**Successful treatment in refractory status asthmaticus with isoflurane in three pediatric patients**

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We report the use of inhaled isoflurane for the successful treatment of three pediatric patients with status asthmaticus who were refractory to usual medical management.

**Case Series**

1. A 13-year-old female with H1N1 presented with status asthmaticus
   - refractory to albuterol, terbutaline, magnesium sulfate, and Heliox
   - developed theophylline toxicity
   - deteriorated rapidly requiring intubation and mechanical ventilation
   - Isoflurane titrated to 1.5% with dramatic improvement in arterial CO2 and exhaled tidal volumes
   - She remained intubated and required isoflurane for 17 days before successfully weaning
   - No side effect noted from isoflurane

2. A 3-year-old male with a tracheostomy admitted with status asthmaticus
   - refractory to pulse steroids, continuous albuterol, terbutaline, Heliox, magnesium sulfate
   - Isoflurane titrated to 1.2% and he was rapidly weaned down to his baseline ventilator setting
   - He remained ventilator and isoflurane dependent for 16 days
   - No side effect noted from isoflurane

3. A previously healthy 2-year-old male with Respiratory Syncytial Virus and status asthmaticus
   - After emergent intubation in the operating room, he initially responded to conventional treatment
   - developed acute respiratory distress with an oxygen saturation as low as 8%
   - Started on isoflurane at 1.1% with a marked improvement in ventilation
   - on isoflurane for 3 days before he was successfully weaned off and exubated
   - developed mild hypotension likely from the vasodilatory effect of isoflurane

Isoflurane is a life-saving treatment for refractory status asthmaticus with few side effects.

**Introduction**

Asthma, a chronic respiratory disease characterized by lower airway obstruction
- intermittent airway inflammation, bronchoconstriction, hyper-responsiveness

Acute Respiratory failure refractory to aggressive medical therapy is rare
- ~2% of pediatric patients hospitalized for asthma require mechanical ventilation
- Heavy sedation and paralysis may facilitate ventilation but have no bronchodilator effects
- For refractory status asthmaticus, isoflurane can therefore be useful

**Epidemiology**

In the US:
- 9.4% of children are affected by asthma
- 20.5 million missed school days, 14.2 work days missed due to asthma
- > 1.9 million asthma-related emergency department visits and hospitalizations/year

**Treatment options**

First line: Inhaled beta-adrenergic agonists and corticosteroids
Second line: epinephrine, magnesium sulfate, aminophylline, anticholinergic agents, intravenous beta-adrenergic agonists, ketamine, and/or a helium-oxygen mixture (Heliox)

**Inhaled volatile anesthetics: Isoflurane**

- Produces sustained bronchodilatation, proposed mechanisms (3):
  - i3-adrenergic receptor stimulation
  - direct relaxation of bronchial smooth muscle
  - antagonism of the action of acetylcholine and histamine
  - Interference with hypocapnic bronchoconstriction
- Acts rapidly and can be life saving for those in status asthmaticus
- Has not been shown to produce life threatening arrhythmia or fluoride toxicity
- Side effect: dose dependent hypotension by peripheral vasodilation

References