Vasoparalytic Sevoflurane-based Induction is Hyperoxygenating Developing Brains: A Follow up Comparative Study with Vasoactively-Neutral Fentanyl-based Induction

Maria M Zestos MD, Deepak Gupta MD, Jaspreet Sangha MD, Edward Kaminski MD, Eric Nowicki MSII

Department of Pediatric Anesthesiology, Children’s Hospital of Michigan, Detroit, Michigan

Background
• In an earlier report with very small number of patients (n=11), we had shown that inhalational induction with sevoflurane induces relative cerebral tissue “hyperoxia” when compared with intravenous induction [1].
• The concerns with “hyperoxia” related cerebral injury may include neuroapoptosis [2].
• Fentanyl-based intravenous induction is more often utilized in very small and young, or non-elective cardiac surgery.

The objective for the ongoing retrospective analysis is
• To identify differences (over time) in cerebral tissue oxygenation when induction of anesthesia is performed with vasoparalytic agent (sevoflurane) vs. vasoactively-neutral agent (fentanyl).

Methods
• After institutional review board approval, Computer data of tissue oximetry is being accessed in pediatric cardiac surgery patients for a five year period.
• Data is being compared between fentanyl-induction patients and sevoflurane-induction patients after excluding patients who did not receive either types of induction.
• Changes from baseline (pre-induction values) in cerebral tissue oximetry and renal (somatic) tissue oximetry are being compared at different points of recorded times till 254 minutes from the baseline.
• (Primarily a Pre-CPB period in our patients)

Results
• Patients’ demographics are listed in Table 1.
• As compared to fentanyl, significant cerebral tissue hyperoxia (p=0.036) and renal (somatic) tissue hyperoxia (p=0.0027; may be related to higher baseline values) occurred with sevoflurane.
• Across the observation period, absolute oximetry numbers were significantly different (Figure 1) but percent changes from the baseline were insignificantly different (Figure 2).

Conclusion
In comparison to intravenous induction with vasoactively-neutral fentanyl, inhalational induction with vasoparalytic sevoflurane is hyperoxygenating developing brains.

References

Figures 1 and 2; Table 1

Methods

Results

In comparison to intravenous induction with vasoactively-neutral fentanyl, inhalational induction with vasoparalytic sevoflurane is hyperoxygenating developing brains.

References

Figures 1 and 2; Table 1