

[GA1-48] Low Sevoflurane Concentration Anesthesia Technique for Young Children Undergoing Adenoidectomy or Adenotonsillectomy

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Background: There are concerns that inhalation anesthetics have a dose-related effect on the developing brain (1-2). Anesthetic gas exposures are quantified in MAC-hours, defined by the minimum alveolar concentration that prevents movement from a noxious stimulus in 50% of subjects (MAC) for 1 hour (3). In the absence of clear-cut evidence proving a neurotoxic effect from inhalation anesthetics, it may be prudent to reduce anesthetic gas exposure by utilizing alternative anesthetics in order to reduce exposure to neuro-apoptotic. Some anesthesiologists at the Texas Children's Hospital have used dexmedetomidine and remifentanyl to this end in the high-risk pediatric population.

Method: In this IRB approved study we performed a retrospective chart review of children less than 5 years old who had undergone adenoidectomy or tonsillectomy with/without adenoidectomy from June 1, 2012 to March 30, 2013 at TCH while receiving either standard sevoflurane concentration anesthesia (SSCA) or low sevoflurane concentration anesthesia (LSCA) with dexmedetomidine and remifentanyl. Data were collected from the automated anesthesia records. Thirty patients (15 for adenoidectomy and 15 for tonsillectomy) in each anesthesia group were randomly chosen from the primary data pool of each anesthesia group. The recorded end-tidal sevoflurane concentration at 1 minute intervals was extracted from medical records along with the duration of the procedure. The MAC-hour exposure was calculated using the age-related MAC and duration of exposure. Student T-test was used to detect any significant differences between the two groups and Chi square was used for categorical value. $P < 0.05$ was considered statistically significant.

Result: There were no significant differences in age, weight, ASA status and surgery time between LSCA and SSCA group. However, anesthesia time was shorter in LSCA group comparing to SSCA group. The mean sevoflurane concentration, peak sevoflurane concentration and MAC-hours in LSCA group were significantly lower than SSCA (Table 1).

Conclusion: LSCA technique can effectively decrease the dose of sevoflurane used for adenoidectomy and tonsillectomy with/without adenoidectomy. A future prospective randomized clinical trial is required to confirm the safety and efficacy of the LSCA technique.

Reference:

- 1.Jevtovic-Todorovic V. J Neurosci 2003 Feb 1;23(3):876-82.
- 2.Ing C. Pediatrics 2012 Sep;130(3):e476-e485.
- 3.Mapleson WW. Br J Anaesth 1996 Feb;76(2):179-85.

Table 1. Demographic information, anesthesia time and surgery time, as well as usage of Sevoflurane during the Surgery

	Low Sevoflurane Concentration Anesthesia	Standard Sevoflurane Concentration Anesthesia	P value
Age (years)	3.0+/-1.2	3.3+/-1.2	0.361
Weight (kg)	14.7+/-3.3	15.5+/-4.0	0.433
ASA Status			0.424
1	4	2	
2	25	28	
3	1	0	
Anesthesia Time (minutes)	29.9 +/-9.1	38.4+/-13.0	0.005
Surgery Time (minutes)	14.8+/-13.3	18.7+/-6.6	0.155
Mean Sevoflurane Concentration (%)	1.9+/-0.3	2.9+/-0.5	<0.001
Peak Sevoflurane Concentration (%)	4.2+/-0.8	5.8+/-0.6	<0.001
MAC-Hours from Sevoflurane (MAC-hours)	0.4+/-0.1	0.8+/-0.2	<0.001