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Hypothermic Oxygenated Machine Perfusion of Liver Grafts: Preliminary Experience in a Single Center

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Abstract

Background: The need to maximize the use of donor organs and the issue of ischemia-reperfusion injury led to the use of thermoregulated oxygenated machine perfusion that improves the function of liver graft prior to transplantation. Among these methods, the HOPE (hypothermic oxygenated perfusion) protocol shows significant benefits. The aim of the paper is to analyze the early experience in using such procedure in a high-volume liver transplantation center.

Methods: Normal liver grafts with cold ischemia time ≥6 hours, marginal grafts and discarded (beyond ECD criteria) grafts were perfused using HOPE. Our selection criteria for dual HOPE (hepatic artery and portal perfusion) were steatosis, at least 3 associated ECD criteria, and discarded grafts. The main criteria to establish graft improvement were the progressive increase of arterial and portal flows, with lactate under 3 mmol/L or, even if over this value, with a decreasing trend during perfusion.

Results: Whole liver grafts harvested from 28 donors between February 2016 and June 2021 benefitted from HOPE: 9 otherwise discarded grafts were assessed and considered not fit for transplantation, while the other 19 were ECD or standard grafts that were subsequently transplanted. Dual HOPE was used in 8 out of the 19 procedures (42.1%). We obtained a significant increase of arterial and portal flow ($p=0.005$ and $p=0.001$, respectively). In recipients, significant improvement of AST, ALT, INR and lactate values were recorded ($p<0.001$, $p<0.001$, $p<0.001$, and $p=0.05$, respectively). The rate of major postoperative complications (Dindo-Clavien grade ≥ 3) after LT was 26.3%, while the rate of early graft dysfunction was 15.8%. No PRS or acute rejection was recorded. The postoperative mortality rate was 15.8%. After a median follow-up of 9.3 months (range 2-44), the late major complication rate was 15.8%, without mortality.

Conclusion: Machine perfusion is nowadays part of current clinical practice. This way, marginal liver grafts (DCD, ECD-DBD) may be safely used for transplantation improving the outcome, thus effectively enhance the use of a persistent scarce pool of donors. For best results, we believe that both techniques of HOPE (mono and dual HOPE) should be used based on specific selection criteria.

Key words: liver transplantation, marginal graft, hypothermic oxygenated perfusion, LiverAssist device