Can measuring of oxygen delivery during cardiopulmonary bypass

Eva Monzon¹.
¹Cardiothoracic Surgery University Hospital, Linköping (SE).

Abstract
The primary purpose of cardiopulmonary bypass (CPB) is to provide systemic oxygen delivery (DO2) that is sufficient to meet systemic oxygen demand during open cardiac surgery. CPB can be individualized by continuous measurement of oxygen delivery per square meter (DO2i), oxygen consumption per square meter (VO2i) and oxygen extraction (VO2/DO2%). DO2 during CPB depends on blood flow, haematocrite and arterial saturation. Traditionally a fixed systemic pump flow of 2.4 L/min/m² is used during CPB, but during the last decade there is a change into a more individualized pump flow aiming for more stable level of DO2i. Low haematocrite during CPB is associated with an increased risk of acute renal failure, mainly due to a low DO2i. The hypothesis was that an perfusion to 2.4 L/min/m² is not enough to reach a DO2i that could minimize the risk of postoperatively acute kidney injury.

Method
The patients were randomized in two groups, Non Goal Directed Perfusion (Non GDP, n=10) where we assumed a fixed systemic blood flow index 2.4 L/min/m² and Goal Directed Perfusion (GDP, n=10) where we individualized perfusion with a goal to reach an DO2i around 300 mL/min/m². DO2i was continuously measured with Goal Directed Perfusion Monitor, (Sorin Group, Mirandola, Italy) during aortic cross clamp time. Serum creatinine (μmol/L) and serum cystatin C (mg/L) was analyzed pre- and postoperatively.

Results
There were no differences in level of serum-creatinine (μmol/L) or serum-cystatin C (mg/L) preoperatively and postoperatively. There was no significant difference in DO2i between the groups. Mean of DO2i was above 300 mL/min/m² in both groups.

Conclusion
We were not able to detect any differences in postoperatively acute injury markers between patients perfused with a fixed systemic indexation of 2.4 L/min/m² or patients perfused with an individualized perfusion with a goal directed to reach DO2i > 300 mL/min/m².

Keywords: Goal directed perfusion, Systemic index