

**Title:** The use of dexmedetomidine during laryngoscopy, bronchoscopy, and tracheal extubation following tracheal reconstruction

**Author(s):** JL Seybold, RJ Ramamurthi, GB Hammer

**Affiliation(s):** Stanford University School of Medicine, Stanford, CA

## **ABSTRACT BODY:**

### **Introduction**

Dexmedetomidine is a highly specific and potent alpha-2-adrenergic agonist that is approved for short-term sedation of adult patients in the intensive care unit, but not for use in children. We report the first use of dexmedetomidine in pediatric patients to facilitate direct laryngoscopy and rigid bronchoscopy in the operating room one week after tracheal reconstruction surgery. Dexmedetomidine provided ideal conditions for tracheal extubation, specifically an awake, cooperative and spontaneously ventilating child tolerating the presence of an endotracheal tube with blunted airway reflexes.

### **Case report #1**

The patient was a two year-old girl with a history of asthma, gastro-esophageal reflux disease (GERD), seizures, and severe developmental delay, who developed severe subglottic stenosis as a complication of prolonged mechanical ventilation. She was re-admitted for tracheal reconstruction surgery, after which she was mechanically ventilated for 7 days in the PICU. One day prior to bronchoscopy and tracheal decannulation in the OR, propofol and dexmedetomidine infusions were started. In the operating room surgical anesthesia was maintained with propofol  $250 \text{ mcg kg}^{-1} \text{ min}^{-1}$  and dexmedetomidine  $2.5 \text{ mcg kg}^{-1} \text{ hr}^{-1}$ . The patient maintained spontaneous ventilation with  $\text{SpO}_2$  99-100% with an  $\text{FiO}_2$  of 0.3 and end-tidal  $\text{CO}_2$  of 40-45 mmHg. Initial HR and BP were 87 and 104/70, respectively, with a maximal rise of HR to 110 and BP to the 120/80 during the procedure. After laryngoscopy and rigid bronchoscopy, the propofol and dexmedetomidine infusions were discontinued and the patient was extubated without incident. She remained arousable with intact airway reflexes but sedated for several hours after her transfer back to the PICU with stable vital signs throughout.

### **Case report #2**

This patient was a five year-old boy with a history of developmental delay, spasticity, corpus callosum agenesis, von Willenbrand's disease, GERD, bronchopulmonary dysplasia, and congenital tracheomalacia with tracheostomy tube dependence. Following uneventful surgery for tracheal reconstruction, fentanyl, lorazepam, and dexmedetomidine were administered by continuous infusion for sedation and analgesia in the PICU for 7 days. Dexmedetomidine was maintained at a dose of  $2.5 \text{ mcg kg}^{-1} \text{ hr}^{-1}$  for 6 hours prior to surgery without a loading dose and a propofol infusion was initiated at a dose of  $200 \text{ mcg kg}^{-1} \text{ min}^{-1}$  immediately prior to surgery. The child was breathing spontaneously during laryngoscopy and rigid bronchoscopy. Following bronchoscopy, his trachea was extubated. The patient maintained spontaneous ventilation with stable  $\text{SpO}_2$  (98-100%), end-tidal  $\text{CO}_2$  (44-46), and blood pressure throughout. He remained sedated for over two hours after his transfer back to the PICU, and required no additional sedative or analgesic medications.

### **Discussion**

Laryngoscopy and rigid bronchoscopy are brief but intensely stimulating procedures and present a challenge for anesthetic management. Anesthetic goals include spontaneous breathing with minimal airway secretions, stable hemodynamics and a rapid recovery of airway reflexes at the end of the procedure. We report the efficacious use of dexmedetomidine in combination with propofol during laryngoscopy and bronchoscopy in two complicated pediatric patients. Both of these children had severe agitation in the PICU following tracheal reconstruction that was resistant to multiple sedative and analgesic agents. Dexmedetomidine provided sedation for at least 2 hours after the termination of the infusion, and neither patient required additional sedative or analgesic medications in the immediate post-operative period.

With its potent analgesic, sedative, anxiolytic and anti-sialogogue properties (1), dexmedetomidine may be a useful agent for brief airway procedures in children. Remifentanyl, ketamine, and propofol are commonly used for these procedures. Spontaneous breathing may be difficult to maintain with remifentanyl, however, and significant hypercarbia may occur. Ketamine is associated with hyper-salivation, tachycardia, hypertension, nightmares, and emergence delirium. Neither the sympatholytic effects of dexmedetomidine leading to hypotension and bradycardia or rebound hypertension upon withdrawal of this medication were observed in our two cases.

### **Refs**

1. Gertler R et al. Proc (Bayl Univ Med Center). 2001.