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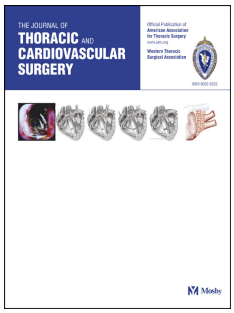

Too much of a good thing? Could we be overdoing cerebral protection in neonatal cardiac surgery.

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Too much of a good thing? Could we be overdoing cerebral protection in neonatal cardiac surgery.

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The use of deep hypothermic circulatory arrest (DHCA), first introduced by Bigalow (1), has revolutionised cardiac surgery. Nowhere is this truer than in neonatal cardiac surgery, where DHCA is used liberally for many indications including but not limited to aortic arch repair, and pulmonary vein repair. Not infrequently it is also used to provide a bloodless field even without the surgical task requiring circulatory arrest (2). The specific parameters of perfusion used in association with DHCA vary somewhat between surgeons (3). The lowest temperature, the acid base management strategy, the lowest hematocrit, and the use of selective cerebral perfusion are some of the variables that are often adjusted. The prevailing parameters are perhaps, a DHCA lowest temperature of 18 degrees Celsius, pH STAT acid base management, and no Antegrade Cerebral Perfusion (ACP). Cooling and rewarming times are also carefully controlled. The success of DHCA in the immediate outcomes is difficult to challenge (4). Postoperative gross neurological defects are rare, clinical seizures and abnormal imaging studies are frequent but reversible in the majority of patients. Subclinical seizures are detectable at a higher frequency than observable seizures. Data about the long term effects of DHCA on neurodevelopmental outcomes are scares. Perhaps the best known study in the subject, the Boston DHCA study, showed that children in whom DHCA was used had higher prevalence of neurologic abnormalities and poorer mental function at 1, 2.5 and 4 years after surgery (2) (5). In a recent study, Algra et al, studied 37 neonates undergoing cardiac surgery with DHCA with or without ACP (4). Perhaps most interesting was that 50% of the neonates had preoperative evidence of cerebral injury on MRI. There was no difference between groups with or without ACP in the development of new cerebral injury. New infarction only occurred with ACP.

It is becoming increasingly clear that the brain is at risk in children with significant congenital heart disease, before, during and after surgery; perhaps even before and during birth. However, the finding of new cerebral injury, and abnormal early neurodevelopmental parameters may indicate that we are not doing enough to protect the brain during surgery. There is however, the theoretical possibility that we are doing too much! In this issue of the Journal, Seltzer et al {ref to accompanying manuscript}, present an analysis of 21 neonates undergoing cardiac surgery with variable diagnoses to assess the correlation between the depth of suppression of brain activity achieved by hypothermia measured by continuous intraoperative EEG, and neurodevelopmental outcomes measured by the Vineland Adaptive