Prevalence of Isoelectric Electroencephalography Events in Infants and Young Children Undergoing General Anesthesia

Yuan et al. Anesth Analg 2019. doi: 10.1213/ANE.0000000000004221

BACKGROUND: In infants and young children, anesthetic dosing is based on population pharmacokinetics and patient hemodynamics not on patient-specific brain activity. Electroencephalography (EEG) provides insight into brain activity during anesthesia. The primary goal of this prospective observational pilot study was to assess the prevalence of isoelectric EEG events—a sign of deep anesthesia—in infants and young children undergoing general anesthesia using sevoflurane or propofol infusion for maintenance.

METHODS: Children 0–37 months of age requiring general anesthesia for surgery excluding cardiac, intracranial, and emergency cases were enrolled by age: 0–3, 4–6, 7–12, 13–18, and 19–37 months. Anesthesia was maintained with sevoflurane or propofol infusion. EEG was recorded from induction to extubation. Isoelectric EEG events (amplitude <20 μV, lasting ≥2 seconds) were characterized by occurrence, number, duration, and percent of isoelectric EEG time over anesthetic time. Associations with patient demographics, anesthetic, and surgical factors were determined.

RESULTS: Isoelectric events were observed in 63% (32/51) (95% confidence interval [CI], 49%–76%) of patients. The median (interquartile range [IQR]) number of isoelectric events per patient was 3 (0–31), cumulative isoelectric time per patient was 12 seconds (0–142 seconds), isoelectric time per event was 3 seconds (0–4 seconds), and percent of total isoelectric over anesthetic time was 0.1% (0%–2.2%). The greatest proportion of isoelectric events occurred between induction and incision. Isoelectric events were associated with higher American Society of Anesthesiologists (ASA) physical status, propofol bolus, endotracheal tube use, and lower arterial pressure during surgical phase.

CONCLUSIONS: Isoelectric EEG events were common in infants and young children undergoing sevoflurane or propofol anesthesia. Although the clinical significance of these events remains uncertain, they suggest that dosing based on population pharmacokinetics and patient hemodynamics is often associated with unnecessary deep anesthesia during surgical procedures.