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Effects of Dopexamine on Lipid Peroxidation during Aortic Surgery in Pigs: Comparison with Dopamine

Ioanna Andreadou[1], Georgia Kostopanagiotou[1], Antonis Doufas[2], Ioanna Chondroudaki[2], Thomas Kotsis[2], Eleftherios Kastellanos[1], Demetrios Rizos[2], Vassilios Smyrniotis[2]

[1]Dept. of Anesthesiology, Attikon Hospital, [2]Dept. of Surgery, Aretaieion Hospital, School of Medicine, University of Athens, Athens, Greece

AIM

To investigate the impact of a low-dose (2 μg/kg/min) and a high-dose (8 μg/kg/min) of dopamine or dopexamine on oxidative stress and subsequent lipid peroxidation, we conducted an experimental study in pigs, simulating the ischemia-reperfusion model of infrarenal aortic repair.

MATERIALS-METHODS

Twenty five pigs (BW 22±2.5 kg, mean±SD) were used in the study. All experiments were performed under general endotracheal anesthesia with ketamine 8 mg/kg, thiopental 5 mg/kg, isoflurane 0.7-1%, fentanyl at 5 μg/kg/h, pancuronium bromide 0.5 mg/kg/h and ventilation was established with tidal volumes of 10 ml/Kg at a frequency of 20-30 breaths/min, and an air/oxygen mixture (FiO_2=40%). All animals underwent a midline laparotomy under strict aseptical conditions. The pigs were randomly assigned into five groups (n=5 in each group): Control group (normal saline), DOPA 2 group: a continuous i.v. infusion of dopamine 2 μg/kg/min. DOPA 8 group: a continuous i.v. infusion of dopamine 8 μg/kg/min. DOPEX 2 group: a continuous i.v. infusion of dopexamine 2 μg/kg/min, was administered in this group. DOPEX 8 group: A continuous i.v. infusion of dopexamine 8 μg/kg/min was administered in this group. The parameters (hemodynamic and plasma malondialdehyde) were determined and detailed in five time points: after induction of anesthesia (baseline), 60 and 120 min after cross-clamping of aorta (ischemia phase), and 60 and 120 min after restoration of flow (reperfusion phase).

RESULTS

Hb levels did not change significantly independently from the drug, the dose used and the time. MAP was statistically significant lower in the dopexamine group, mainly at the dose of 8 μg/kg/min. A higher cardiac output is observed in pigs which received dopexamine in both 2 and 8 μg/kg/min intravenous doses. Arterial pH changed statistically significant in the animals treated with both drugs in both doses from baseline until the 120th min of reperfusion. Significant increase of plasma MDA was observed in the control group at 120 min of aortic cross-clamping and 60 and 120 min after release of aortic clamp compared to baseline values. In contrast, dopamine at a dosage of 8 μg/kg/min and dopexamine at both doses tested significantly reduced the circulating MDA concentration after 60 and 120 min of reperfusion compare to control values at the same time points. Administration of dopamine at a concentration of 2 μg/kg/min had no effect on MDA levels during ischemia/reperfusion. Dopexamine at both concentrations administered (2 and 8 μg/kg/min), resulted in a significant reduction of the MDA after reperfusion compared to the control group.

CONCLUSION

Administration of dopexamine at both doses erases significantly the circulating MDA levels after reperfusion compared to the 60 and 120 min of ischemia accordingly and to the control group, in comparison with dopamine.