

Biological Benefit of the Off-Pump Coronary Surgery: Review of Oxidative Stress and Inflammatory Response Parameters in Conventional and Off-Pump Cardiac Surgery

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Background: After heart operations using the conventional cardiopulmonary bypass (CPB) method patients have a revealing systemic inflammatory response and oxidative stress reaction, that is believed to cause increased postoperative morbidity and systemic postoperative complications. In recent years, to get around the adverse effects of CPB, off-pump coronary artery bypass (OPCAB) operations are spreading in cardiac surgery. In our present study we investigated whether OPCAB on the beating heart reduces the systemic oxidative stress and inflammatory reaction seen in patients operated under CPB.

Methods: In our controlled, randomised, prospective study we examined 40 patients with two or three-vessel heart disease: 20 CPB and 20 OPCAB operations were carried out. In both groups various number of graft were performed. During the operation and in the postoperative period blood samples were taken from peripheral vein and from coronary sinus measuring the oxidative stress parameters (lipid peroxidation, antioxidant enzymes). We focused our investigations to detect the activated state of leukocytes and endothelial cells.

For this reason we used ELISA method to determine the myeloperoxidase, PMN elastase and ICAM-I in the serum of the patients. The adhesive molecules (CD11, 18 and 97) expression of leukocytes was also investigated by flow cytometric method. The free radical production of PMNs was detected using confocal laser microscop. Behind the routinely used CK-MB and LDH measurement the high sensitive CRP method help to estimate the possible damages of heart muscle and the early inflammatory response during CPB or OPCAB.

Results: Our results show that OPCAB operation on beating heart significantly reduces the oxidative stress and the inflammatory response in patient associated with the use of CPB.

Conclusion: This study tries to give an explanation for the biological advantages of the less invasive off-pump method for patients undergoing coronary artery bypass surgery.