Assessment of Exhaled Nitric Oxide in the Pediatric Population

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PURPOSE:

This study evaluated the correlation between fractional exhaled nitric oxide (FeNO) levels and preoperative reactive airway disease, as well as breathing-related conditions. The study also helps to establish a baseline for future FeNO research in pediatric populations.

INTRODUCTION:

-Nitric oxide (NO) is synthesized in the bronchial epithelium and serves as a key clinical indicator of airway inflammation.
-Elevated levels of fractional exhaled nitric oxide (FeNO) are associated with the presence and severity of reactive airway disease in both pediatric and adult populations.
-A large population of pediatric patients undergoing GA for dental rehabilitation present with undiagnosed or inadequately managed respiratory disease, resulting in complications.
-FeNO levels are used rarely as a diagnostic tool in the pediatric population due to cooperation requirements.
-This study establishes a reliable method to evaluate FeNO levels in children under 7 with baseline readings for future studies.

MATERIALS AND METHODS:

-Three liters of exhaled breath were captured from 42 patients (ages 2–7 years) using a modified Jackson Rees breathing circuit with additional plastic tubing and HEPA filter.
-Samples were analyzed via a commercial NO measuring instrument (NIOX VERO® Morrisville, North Carolina) and FeNO concentrations were recorded.
-Statistical analysis included patient age and medical history.

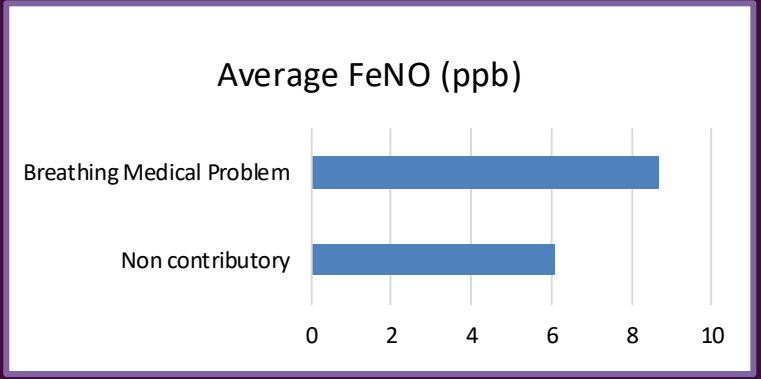

Figure 1. FeNO levels of patients stratified by contributory vs non-contributory medical history (asthma, laryngomalacia, etc.). Mean FeNO levels were 8.688 ppb vs. 6.077 ppb; *p = 0.012*.

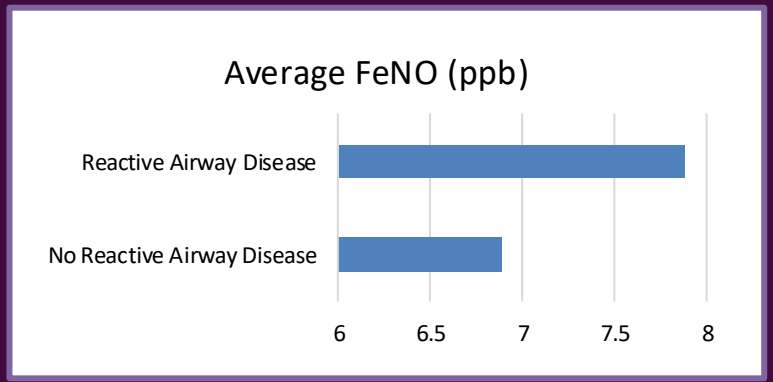

Figure 2. FeNO levels of patients stratified by known/suspected reactive airway disease (active cough or illness, albuterol prescription without a formal diagnosis, etc.). Mean 7.875 ppb vs. 6.882 ppb; *p= 0.030.*

RESULTS:

-Total patients in the sample: 42 patients (22 males, 20 females)
-26 patients had noncontributory medical histories, 16 had medical histories significant for breathing-related conditions, and 8 had known reactive airway disease.
-FeNO levels were significantly higher in those with contributory medical histories compared to those without (Figure 1).
    *mean 8.688 ppb vs. 6.077 ppb; *p = 0.012*
-FeNO levels were significantly higher in those with known or suspected reactive airway disease; e.g., active cough or illness, albuterol prescription without a formal diagnosis, etc. (Figure 2)
    * mean 7.875 ppb vs. 6.882 ppb; *p= 0.030*
-When analysis was limited to patients with known reactive airway disease alone, the difference in FeNO levels was not statistically significant.

CONCLUSIONS:

-Results are consistent with expectations that higher FeNO values (which are known inflammatory markers) are associated with patients who have either a reactive airway disease or contributory medical diagnoses.
-These findings support the development of FeNO as a valuable screening tool prior to anesthesia administration in children.
-This study provides a foundational baseline for pediatric FeNO readings for further studies.

REFERENCES:

-Petkova et al., (2025, May 1-3) *Assessing Exhaled Nitric Oxide as a Predictor of Airway Complications in Pediatric Anesthesia: A Pilot Study* [Poster Presentation] American Society of Dental Anesthesiologists Annual Session, San Diego, CA 92109

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