Assessment of perioperative critical cerebral and splanchnic desaturation periods during neonatal heart surgery

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Aim of the study:
To identify critical cerebral and splanchnic desaturation periods during neonatal heart surgery.

Material and Methods:
• Prospective observational study in neonatal heart surgery with and without the use of cardiopulmonary bypass.
• Cerebral and splanchnic saturation was measured with near-infrared spectroscopy (Nonin Equanox™ 7600).
• Eleven potential jeopardizing events were evaluated.
• Differences between the two surgical groups were evaluated with the independent samples t-test. Changes over time were assessed with a linear mixed model.

Results and Discussion:

• 12 neonates undergoing arterial switch repair and 11 coarctation patients were studied.
• Two patients (9%) had an absolute decrease in cerebral saturation below 50%. Eight patients (35%) showed a relative decrease of >20% from baseline.
• The two groups were only significantly different during aortic cross-clamping (Cerebral saturation: 72±8% vs 80±5%, p=0.012, and renal saturation: 84±12% vs 54±11%, p<0.001, for arterial switch repair and coarctation repair, respectively) (Figure 3).
• Main risk moments for cerebral desaturation in the arterial switch group were arterial and venous cannulation and start of cardiopulmonary bypass.
• Risk moments in both groups were transfer to intensive care and extubation.

Figure 1: Typical intraoperative course of NIRS values during arterial switch repair

Figure 2: Typical intraoperative course of NIRS values during aortic coarctation repair

Figure 3: Boxplot of NIRS values during predefined critical events (Red boxes: significantly different from baseline)

Conclusion:
Cerebral and splanchnic desaturations were short lasting and linked to specific, predictable perioperative events.