

Risk Management Claim involving “In the Field” Endotracheal Intubation

Review and Comments by Kirk Gilmore, M.D. Emergency Physician UMIA Risk Management and Underwriting Committees and RM Program Breakout Presenter

A recent liability claim involving a UMIA’s insured physician reminds all physicians treating patients with respiratory distress and needing intubation of the importance of assuring proper endotracheal tube position.

Case History

An 18 month old male toddler with a two day history of viral-like symptoms being tended by his grandmother had a generalized tonic-clonic seizure that lasted “for several minutes” during which he “turned blue”. On arrival, EMS found the child with a heart rate of 150 bpm and O₂ saturations in the 70-80 %’s. EMS gave the child intra-nasal Versed for the seizure and Benadryl and epinephrine intravenously because of a red rash and a concern the seizure resulted from an allergic reaction. Airway management consisted of initial bagging and then intubation in field with a 3-0 uncuffed oral tracheal tube. EMS noted they were “quite certain he had aspirated”. Following a short transport to a community hospital, a seasoned emergency physician evaluated him. Initial vital signs indicated a tachycardia at 154 bpm, saturation at 64% and a temperature of 103.6 F. Because the saturations hovered between 70-80%, the endotracheal tube position verified by visual inspection and judged to be properly in place. The low saturations were attributed to “aspiration”. End tidal CO₂ was not done. A chest radiograph suggested a right mainstem bronchus intubation, and a large stomach bubble also noted. A large air leak around the tube also noted. Auscultation exam showed diminished breath sounds and the stomach distended “presumably from air”. Suction proved difficult because the child was biting the ET tube. Following administration of succinylcholine, the tube withdrawn slightly. Additional Versed administered after another seizure after which he immediately became bradycardic at 60 bpm and desaturated to the 50% range. CPR was started.

The physician consulted with a tertiary care pediatric facility following which a medical helicopter arrived within ten minutes. The flight nurse noted no breath sounds, removed the 3-0 oral tracheal tube and bagged the child, then re-intubated him with a 3.5 cuffed oral tracheal tube. The heart rate responded becoming again tachycardic and saturations improved from 42% to 99% within three minutes. End tidal CO₂ was initially 28 after re-intubation and on transport was noted to be 30.

After a 48 hour stay in the pediatric intensive care unit a nuclear cerebral blood flow study showed no flow. The child was declared brain dead and taken off the ventilator.

Discussion:

This tragic case highlights several crucial points in the “in field” intubated patient. As noted in recent studies [1,2,3] EMS infield intubation is frequently misplaced (up to 25% in one study[1]) and requires all receiving emergency staff to assure proper endotracheal tube placement. It is important to note that the vast majority of arrest situations involving

children are related to a respiratory cause, unlike the multiple possible etiologies in the adult population.

In hindsight there are several clues that could have indicated a misplaced endotracheal tube in this case. The large air leak, the presence of a large gastric bubble and absent breath sounds may have been discounted by the direct visualization which had been done. End tidal CO₂ monitoring is helpful in confirming proper placement and if available should be done on every patient so presenting. The clinical scenario of immediate deterioration of saturations and bradycardia after the administration of succinylcholine should raise immediate concern for the child's ventilation and airway status.

Here is a useful mnemonic to remind us of utilizing EVERY available resource to confirm that EVERY endotracheal tube is in position:

E: Examination: Chest expansion with assisted breathing; auscultation of lung fields and epigastrium.

V: Visual inspection of the endotracheal tube with laryngoscope, noting definitively, the tube between the cords. Also is the tube fogging with assisted breaths?

E: End tidal CO₂: These small devices should be present in every ER and ICU. Knowledge of their use by emergency and respiratory staff is essential.

RY: Radiography: Chest x-ray confirmed by both the acute care physician and the radiologist.

An excellent review of the dilemma of out-of-hospital endotracheal intubation is published in the June 2006 Annals of Emergency Medicine along with an accompanying editorial.

Summary:

Assurance of a protected airway will always be the first priority for every emergency patient presenting in an arrest, trauma or medical condition with altered mental status. The vast majority of pediatric arrest scenarios involve primarily the airway. In field intubations are frequently misplaced. Treating acute care physicians should use all of their clinical skills as well as saturation status and radiographs to assure EVERY endotracheal tube is correctly placed and the patient well ventilated. End tidal CO₂ monitoring should be available in all emergency departments and provides a valuable resource in this challenging patient population.

References:

- 1) Katz SH, Falk JL; Annals of Emergency Medicine 2001; 37:32-37
- 2) Silvestri S, Rallas GA; Annals of Emergency Medicine 2005; 45:497-503
- 3 Jemmett ME, Kendal KM; Academic Emergency Medicine 2003; 10:961-965