Splanchnic oxygen transport, hepatic function and gastrointestinal barrier after normothermic cardiopulmonary bypass


Background
The effect of non-pulsatile, normothermic cardiopulmonary-bypass (CPB) on the splanchnic blood-flow and oxygen-transport, the hepatic function and the gastrointestinal barrier were observed in a prospectiv observational study in 31 adults undergoing cardiac valve replacement surgery.

Methods
The splanchnic (i.e. hepatic) blood-flow (HBF) was measured by the constant infusion of indocyanine-green (ICG) using a hepatic-venous catheter. Liver function was examined by calculation of lactate uptake, ICG extraction and the monoethylglycinexylidide (MEGX) test. A day before and after surgery the gastrioduodenal and intestinal permeability was measured by determination of sucrose and lactose/ mannitol excretion.

Results
Splanchnic blood flow and oxygen delivery did not decrease during and after surgery while splanchic oxygen consumption ($P < 0.0125$) and arterial lactate concentrations increased. The splanchnic lactate uptake paralleled the lactate concentration. After but not during CPB an increase of systemic oxygen consumption was observed. The MEGX test values decreased on the first day after surgery. The ICG extraction was attenuated during the operation. The gastroduodenal and the intestinal permeability increased significantly postoperatively ($P < 0.002$, respectively, $P < 0.001$). There was no correlation between these findings and the duration of CPB. There was a significant correlation of the intestinal permeability but not of the gastroduodenal permeability between the prior and after surgery values ($P < 0.001$).

Conclusion
Increased oxygen consumption during CPB may indicate an inflammatory reaction due to pump beginning in the splanchnic area or a redistribution of the splanchnic blood flow during the CPB. Normothermic CPB does not lead to a significant or prolonged reduction of liver function. Normothermic CPB causes an increase of gastrointestinal permeability. The intestinal barrier function prior to surgery was accountable for the degree of loss of intestinal barrier function surgery.

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