

Pretreatment with hyperbaric oxygen and its effect on neuropsychometric dysfunction and systemic inflammatory response after cardiopulmonary bypass: a prospective randomized double-blind trial

[Joseph Alex¹](#), [Gerard Laden](#), [Alex R J Cale](#), [Sean Bennett](#), [Kenneth Flowers](#), [Leigh Madden](#), [Eric Gardiner](#), [Peter T McCollum](#), [Steven C Griffin](#)

Objective: Animal studies have shown that pretreatment with hyperbaric oxygen can induce central nervous system ischemic tolerance and also modulate the inflammatory response. We evaluated this therapy in patients undergoing cardiopulmonary bypass.

Methods: Sixty-four patients were prospectively randomized to group A (n = 31; atmospheric air, 1.5 atmospheres absolute) or group B (n = 33; hyperbaric oxygen, 2.4 atmospheres absolute) before on-pump coronary artery bypass grafting. Age, sex, body mass index, diabetes, hypertension, smoking, coronary disease severity, left ventricular function, Parsonnet score, Euroscore, bypass time, myocardial ischemia time, and number of grafts were comparable in both groups. Canadian Cardiovascular Society angina, New York Heart Association dyspnea, and previous myocardial infarction were significantly higher in group B. Inflammatory markers were analyzed before surgery and 2 and 24 hours after bypass. Neuropsychometric testing was performed 48 hours before surgery and 4 months after surgery and included trail making A and B, the Rey auditory verbal learning test, grooved peg board, information processing table A, and digit span forward and backward. Neuropsychometric dysfunction was defined as more than 1 SD deterioration in more than 2 neuropsychometric tests. Chi-square tests, Fisher tests, t tests, and analysis of variance were used as appropriate for statistical analysis.

Results: Group A had a significant postoperative increase in the inflammatory markers soluble E-selectin, CD18, and heat shock protein 70. This was not observed in group B. Neuropsychometric dysfunction was also significantly higher in group A compared with group B. There was no difference in any other early postoperative clinical outcome.

Conclusions: Our results seem to indicate that pretreatment with hyperbaric oxygen can reduce neuropsychometric dysfunction and also modulate the inflammatory response after cardiopulmonary bypass. However, further multicenter randomized trials are needed to clinically evaluate this form of therapy.