

Normothermic versus Hypothermic ex vivo flush. A comparison of a novel phosphate-free preservation solution and a standard hypothermic method in renal allografts

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Objective

The detrimental effect of hypothermic conditions in conjunction with warm ischaemia is well documented in non-heart beating donor kidneys; the aim of this study was to assess renal function after an ex vivo warm flush with a novel non-phosphate buffered preservation solution (RS-I).

Method

Porcine kidneys were flushed with either 30°C RS-I or a hyperosmolar citrate preservation solution at 4°C at a pressure of 100mmHg after 5 - 10 minutes warm ischaemic time, followed by cold storage for 2 hours (N = 4 per group). An assessment of renal function was made by perfusing the organs with autologous blood at 37°C, with an initial circulating serum creatinine concentration of 1000µmol/L on an isolated organ perfusion system. Physiological and biochemical parameters were measured throughout the 6 hour perfusion period.

Results

The RS-I group flushed significantly faster than the hyperosmolar citrate group, 8 ± 1.15 vs 12.6 ± 2.5min respectively (p= 0.0159). Creatinine clearance, renal blood flow and resistance were all significantly better in the RS-I group over 6 hours. Oxygen consumption, urine output and acid base balance were all improved in the RS-I group. The RS-I flushed kidneys also gained less weight after the perfusion period 8.7 ± 8.9 vs 21.8 ± 8.5g respectively. All values are mean ± SD.

Functional Parameters	RS-I 30°C	Hyperosmolar citrate 4°C	P Value
% creatinine fall	83 ± 12.1	72.4 ± 12.8	0.41
CrCl ml/min/100g	4.14 ± 2.2	1.9 ± 0.9	0.037
O ₂ consumption ml/min/g	50 ± 14.5	30.8 ± 6.9	0.0635
RBF ml/min/100g	67.4 ± 17.9	43.4 ± 9.6	0.017
RVR mmHg/ml/min	0.57 ± 0.28	0.76 ± 0.5	0.017

Conclusion

The potential beneficial effects of normothermic preservation have been previously highlighted. However, there is little evidence of the use of an initial normothermic flush. In this study a normothermic flush using a phosphate-free solution was superior to standard cold flush. It is hoped that this will broaden the applicability of warm preservation.