Securing a Definitive Airway After Pre-Hospital Supraglottic Rescue Airway Insertion

Ryan M. Antiel, MD, MSME; Matthew C. Hernandez, MD; Karthik Balakrishnan, MD, MPH; Martin D. Zielinski, MD; Denise Klinkner, MD

1Department of Pediatric Surgery; 2Department of Trauma, Critical Care and General Surgery; 3Department of Otolaryngology
Mayo Clinic, Rochester, MN

Introduction
Several methods are available to prehospital providers to maintain patient ventilation and oxygenation including bag valve mask (BVM) ventilation, direct laryngoscopy with endotracheal intubation (ETI) and other supraglottic airway devices such as the laryngeal mask airway (LMA), Combitube, and King Airway Device (King LT-D) King Systems, Noblesville, IN). Many of these approaches have disadvantages including limited oxygenation and ventilation, obstructed tracheal access for the insertion of a supraglottic airway, difficulty with endotracheal tube intubation, and potential complications from insertion. In addition, the ability to secure a definitive airway is often not possible with these methods.

Methods

Patients
From 2015–2016 we performed a single center retrospective study examining patients ≤18 years old with multisystem trauma defined as an Injury Severity Score of ≥9 that necessitated prehospital insertion of a supraglottic rescue airway (patients receiving only a King Airway Device, King LT-D, Noblesville, IN). Patients were identified from the Mayo Clinic Trauma Center database. Institutional review board approval was obtained prior to data generation and analysis.

Outcomes
The primary outcome for this study was need for tracheostomy. Patient demographics, transportation method and duration, traumatic mechanism, trauma severity (ISS and abbreviated injury scores (AIS)), admission vital signs (heart rate, respiratory rate, systolic and diastolic blood pressure and oxygen saturation), Glasgow Coma Score (GCS), 24-hour and overall mortality, frequency and type of prehospital airway complications, and number of prehospital airway attempts, durations of intensive care, mechanical ventilation and overall hospital stay were abstracted from the electronic record.

Results

• 17 patients met inclusion criteria, 76% were male.
• Median age [Q1,Q3] was [10,17] years.
• Mechanism of injury included MVC (47%), Drowning (18%), and Asphyxiation (12%).
• Median ISS was 26 [25,43], median AIS for head, facial and cervical spine were 5 [4,5], 0 [0-2] and 0 [0-0] respectively. The median [Q1,Q3] transport duration was 2 [12-13] minutes.
• Patient demographics and characteristics are summarized in Table 1.
• Among the 17 patients, the indications for supraglottic rescue airway were multiple failed intubation attempts (n=12) and multiple failed attempts with poor visualization (n=5).
• Median number of prehospital endotracheal intubation attempts was 2 [1,3].
• Definitive airway approaches included tracheostomy (n=23, 79%) and direct laryngoscopy (n=12, 71%).
• Patients that necessitated a tracheostomy compared to endotracheal tube exchange demonstrated increased prehospital airway complication rates (88% versus 17%, p=0.01) and median number of attempts at endotracheal tube intubation (3 versus 2, p=0.01) Table 1.
• The 24-hour mortality rate was 35% and this was significantly greater in patients patient receiving endotracheal tube (n=5, 42%) versus surgical tracheostomy (n=11, 20%) for definitive airways (p=0.01).

Conclusions
A supraglottic airway device is a fast and reliable means to secure a difficult prehospital airway.
• Patient factors such as increased craniofacial injury patterns, the number of attempts at endotracheal intubation prior to supraglottic airway deployment, and prehospital airway complications were all associated with decision to convert to tracheostomy.
• Future research is necessary to compare similarly injured patients with airway control provided by BVM and subsequent intubation in a hospital setting to those with prehospital supraglottic airway insertion.

References