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Double arterial cannulation for aortic arch reconstruction in newborns and infants

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Introduction:

Aortic arch reconstruction (AAR) is a highly demanding procedure in congenital heart surgery. The two conventional options of cardiopulmonary bypass - deep hypothermic circulatory arrest or antegrade cerebral perfusion – both mean lack of perfusion of the entire or lower body. 1999 Imoto et al presented a perfusion technique with a second arterial cannula into the descending aorta (double arterial cannulation, DAC). However, there is still limited experience with large series of patients.

Methods:

All operations including AAR in newborns and infants performed in our institution between 2003-2013 were reviewed. Median age of our 348 patients at time of operation was 8,0d [6; 16], median weight 3,3kg [2,9; 3,8]. The cohort was divided into 3 groups: simple biventricular (1), complex biventricular (Taussig Bing Heart etc)(2) and univentricular (Norwood procedure, others)(3).

The cannulation technique has not been changed substantially over the years.

We used descriptive analyses to evaluate i.a. complications or in hospital mortality and multiple linear regression analyses to investigate influence of variables on lactate and creatinine related endpoints.

Results:

There was no lethal incident associated with DAC. We evaluated median in hospital mortality between 2,6% in group 2 and 10,1% in group 3. Postoperative lactate decreased to 2mmol/l after 12 hours at the latest in group 3. The highest creatinine levels on postoperative day 3 were found in group 3 (0,66mg/100ml). 7 patients (2,2%) required peritoneal dialysis postoperatively. As complications of DAC we found 1 intraoperative local lesion of descending aorta (repaired immediately), 1 reoperation and 4 secondary pleural drainages due to prolonged chylothorax.

Conclusion:

DAC is a simple and save method for perfusing lower parts of the body in AAR. Dissection of the descending aorta has to be done with great attention on local lymphatic vessels. Perioperative results as in hospital mortality or lactate levels and necessary reoperations or peritoneal dialysis are satisfying. Comparison to patient cohorts with other perfusion techniques in our centre wasn't done, since we never stepped back to other perfusion techniques due to the simplicity of DAC.