

Minimized versus conventional Cardiopulmonary Bypass: less myocardial damage in coronary surgery.

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Objective: Minimized extracorporeal circulation (MECC) is a novel perfusion technology, consisting of a centrifugal pump and a high-end membrane oxygenator as the only components in a reduced, closed circuit. It has been shown by our group and others that MECC was superior to conventional open extracorporeal circulation (CECC) in terms of inflammation, brain protection and blood product usage. In this prospective randomized study we focused on perioperative myocardial damage.

Materials and Methods: Sixty patients scheduled for on-pump CABG were randomly assigned to be perfused either with the MECC or a standard CECC system (both provided by MAQUET Cardiopulmonary, Germany). Leakage of myocardial enzymes (Troponin T and CK-MB) was determined by specific immunoassays 6h, 12h and 24h after CPB initiation. Results were corrected for hemodilution.

Results: Thirty patients were treated in each group. Demographics, preoperative hemodynamics, number of anastomoses, CPB and cross clamp time were comparable between the groups. Hemodilution, inotropic support and blood loss were significantly reduced in the MECC group. Blood transfusion was required in none of the MECC patients and 37% (11/30) of the CECC patients. MECC patients demonstrated significantly lower levels of Troponin T (ng/ml) at 6h, 12h and 24h (0.07 ± 0.01 vs. 0.16 ± 0.04 , $p < 0.005$; 0.12 ± 0.03 vs. 0.28 ± 0.08 , $p < 0.008$; 0.21 ± 0.05 vs. 0.35 ± 0.09 , $p < 0.03$, respectively) and CKMB (U/l) at 6h and 12h (22.5 ± 1.5 vs. 40.6 ± 3.3 , $p < 0.0001$; 23.3 ± 3.4 vs. 40.8 ± 8.0 , $p < 0.001$, respectively).

Conclusion: Use of closed minimized CPB compared with conventional open CPB results in superior myocardial preservation as demonstrated by less cardiac enzyme leakage. Thus, the MECC system may not only provide a less invasive solution to meet the perfusion requirements during coronary surgery but also be a more organ preserving alternative to standard cardiopulmonary bypass.