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CEREBRAL ISCHEMIA AND ANOXIA

CARDIAC SURGERY AND BRAIN INJURY

The incidence of perioperative brain injury after deep hypothermia with circulatory arrest was compared to that associated with low-flow cardiopulmonary bypass during repair of D-transposition of the great arteries in 171 patients operated within the first three months of age at the Children's Hospital, Boston. Circulatory arrest was associated with a higher likelihood of clinical and EEG seizures, a longer time to the recovery of normal EEG activity, and a greater release of the brain isoenzyme of creatine kinase in the first 6 hours after surgery. The duration of total circulatory arrest was of equal importance to the method of support treatment in predicting the neurologic outcomes. Clinical seizures occurred in 11% of infants with circulatory arrest, but EEG seizure activity was detected in 26%. At time of discharge, the two treatment groups were similar in overall incidence of neurologic abnormalities. (Newburger JW et al. A comparison of the perioperative neurologic effects of hypothermic circulatory arrest versus low-flow cardiopulmonary bypass in infant heart surgery. N Engl J Med Oct 7 1993;329:1057-64). (Reprints: Richard A Jonas MD, Dept of Cardiovascular Surgery, Children's Hospital, 300 Longwood Ave, Boston, MA 02115).

> **COMMENT.** The assessment of the effect of total circulatory arrest on later neurologic and developmental outcome awaits further follow-up by the neurologists who collaborated in this large prospective, randomized clinical study. In an editorial, Dr Julie A Swain of the University of Nevada outlines three mechanisms of neurologic injury in infants undergoing cardiac surgery: 1) mechanical injury from

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microemboli; 2) alterations in blood flow, distribution, and pressure; and 3) neuropsychological effects of neuroleptic drugs, anxiety, pain, and postoperative isolation. Some protection from cerebral injury is provided by hypothermia and drugs that decrease cerebral metabolism.

CEREBRAL BLOOD VOLUME AFTER BIRTH ASPHYXIA

Cerebral hemodynamics and oxygenation in 18 perinatally asphyxiated neonates were compared with 13 healthy controls using near-infrared spectroscopy (NIRS) at the Dept of Pediatrics, University Hospital of Leiden, The Netherlands. Cerebral blood volume (CBV) in the first 12 hours of life was decreased in all of 9 severely asphyxiated neonates who subsequently developed neurologic abnormalities. This decrease in CBV was associated with a drop in HbO_2 and cytochrome oxidase. All patients showed stable CBV and enzyme patterns at 12 to 24 hours,. The findings suggest that posthypoxic-ischemic reperfusion injury of the brain occurs during early neonatal life after severe birth asphyxia. (van Bel F et al. Changes in cerebral hemodynamics and oxygenation in the first 24 hours after birth asphyxia. Pediatrics Sept 1993;92:365-372). (Reprints: Frank van Bel MD,PhD, University Hospital Leiden, Neonatal Unit, Bldg 35, PO Box 9600, 2300 RC Leiden, The Netherlands).

COMMENT. The decrease in cerebral CBV, oxyhemoglobin, and cytochrome oxidase during the first 12 hours of life are indicators of decreased cerebral perfusion and oxygenation. The authors propose a possible relation between a decreased CBV and adverse neurologic outcome, suggesting a relation between cerebral hypoperfusion and brain tissue damage in severely asphyxiated neonates. NIRS may be used to monitor changes in CBV of neonates.

CEREBRAL ULTRASOUND AND NEURODEVELOPMENT

The relations between lesions detected by ultrasound brain-imaging and neurodevelopmental outcome at 8 years in a cohort of 206 very preterm infants were studied at the Department of Paediatrics, University College and Middlesex School of Medicine, London. Scans were normal at discharge from hospital in 112 (54%), and of these, 4% developed major, disabling impairment and 22% had minor impairments. Uncomplicated periventricular hemorrhage (PVH) was diagnosed in 55 (27%), ventricular dilatation in 21 (10%), hydrocephalus developed in 5, and cerebral atrophy was found in 13 (6%). Disabling neurodevelopmental impairments, including epilepsy, mental retardation and cerebral palsy, were documented in 25 children at follow-up (12%). Ventricular dilatation and cerebral atrophy were significant independent predictors of impairment of neurodevelopment, of school performance or achievement, and of the WISC-R Full-scale and Performance subscale IQs. (Roth SC, Reynolds EOR et al. Relation between ultrasound