EXPERIMENTAL DESIGN FOR OPTIMAL FLOW RATE OF ANTEGRADE CEREBRAL PERFUSION

To the Editor:

We read with great interest the recent article by Sasaki and colleagues.¹ The purpose of this neonatal animal investigation was to determine the optimal flow rate of antegrade cerebral perfusion (ACP) during deep hypothermic circulatory arrest (DHCA). Sasaki and colleagues should be congratulated, and we believe that their study is a good attempt to use varied flow rates to filtrate the optimal flow rate of ACP during DHCA in this neonatal model.

For the past decade, surgical and perfusion techniques have been developed to repair complex intracardiac and aortic arch lesions during cardiopulmonary bypass (CPB) without using DHCA. When aortic arch surgery is needed, modification of systemic arterial cannulation and perfusion techniques are required. Combined ACP with DHCA has been advocated in complex congenital and arch repairs in recent years.² However, several issues remain unresolved relating to the optimal management of the standard set of variables associated with perfusion practice when contemplating the use of ACP during DHCA. Technical issues relating to the use of hypothermic ACP, such as the perfusate temperature, the flow rate, and the pressure used to selectively perfuse the brain, are still unresolved. Stan-

dard methods of evaluation will likely clarify many of these issues as experience and investigations continue. It is hard to make a conclusion about the optimal flow for ACP at low temperatures based on the existing literature.

In this particular study the authors tried to use the neonatal animal model to filtrate the optimal ACP flow rate during DHCA, and they concluded that an ACP flow rate that closely matches standard CPB conditions is between 30 and 50 mL · kg⁻¹ · min⁻¹. We would like to make several comments concerning the experimental design of this investigation. First, the authors mentioned that during neonatal deep hypothermic (18°C to 20°C) CPB, a total body flow rate is commonly used in practice as a standard flow rate, and they cited another clinical study for supporting this flow rate (100 mL · kg⁻¹ · min⁻¹) as a baseline. However, we did not find any descriptions using a 100 mL · kg⁻¹ · min⁻¹ flow rate at 18°C to 20°C in the cited article³ but rather a 30% to 50% body full-flow rate at 18°C. Nevertheless, this issue can be easily resolved. By using the Q10 relationship, which links metabolic rate to temperature, it is possible to estimate body flow requirements at various degrees of hypothermia.

Second, the authors used 3 different ACP flow rates in every single model during DHCA. Although they adopted random order and maintained the duration of every flow rate for 15 minutes to avoid errors in the experimental design, we believe several limitations must be considered in this experimental design that might have an effect on the results as well. The model they used in this experiment was not identical with the pediatric clinical setup. It is impossible to switch different ACP flow rates at 15-minute intervals in a clinical setup during DHCA. The duration of ACP in this model should have been much longer with a varied flow rate because the total ACP time in a clinical situation is shorter than this with a consistent flow rate. Moreover, because of using 3 different flow rates in the same animal,

investigating cerebral histology after ACP is not meaningful, and thus the authors did not use histologic comparison, even though they separate brain issue. In our opinion a better experimental design would be identical with the clinical setup and repeatable, yielding results more closely aligned with clinical experience.

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PSEUDOANEURYSM OF THE MITRAL-AORTIC INTERVALVULAR FIBROSA

To the Editor:

I read with great interest the case presentation titled "Mitral-Aortic Intervallvular Fibrosa Pseudoaneurysm Resulting in the Displacement of the Left Main Coronary Artery after Aortic Valve Replacement" by Kim and Chung¹ in this *Journal*. They presented the case history of a male patient with angina and previous infectious disease in whom infective endocarditis of the aortic valve developed. Then he underwent aortic valve replacement surgery with a mechanical valve. Late after surgery, angina pectoris occurred and a large pseudoaneurysm in the mitral-aortic intervalvular fibrosa (MAIVF) was

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