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Effect of hypothermic oxygenated machine perfusion compared to conventional static cold preservation in liver transplantation; systematic review and meta-analysis

SeongWook Shin¹, ManKi Ju¹, JungJun Lee¹

¹Department of Transplantation Surgery, Gangnam Severance Hospital, Yonsei University, Republic of Korea

Introduction:

Hypothermic oxygenated machine perfusion (HOPE) is a novel technique for liver grafts preservation. Many studies have been performed to demonstrate the effect of HOPE compared to conventional static cold storage (SCS) in extended criteria donors.

Methods:

We systemically reviewed MEDLINE, Embase, and Cochrane Library for randomized control trials (RCTs) and propensity score matched (PSM) cohort studies that compared HOPE and SCS for preservation of liver grafts published up to August 1, 2022. Data extraction and synthesis were conducted following the PRISMA guidelines. Data were pooled by using random effect model. Primary outcomes were early allograft dysfunction (EAD) and 1-year graft survival. Secondary outcomes were postoperative biochemical outcomes (serum peak alanine aminotransferase) and postoperative complications by ischemia-reperfusion injury (non-anastomotic biliary complications).

Results: Overall, 2 RCTs and 9 PSM studies (HOPE, n=418; SCS, n=1,143) were included. Applying HOPE was associated with a significant reduction of EAD in RCTs and PSM studies analysis (RCTs analysis: Odds Ratio (OR): 0.49, 95% confidence interval (CI): 0.27-0.91, p = 0.02, PSM studies analysis: OR: 0.37, 95% CI: 0.24-0.59, p < 0.0001). In HOPE group, a significant 1-year graft survival was observed in PSM studies analysis (Hazard Ratio (HR): 0.57, 95% CI: 0.40-0.81, p = 0.002). And serum peak alanine aminotransferase (ALT) remained significantly lower in applying HOPE group in both analyses. Although there was no difference in the incidence of anastomotic biliary structure, non-anastomotic biliary stricture was significantly less occurred in HOPE group in both analyses (RCTs analysis: OR: 0.40, 95% CI: 0.17-0.93, p = 0.03, PSM studies analysis: OR: 0.47, 95% CI: 0.25-0.87, p < 0.02).

Conclusion:

This meta-analysis demonstrated that applying HOPE showed less EAD with low serum peak ALT level and improved 1-year graft survival. And using HOPE resulted in lowering risk of non-anastomotic biliary stricture by reducing ischemia-reperfusion injury.