

PW1-8

Does neonatal cardiac surgery influence the balance between vasodilative and vasoconstrictive mediators?

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Objectives: Cardiac surgery in neonates is associated with the development a capillary leak syndrome (CLS), the exact cause of which remains unknown. The imbalance in the production of vasoactive mediators during and after surgery might be one of the key mechanisms in the pathophysiology of CLS.

Aim: To investigate the influence of neonatal cardiac surgery on the production of the vasodilative mediator nitric oxide (NO) and the vasoconstrictive mediator vasopressin as well as the postoperative outcome.

Methods: 27 neonates undergoing cardiac surgery were investigated. Plasma levels of nitrate and nitrite (as the end products of endogenous nitric oxide) and vasopressin were measured during and after surgery and correlated with clinical outcome.

Results: In all patients, a significant decrease in the plasma levels of nitrate/nitrite was observed during and after cardiac surgery. On the contrary, levels of vasopressin significantly increased during surgery and normalized on the first postoperative day. Duration of aortic clamping time correlated positively and esophageal T° negatively with nitrate/nitrite concentrations. Lower nitrate/nitrite levels were associated with better cardiac function score and also with better renal function postoperatively. Higher vasopressin levels were associated with a better cardiac function and with an impaired renal function.

Conclusion: Neonatal cardiac surgery leads to decreased endogenous NO- and increased vasopressin production. This imbalance might correspond to a protective adaptation mechanism as it is associated with a better cardiovascular function postoperatively. Nevertheless, the fact that higher production of vasopressin is associated with impaired renal function might suggest that vasoactive imbalance in neonates contributes to fluid retention and therefore to the development of CLS in this patient population.