Desflurane is Superior to Opioid Anesthesia for Cardiac Shunt Procedures in Infants with Cyanotic Congenital Heart Disease

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**ABSTRACT**

- **Introduction**: Placement of a Blalock-Taussig(BT) shunt is frequently performed for palliation of cyanotic congenital heart disease (CCHD). Inhalational anesthetics, when used in adult heart surgery, offer advantages of myocardial protection and decreased use of inotropes, duration of ventilation, ICU and hospital length of stay (LOS). There is little literature, however, in the comparative use of inhalational and narcotic anesthesia in CCHD.

- **Materials and methods**: Following IRB approval and parental consent, we prospectively randomized 35 patients presenting for BT shunt to receive either desflurane anesthetic or a narcotic anesthetic. Induction was performed with 5-7% sevoflurane in 100% oxygen, 2ug/kg fentanyl, 0.05mg/kg midazolam and 0.1mg/kg vecuronium. After intubation, patients in the narcotic group (n=16) received an additional 5-15ug/kg fentanyl, 0.1mg/kg midazolam, 100% oxygen and vecuronium. Patients in the inhalational group (n=19) received desflurane, 0.6-1 MAC, 100% oxygen, 0.1mg/kg midazolam, IV paracetamol 15mg/kg and vecuronium. At the end of surgery, patients were transferred to the ICU and received IV paracetamol and midazolam. Ventilation was weaned when the patient was hemodynamically stable. Demographics, baseline, intra and post-op heart rate, duration of intropoe use, ICU and hospital LOS, pre and post-op creatinine and serious adverse events (SAE) were recorded. Data were analyzed using Student, paired t, Mann-Whitney U and Chi square/Fisher exact tests, p<0.05 significant.

**RESULTS**

**MATERIALS AND METHODS**

- IRB approved
- Prospective, randomized
- 35 Patients undergoing BT Shunt on CPB
- Sevoflurane induction in oxygen, fentanyl 1mcg/kg
- Patients in the opioid (n=16) group received an additional 5-10 mcg/kg fentanyl, 0.1mg/kg midazolam, 100% oxygen and vecuronium as needed for muscle relaxation. In the desflurane group (n=19), anestheisia was maintained with desflurane at 0.6 - 1 MAC in 100 % oxygen, 0.05 mg/kg midazolam, 1-2 mcg/kg fentanyl and vecuronium as needed for muscle relaxation.

- Transported ventilated to ICU and weaned when hemodynamically stable.
- Demographics, baseline, intra and post-op heart rate, duration of intropoe use, ICU and hospital LOS, pre and post-op creatinine and serious adverse events (SAE) were recorded.
- Data were analyzed using Student, paired t, Mann-Whitney U and Chi square/Fisher exact tests, p<0.05 significant.

**CONCLUSIONS**

Opioid with fentanyl, midazolam and non-depolarizing muscle relaxant is an established and accepted technique for BT shunt and other cardiac surgeries, but has disadvantages of prolonged mechanical ventilation, potential shunt compromise secondary to positive pressure ventilation and prolonged ICU stay. Our study demonstrates the use of desflurane along with low dose fentanyl is a favorable alternative to the high dose fentanyl, benzodiazepine combination. Possible cardioprotective and renal protective effects of desflurane in the pediatric population should be further studied.