Short and Long Term Cost-Effectiveness of Hypothermic Machine Perfusion versus Static Cold Storage in Kidney Transplantation

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Introduction: Static cold storage (CS) is the most widely used organ preservation method for deceased donor kidney grafts. Our recently conducted multi-center RCT (Machine Preservation Trial) showed that hypothermic machine perfusion (MP) leads to improved outcome after renal transplantation. We performed a cost-effectiveness analysis for the use of MP versus CS alongside this prospective study.

Methods: The clinical study included 336 consecutive kidney pairs from deceased donors, one of which was assigned to MP and one to CS. An economic evaluation was performed, combining short term results based on data from the study with a Markov model (20-year time horizon) to evaluate long term cost-effectiveness. Patient survival (life years) and quality adjusted life years (QALYs) were the clinical outcomes. Direct medical costs associated with hospital stay, dialysis treatment and complications were included. Data on long term survival, quality of life, and costs were derived from literature.

Results: MP significantly reduced the risk of delayed graft function (OR 0.57) and reduced the risk of graft failure (HR 0.52). Average total costs per patient in the first year posttransplant were €4,896 for MP and €5,309 for CS. The long term analysis showed an incremental cost-effectiveness ratio of minus €51,200 per life year gained in favor of MP. The corresponding incremental cost-utility ratio was minus €111,800 per QALY gained.

Conclusion: Our cost-effectiveness analysis suggests that MP is superior to CS in both the short and the long term. MP is associated with improved short term outcome, better long term survival and lower costs. When deceased donor kidneys are preserved by MP instead of CS, life years and QALYs can be gained while reducing costs at the same time.