OXYGENATED HYPOTHERMIC MACHINE PERFUSION OF KIDNEYS DONATED AFTER CIRCULATORY DEATH: AN INTERNATIONAL RANDOMISED CONTROLLED TRIAL

Authors:

I Jochmans[1], H S Hofker[2], L Davies[3], S Knight[3], J Pirenne[1], R J Ploeg[3] on behalf of the Consortium of Organ Preservation in Europe and participating centres.

(1) University Hospitals Leuven, KU Leuven, Belgium

(2) University Medical Center Groningen, University of Groningen, the Netherlands

(3) Nuffield Department of Surgical Sciences, University of Oxford, UK

Background: An international, double-blinded, randomised, paired phase 3 trial designed to determine the effect on 1-year graft function of continuous oxygenated (HMPO) vs non-oxygenated hypothermic machine perfusion (HMP) in controlled DCD kidneys from donors aged 50 years or older.

Methods: At randomisation, one kidney from each donor was assigned to HMPO, the other to HMP. Kidneys were pumped immediately after retrieval until transplantation. The primary endpoint was estimated glomerular filtration rate (eGFR) at 1-year post-transplant (CKD-EPI) with 90% power at α=0.05 to detect a 8 ml/min/1.73m^2 difference. A pre-specified sensitivity analysis accounted for cases where no eGFR at 1 year was available due to graft loss (eGFR imputed by 10 mL/min/1.73m^2) or patient death with functioning graft (last known eGFR carried forward). Secondary endpoints were delayed graft function, primary nonfunction, biopsy proven acute reject, graft and patient survival. The primary analysis was performed according to intention to treat.

Results: Belgium, the Netherlands, and part of the UK randomised 197 kidney pairs (median donor age 56 (range: 50-78) years), of which 106 were successfully machine perfused and transplanted (median recipient age 61 (21-79) years). Median total warm ischemia time was 28.5 (8-114) minutes and cold time was 11 (4.6-27.6) hours in HMPO and 10.3 (3.5-27.1) hours in HMP. Kidneys were pumped for 6.9 (1.7-24.3) vs 7.4 (1.3-23.8) hours.

For the primary analysis, 83 pairs were eligible for inclusion (23 pairs excluded due to all-cause graft failure of at least 1 kidney). No difference in eGFR at 1 year was observed between HMPO vs HMP (mean (SE): 50.5(2.1) vs 46.7(1.8) mL/min/1.73m^2, p=0.12). However, sensitivity analysis, accounting for all-cause graft failure, showed a higher eGFR in HMPO (47.6(1.9) vs 42.6(2.0) mL/min/1.73m^2, p=0.035). Graft loss and acute rejection were significantly lower after HMPO; other secondary outcomes were similar (Table).

Conclusion: This first randomised controlled trial comparing HMPO with HMP suggests that oxygenation improves 1-year kidney graft function when accounting for the beneficial effect on graft survival.

	HMPO (N=106) N	HMP (N=106) N	p-value
Delayed graft function	38	38	0.99
Primary non-function	3	5	0.48
Acute rejection	15	30	0.014
Graft loss	3	11	0.021
Patient Death	7	8	0.80