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Response to d-transposition of the great arteries and ductal dependent pulmonary circulation

With great interest, we have read the letter to the authors by Dr. Ghimire regarding our recent article describing the course of cerebral oxygen saturation (rSO2) and extraction (FTOE) in infants diagnosed prenatally with several types of duct-dependent congenital heart disease (CHD) [1].

Classification of CHD into different categories can be done in several ways, each with its own advantages and disadvantages. For our study in infants with duct-dependent CHD, infants were categorized into CHD with duct-dependent pulmonary circulation and CHD with duct-dependent systemic circulation. Transposition of the great arteries (d-TGA) could not be categorized easily into one of these categories. After extensive discussion and thoughtful consideration, we decided to categorize d-TGA into CHD with duct-dependent pulmonary circulation. We chose to do so, because both d-TGA and CHD with duct-dependent pulmonary circulation cause cyanosis, while CHD with duct-dependent systemic circulation also comprises acyanotic CHD.

If we would have categorized d-TGA into a separate category, the main results of the study would not have been different (Table 1). Infants with duct-dependent pulmonary circulation had similar rSO2 and FTOE in comparison with infants with d-TGA. Both categories had lower rSO2 and higher FTOE in comparison with CHD with duct-dependent systemic circulation. Infants with d-TGA did have lower arterial oxygen saturation during the first 72 h after birth in comparison with infants with duct-dependent pulmonary circulation. We speculate that blood flow in favor of brain perfusion might be responsible for similar rSO2 values in the presence of lower arterial oxygen saturation.

Of the infants with d-TGA, 53% underwent balloon atrial septostomy (BAS) during the study period. As one would expect, infants that underwent BAS had significantly lower arterial oxygen saturation during the first day after birth (84% vs. 88%). Cerebral oxygen saturation, however, was similar in both groups during the first and second day and higher on the third day after birth in infants that underwent BAS (63% vs. 58%). This is in line with a study from Van der Laan et al. who also demonstrated increasing rSO2 after BAS in infants with d-TGA [2]. Since rSO2 was similar or even higher in infants that underwent BAS, we do not believe that this might be an explanation for the differences observed between infants with duct-dependent pulmonary circulation and infants with duct-dependent systemic circulation in our study population.

We agree with Dr. Ghimire that neurodevelopmental outcome is very different in different types of CHD and that there are still many uncertainties regarding neurodevelopmental outcome in infants with CHD. We believe that our main result that rSO2 was low in infants with duct-dependent CHD during the first days after birth contains a wake-up-call and warrants further investigation into the association between preoperative cerebral oxygenation and neurodevelopmental outcome. Furthermore, we believe that a longitudinal study, from the antenatal period to at least early childhood, might be the best approach to clarify some of the uncertainties that still exist.

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References


Table 1

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<td>94</td>
<td>88</td>
<td>92*</td>
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<td>87</td>
<td>92*</td>
<td>94</td>
</tr>
</tbody>
</table>

rSO2: cerebral oxygen saturation; FTOE: fractional tissue oxygen extraction; SpO2: arterial oxygen saturation; TGA: transposition of the great arteries; DDPC: duct-dependent pulmonary circulation; DDSC: duct-dependent systemic circulation.

* Indicates P-value < 0.05 (Mann-Whitney U test between TGA and duct-dependent pulmonary circulation).
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