CW008

Outcomes from steatotic livers preserved via normothermic machine perfusion

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Introduction:
Steatotic livers are associated with poor outcomes after transplantation, resulting in a large number being discarded. By preventing the injury that results from static cold storage (SCS), normothermic machine perfusion (NMP) may enable a larger number of steatotic organs to be transplanted. We report the post-transplant outcomes from matched steatotic NMP and SCS livers and describe the associated changes in perfusate lipid metabolites from steatotic and lean livers during NMP.

Methods:
Thirty-one steatotic livers transplanted as part of a trial comparing NMP (n=20) and SCS (n=11) were identified. Lean livers were matched with their steatotic counterparts (16 SCS, 13 NMP). Groups were matched for donor type, age, risk index and recipient age and model for end-stage liver disease (MELD). Peak serum aspartate aminotransferase (AST) in the first 7-days post-transplant, early allograft dysfunction (EAD), primary non-function (PNF) and 30-day and 6-month patient and graft survival were compared between the groups. Markers of lipid metabolism and function including: triglyceride (TG), cholesterol, 3-hydroxybutarate, urea and AST were measured during NMP. Student's t-test, Mann-Whitney U test and Fischer's exact test were used for statistical analysis.

Results:
Steatotic NMP livers had a lower rate of EAD compared to steatotic SCS livers (3/20 NMP vs 6/11 SCS, p = 0.04). Median peak serum AST was lower in steatotic NMP livers compared to steatotic SCS livers but this did not reach statistical significance (902 U/L [88-5101 U/L] vs 2316 U/L [192-5511], respectively; p=0.48). There was, however, a statistically significant reduction in median peak serum AST between steatotic and lean NMP livers (902 U/L [88-5101 U/L] vs 320 U/L [171-1493 U/L], respectively; p=0.01). Only one patient (1/60) developed PNF and died on the 3rd post-operative day having received a steatotic liver preserved via NMP. All other patients were alive at 6 months follow-up.
At the end of perfusion, mean perfusate TG was significantly higher in steatotic than lean NMP livers (2032 ± 300μmol/L vs 1114 ± 203.2μmol/L, respectively; p=0.03) and median 3-hydroxybutarate levels were also significantly higher in the steatotic liver perfusate (992.2μmol/L [239.9-4889.5μmol/L] steatotic vs 477.8μmol/L [108.4 1577.9μmol/L] lean; p=0.002). Median perfusate AST was significantly higher in steatotic than lean livers (853 U/L [359-6480 U/L] vs 288 U/L [123-1118 U/L], respectively; p=0.003). There was no significant difference in total cholesterol and urea between the two groups.

Discussion:
NMP facilitates enhanced preservation of steatotic livers with improved outcomes compared to SCS. However, the poorer outcomes seen in steatotic compared to lean NMP livers combined with elevated markers of lipid metabolism in the perfusate highlight the potential need for de-fatting interventions.