Does Changing from Isoflurane to Desflurane Affect Cerebral Hemodynamics in Children

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Introduction: Although desflurane is known to cause cerebral vasodilation (1), it is increasingly being used as a replacement for isoflurane towards the end of neurosurgical cases in order to facilitate rapid emergence. The aim of this study was to determine the effect on middle cerebral artery blood flow velocity (Vmca) when isoflurane is replaced by desflurane during balanced anesthesia with remifentanil in children.

Methods: With REB approval and parental consent 14 healthy children aged 1-6 years and scheduled for lower body surgery will be recruited. After induction with sevoflurane in oxygen I.V. access was secured and orotracheal intubation facilitated with rocuronium 1.0 mg/kg. Pulmonary ventilation was achieved with 35% oxygen in air at pressures of 15/0 cmH2O, rate adjusted to an EtCO2 35 mmHg. Anesthesia was maintained with remifentanil (0.5 mcg/Kg bolus followed by an infusion of 0.2 mcg/Kg/min), and either a sequence of Isoflurane 1 MAC / Desflurane 1 MAC / Isoflurane 1 MAC or Desflurane 1 MAC / Isoflurane 1 MAC / Desflurane 1 MAC. The sequence of inhalational agent administration was randomly allocated. Caudal epidural analgesia was performed with plain 0.25% bupivacaine 1.0 ml/kg. Normovolemia, normotension and normothermia were maintained. Vmca was measured using transcranial Doppler sonography. Measurements were taken 30 mins after establishing the caudal block and repeated 30 mins after each change in maintenance agent. Each set of measurements was recorded 3 times, 30 seconds apart and included Vmca, heart rate (HR) and mean arterial pressure (MAP). An investigator unaware of the sequence of agents analyzed the data. All parametric data are expressed as a mean ±SD. Student's unpaired t-test, repeated measures ANOVA and Tukey-Kramer test were used where appropriate. P<0.05 was accepted as significant.

Results: 14 patients have been studied to-date, with a mean age and weight of 22.0 ±/− 14.2 months and 11.5 ±/− 3.3 Kg, respectively. The Vmca did not vary significantly when isoflurane was changed to desflurane during balanced anesthesia in normal children (Fig). All other variables remained stable throughout the study period.

Conclusion: In order to facilitate rapid emergence from anesthesia in children, changing from isoflurane to desflurane towards the end of a case may be suitable as cerebral blood flow velocity remains stable. This may have important implications in pediatric neuroanesthesia.

References: