

Sugammadex to reverse neuromuscular blockade in an unexpected cannot intubate/cannot ventilate situation in an 850 gram premature infant

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Case

An 850 gram premature infant presented to the operating room for exploratory laparotomy and repair of ileal atresia. Induction of anesthesia began with 2 mg of propofol and neuromuscular blockade was achieved with 1 mg of rocuronium. Mask ventilation was initially easy. Direct laryngoscopy (DL) with a Miller 00 blade revealed no view of the glottic structures. The infant experienced rapid oxyhemoglobin desaturation and mask ventilation became very difficult with an oral airway and significant jaw thrust. Second DL by the attending anesthesiologist again revealed a grade IV view and help was requested. Mask ventilation between attempts continued to be very difficult. Oxygen saturation fell to 50%, and mask ventilation became impossible. The smallest laryngeal mask airway was too large for the infant and the smallest fiberoptic scope too large to pass through an appropriately sized ETT.

Emergent tracheostomy was planned by general surgery as ENT was in route to the hospital. In the meantime, 16 mg/kg of sugammadex was administered. The infant resumed spontaneous ventilation immediately after and could maintain normal oxygenation on 100% FIO₂ by face mask. Otolaryngology performed direct laryngoscopy and bronchoscopy (DLB), which revealed a 2b view with an edematous glottis and severe long segment tracheomalacia (Figure 1). Following intubation, she proved to be difficult to oxygenate and ventilate, until the positive end-expiratory pressure (PEEP) was titrated to 10 cm H₂O. No adverse reactions were noted due to sugammadex administration.

Discussion

Sugammadex is a novel reversal agent for the neuromuscular blocking agents rocuronium and vecuronium. The FDA approved it for use in adults in 2015 but it has yet to be approved for pediatric patients. The drug encapsulates the neuromuscular blocking agent and the drug complex is renally excreted. Sugammadex has been shown to rapidly and completely reverse neuromuscular blockade, even when the blockade is profound.¹ Few case reports and studies have described the use of sugammadex in neonates to reverse neuromuscular blockade.²⁻⁵ On review of the published literature, no studies have described the use of sugammadex in an extremely low birthweight premature neonate, nor for reversal of neuromuscular block in a neonate in a cannot intubate/cannot ventilate situation. In our patient, the use of sugammadex was likely a life-saving intervention. Due to the size of the infant, it is unclear if a tracheostomy would have been feasible or effective.

Our case also highlights the difficulty in ventilating and oxygenating a patient with severe, long-segment tracheomalacia even after securing the airway. A previous study has shown that increasing levels of continuous positive airway pressure (CPAP) improves forced expiratory flows at functional residual capacity (FRC) primarily by increasing lung volume.⁷ CPAP has also been shown to improve airway patency in patients with severe bronchomalacia as evidenced by an improved airway caliber on bronchoscopic exam as well as improvement of clinical symptoms.⁸ Coincident with these findings, we were unable to normalize our patient's oxygenation and ventilation until PEEP was titrated to 10 cm H₂O.

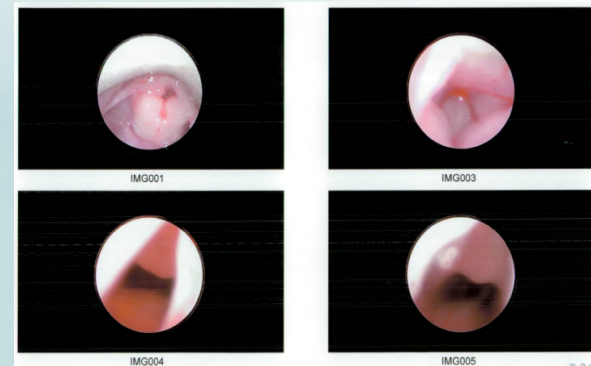


Figure 1: Findings from bronchoscopy revealing a swollen epiglottis with partial view of the vocal cords, and severe tracheomalacia.

References

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