P.447

High Oxygen Pressure during Continuous Hypothermic Machine Perfusion is Associated with a Better Ex Vivo Renal Blood Flow and Early Graft Function in a Porcine DCD Auto-Transplant Model

Tom Darius[1], Pierre Gianello[2], Antoine Buemi[1], Martine de Meyer[1], Michel Mourad[1]

[1]Surgery and Abdominal Transplantation, University Clinics Saint Luc, Brussels, Belgium; [2]Pôle de Chirurgie Expérimentale et Transplantation, Université catholique de Louvain, Brussels, Belgium.

Introduction: Continuous hypothermic machine perfusion (HMP) demonstrated improved early graft function compared to static cold storage (SCS) alone. The aim of this study was to evaluate the impact of different perfusate oxygen pressures during continuous hypothermic machine perfusion on physical machine perfusion parameters and early graft function in a porcine auto-transplant model.

Materials and Methods: The left kidney of a ±40 kg female Landrace pig was exposed to 30 minutes of warm ischemia by vascular clamping and randomized after standard procurement and ex vivo donor blood flush out to one of 4 studied preservation strategies: 1) 22hrs SCS, 2) 22hrs (no active oxygen supply) HMP, 3) 22hrs oxygenated HMP ($HMPO_2$low)(pO_2=220-240mmHg), and 4) 22hrs oxygenated HMP ($HMPO_2$high)(pO_2=700-800mmHg). The LifePort Kidney Transporter® (Organ Recovery Systems) was used for all machine perfusion strategies. The left kidney was auto-transplanted in a right orthotopic position.

Results: Twenty-four auto-transplants were performed with 6 pigs per study group. Renal blood flow (RBF) was significantly higher in both $HMPO_2$high and $HMPO_2$low groups compared to non-oxygenated HMP (figure 1). The RBF increase was faster in the $HMPO_2$high group (significant from 3 to 20hrs compared to the HMP group) compared to the $HMPO_2$low group (significant from 8 to 19hrs compared to HMP group). At the end of the HMP no difference was observed in RBF between the machine perfusion groups. No significant difference in RBF was observed between the $HMPO_2$low and the $HMPO_2$high group during the whole period of machine perfusion. Serum creatinine at day 1, 2, and 3 was significantly lower in the $HMPO_2$high group compared to non-oxygenated HMP (p=0.0126; p=0.0013 and p=0.0236, respectively) and SCS (p=0.0001; p<0.0001; p<0.0001)(figure 2). We observed a tendency toward better renal function during the first 3 days after transplantation in favor of the HMPO2high group compared to the HMPO2 low group, but the difference was not statistically significant. No difference in serum creatinine was observed between all the study groups at 7 and 13 days of follow-up.

Discussion: High oxygen pressure during HMP demonstrated a faster increase in RBF compared to low dose oxygen administration or non-oxygenated HMP and a positive effect on early graft function. This strategy should be further explored as an easy strategy to decrease ischemia reperfusion injury and to decrease the incidence of delayed graft function in clinical practice.

Conclusions: The administration of high levels of perfusate oxygen concentration during HMP positively influence ex vivo renal blood flow and early graft function compared to low or no oxygen supply during HMP.

Organ Recovery Systems. Astellas.

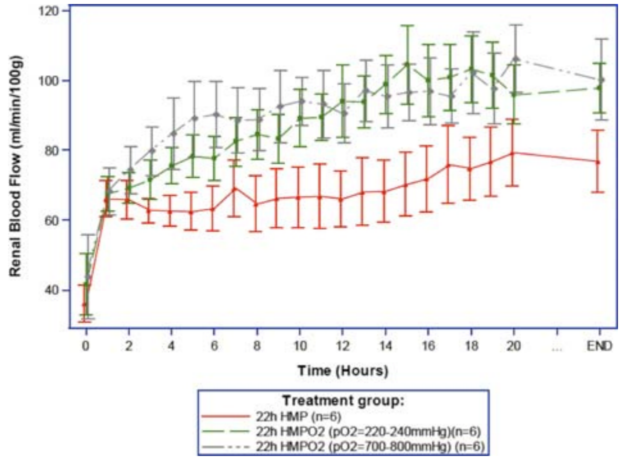

FIGURE 1.

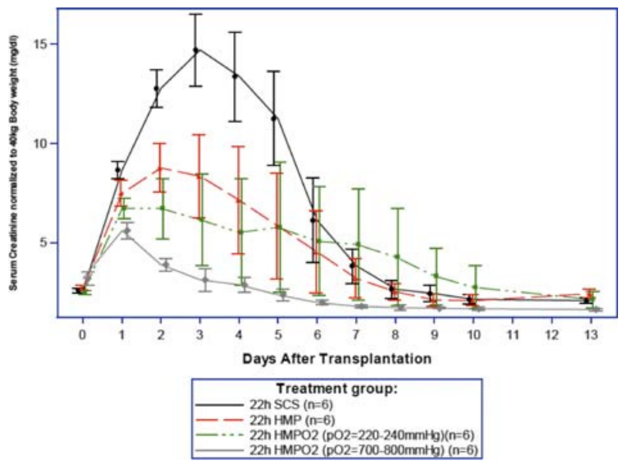

FIGURE 2.