DHOPE) and normothermic (NMP) protocols.

Methods

Two grafts were recovered from ECD (case 1: 55-year-old male died from head trauma, with hemodynamic instability; case 2: 70-year-old female died from anoxia, macro-steatosis 45%). To get acquainted with the system, a first 90-minute DHOPE treatment was performed. Then, the second liver underwent NMP with the integration of PerSorb cartridge to remove inflammatory mediators from the perfusate. A 2L/min oxygen mixture was supplied, and the perfusate was adjusted according to blood-gas evaluation when needed. Red blood cells were used as oxygen carriers for NMP. Perfusion parameters (pressure, flow, resistance, temperature) were continuously monitored, while perfusate samples were collected at the beginning of the procedure and every 30 min.

Results

There was a progressive increase of the arterial and the venous flows: in DHOPE, arterial flow increased from 60 to 80mL/min and venous from 190 to 250mL/min, while, in NMP, arterial and portal flows increased from 70 to 170mL/min and from 250 to 860mL/min, respectively. In NMP, a decrease by 89.9% was observed in perfusate lactate levels after 220min of treatment.

Perfusate IL-6 peaked at 602 and decreased to 371pg/mL at the end of perfusion. Both grafts were transplanted after the treatment (case 1: 66-year-old men with HCV and HCC, MELD-Na 13; case 2: 43-year-old male with NASH and HCC, MELD-Na 18). The transaminase peak was 930IU/L and 787IU/L for case 1 and case 2, respectively.

The postoperative course was uneventful and both recipients did well after an overall follow-up of 5 and 4 months.

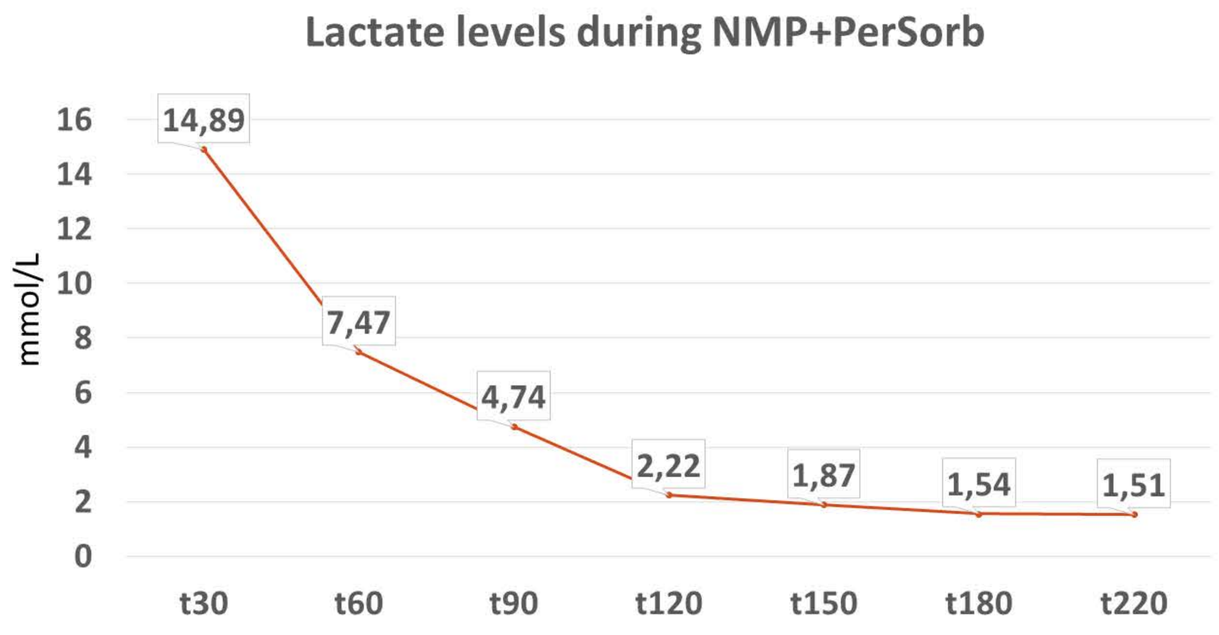

Figure 1: Lactates during NMP + PerSorb.

Conclusions

Both DHOPE and NMP ex-situ organ perfusion with PerLife were safe and feasible. The combination of NMP and PerSorb resulted in optimal organ perfusion. This is a preliminary experience: further evaluations are needed to explore the potential role of inflammatory mediators' adsorption in ex-situ treatments.