Volatile sedation in children following congenital cardiac surgery is safe and efficient – a case series

Menzel C. (1), Germund I. (1), Trieschmann U. (2)
Department of Pediatric Cardiology, University Hospital of Cologne / Germany (1); Department of Anesthesiology, University Hospital of Cologne / Germany (2)

Introduction: Spontaneous breathing is essential in children following congenital cardiac surgery – especially with (Hemi-)Fontan circulation or restrictive right ventricular physiology. However, sedation with conventional drugs as benzodiazepines and opioids, regularly impedes appropriate spontaneous breathing. Volatile sedatives (e.g. Isoflurane), applied by the AnaConDa® device, allow reduction of other sedatives and facilitate spontaneous breathing. Isoflurane is a halogenated hydrocarbon, major side effects are systemic vasodilation and potentially elevated fluoride levels. Effects on neurological outcome remain unclear, thus it is a final rescue option if other sedative drugs fail. Aim of our study was to analyze spontaneous breathing and the safety of this method.

Patients: Retrospective analysis of the electronic records of 12 children (5 with Fontan, 2 with Hemifontan, 5 with restrictive RV) with prolonged or difficult sedation following congenital cardiac surgery. Analysis of (1) time to achieve spontaneous breathing and extubation, (2) hemodynamic and metabolic parameters, (3) doses of conventional sedatives and (4) fluoride levels (before starting isoflurane, after 48h and afterwards weekly). As volatile anesthetics are not licensed for sedation in children parental consent was obtained.

Results: Age 2-30 months. Median duration prior to Isoflurane sedation: 6,8 days, median duration of Isoflurane sedation: 7,9 days. Patients with >50% spontaneous breathing: 29% after 6 hours and 50% after 18 hours. Extubation: 6 patients within 1 hour, 3 patients within 3 hours and 10 patients within 8 hours. Stable hemodynamics (MAP: +1%±21%, heart rate: -10%±30% after 120min), ScvO2, lactate levels, urine output and inotropic indeces. Withdrawal of all conventional sedatives and dose reduction of opioids. Fluoride levels <30 µmol/l (median 12 µmol/l). No relevant side effects.

Conclusions: Volatile sedation provides initiation of effective spontaneous breathing and timely extubation in patients with congenital heart disease and prolonged or difficult sedation. Hemodynamics remained stable, fluoride levels were low during and after therapy. However, sedation with Isoflurane remains a rescue option as its effects on long-term neurologic outcome are unknown. Further investigations concerning this topic are necessary.

References: