

Divide and Preserve:

Hypothermic Oxygenated Perfusion

in the Context of Liver Split Transplantation

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Introduction

Hypothermic oxygenated perfusion (HOPE) has been shown to mitigate ischemia-reperfusion injury (IRI), which is associated with poorer outcomes in liver transplantation (LT), particularly in split liver grafts that are more susceptible to IRI. We aim to present the application of hypothermic oxygenated perfusion during liver split procedures, demonstrating the feasibility of simultaneous perfusion of both liver lobes.

Methods

- We report two clinical cases in which HOPE was applied during the liver split procedure, enabling simultaneous perfusion of both lobes until the end of the surgery:
- Early portal vein cannulation enabled prompt start of oxygenated perfusion
 - Split performed with standard technique; final division of the left/right portal branch maximized bilateral HOPE duration
 - Cholangiography performed immediately before the division of the portal branch.
 - The right lobe remained on HOPE for as long as necessary
 - Iliac cadaveric vein graft used for HOPE cannulation, maximizing portal length

Machine Perfusion

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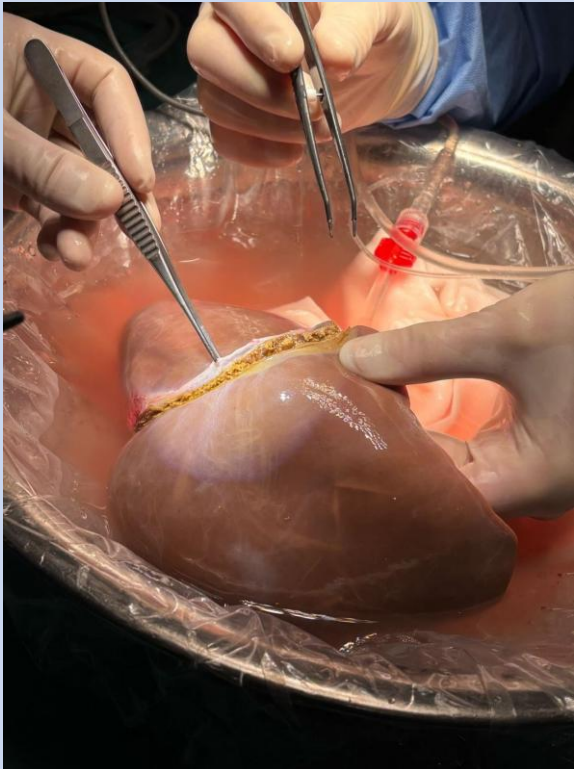
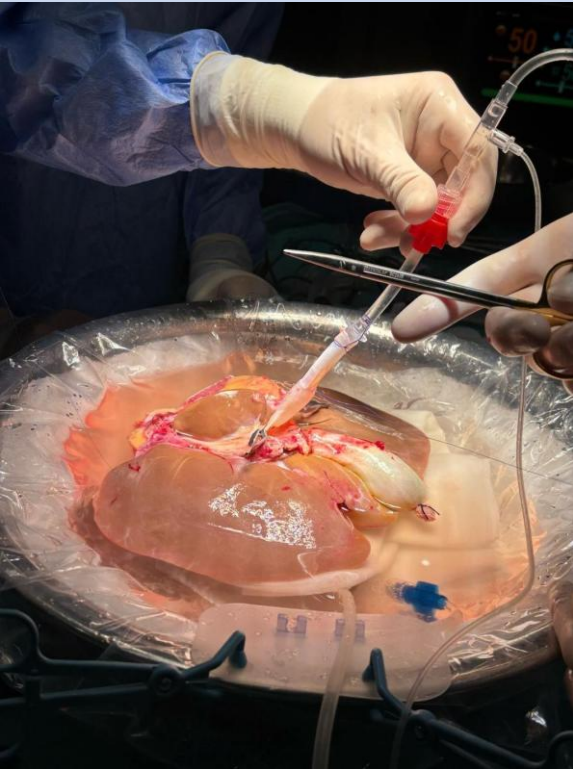
Perfusion - portal vein

Maximum pressure: 3 mmHg

Maximum flow: 250 ml/min

Oxygenation: PaO2: 450 mm/Hg

Temperature: 4-10° C



Results

Case 108/03/2025	Case 212/04/2025
Adult recipient Male, 66 years old, HCC MELD Na: 7	Adult recipient Male, 65 years old, HCC MELD Na: 12
Preservation time: 606 min.	Preservation time: 594 min.
Cold ischemia time: 237 min.	Cold ischemia time: 232 min.
Warm ischemia time: 43 min.	Warm ischemia time: 37 min.
HOPE time: 369 min.	HOPE time: 362 min.
GW/RW: 1.8%	GW/RW: 1.5%
Peak ALT: 2264 U/L.	Peak ALT: 619 U/L.
Hospital stay: 18 days	Hospital stay: 10 days
Graft's biopsy post reperfusion IRI: No Macrovacuolar steatosis: 2%	Graft's biopsy post reperfusion IRI: moderate Macrovacuolar steatosis: No
BAR: 3ET-DRI: 1.5	BAR: 3ET-DRI: 1.9
Pediatric recipient Female, 6 months old, 5.9 kg Cirrhosis (biliary atresia) PELD: 30	Pediatric recipient Female, 9 years old, 26 kg Congenital hepatic fibrosis, Hepatopulmonary syndrome PELD: 6
Preservation time: 380 min.	Preservation time: 504 min.
Cold ischemia time: 198 min.	Cold ischemia time: 324 min.
Warm ischemia time: 54 min.	Warm ischemia time: 45 min.
HOPE time: 120 min.	HOPE time: 187 min.
GW (S2,3)/RW: 4.9%	GW (S2,3)/RW: 1%
Peak ALT: 1258 U/L.	Peak ALT: 553 U/L.
Hospital stay: 22 days (after LT)	Hospital stay: 16 days
Donor Male, 21 years old BMI: 20 kg/m² Trauma ICU: 1 day	Donor Male, 24 years old BMI: 29.4 kg/m² Trauma ICU: 3 days

Intraoperatively, both recipients (case 1), had hepatic artery thrombosis, managed with fibrinolytic therapy.

Follow-up until 20/06/2025. No complications in adult recipients. One pediatric recipient (case 2) developed antibody-mediated rejection within the first post-LT month.

Conclusions

- In our center:
- Simultaneous HOPE of both lobes in split LT is feasible using a single perfusion kit
 - The use of HOPE allows to reduce CIT and may contribute to lower post-LT hepatocellular injury
 - Further follow-up is required to assess mid- and long-term outcomes

Referece: Rossignol G, Muller X, Ruiz M, Collardeau-Frachon S, Boulanger N, Depaulis C, Antonini T, Dubois R, Mohkam K, Mabrut JY. HOPE Mitigates Ischemia-Reperfusion Injury in Ex-Situ Split Grafts: A Comparative Study With Living Donation in Pediatric Liver Transplantation. Transpl Int. 2024 Jun 7;37:12686. doi: 10.3389/ti.2024.12686. PMID: 38911062; PMCID: PMC11190067.