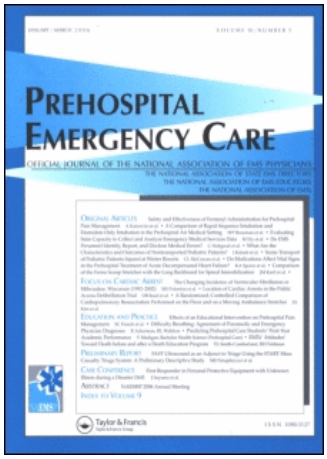

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Rapid Sequence Airway (RSA) - A Novel Approach To Prehospital Airway Management

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CASE CONFERENCE

RAPID SEQUENCE AIRWAY (RSA)– A NOVEL APPROACH TO PREHOSPITAL AIRWAY MANAGEMENT

Darren Braude, MD, EMT-P, Michael Richards, MD, MPA

ABSTRACT

This article presents a case in which an air medical flight crew encountered a potentially difficult airway when a trauma patient deteriorated in-flight. The crew elected to sedate and paralyze the patient and place a laryngeal mask airway without a prior attempt at direct laryngoscopy and endotracheal intubation. The term Rapid Sequence Airway (RSA) is coined for this novel approach. This article describes and supports this concept and provides definitions of alternative and failed airways. **Key words:** prehospital; airway management; air medical.

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CASE REPORT

At 18:09, two of our helicopters were dispatched to the remote scene of a motor vehicle collision involving a tractor-trailer and a sport-utility vehicle. The first-arriving crew, composed of two flight nurses, was asked to care for a 42-year-old male who was an unrestrained passenger in the back of the SUV and was being extricated. The patient was noted to be alert and oriented, complaining of head and abdominal pain. After a prolonged extrication, a rapid secondary survey was performed and an IV established prior to loading the immobilized patient into our Eurocopter AS350 B3 aircraft for a 23-minute flight to the nearest trauma center. Care en route included maintaining spinal precautions, oxygen administration at 15 L/min by non-rebreather mask, and infusion of normal saline. During flight the patient was noted to become increasingly somnolent. With 18 minutes remaining in the flight, the crew determined that the patient required an airway intervention as he was no longer able to protect his airway and would soon be unable to adequately ventilate. The crew prepared for a difficult airway due to spinal precautions, darkness, turbulence, and tight working conditions. The patient was preoxygenated, then given etomidate followed immediately by rocuronium. The front of the cervical collar was removed, and the second crew member applied cricoid pressure with one hand and maintained cervical stabilization with the other hand. Using options allowed in our treatment guidelines, the crew elected to place a laryngeal mask airway (LMA) without any prior attempt at intubation. A #4 LMA-Unique™(LMA North America, San Diego CA) was placed rapidly without complication, and correct placement was confirmed with end-tidal CO_2 detection and good chest rise. The cervical collar was replaced and the patient was given 50 micrograms of fentanyl for analgesia; further sedation with midazolam was withheld as blood pressure could not be determined. On arrival at the hospital, the patient was taken to the trauma room where he was noted to have an oxygen saturation of 98% and was being ventilated without difficulty; there was no evidence of aspiration. The trauma team elected to leave the LMA in place for emergency CT scanning.

DISCUSSION

Historically, the primary approach to emergency prehospital airway management after critical basic maneuvers (positioning, suction, supplemental oxygen, and bag-valve-mask ventilation) has been oral endotracheal intubation without pharmacological assistance. Prehospital endotracheal intubation is usually performed by paramedics in the respiratory-arrested or cardiac-arrested patient where the success rates are relatively high without pharmacological assistance.[1] More recently, rapid sequence intubation (RSI) has been introduced into the prehospital setting to allow earlier and more widespread intubation.[2] RSI is a series of steps, involving the use of a paralytic agent, which culminates in endotracheal intubation.

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Prehospital RSI has recently undergone a great deal of scrutiny and the technique remains controversial, particularly in the setting of head trauma.[2–6] Wang et al. have reviewed the scientific evidence in considerable detail.[2] There is a body of evidence demonstrating potential benefits to prehospital RSI in selected circumstances, including improved oxygenation and ventilation and prevention of aspiration. However, these potential benefits do not come without associated risks. Potential harms from prehospital RSI include transport delays, hypoxemia, aspiration, bradycardia, increased intracranial pressure, and airway trauma. Proponents of field RSI have proposed that we can improve the risk-to-benefit ratio through better training (appropriate patient selection, preoxygenation, early use of rescue airways), better medical oversight, and better equipment (gum-elastic bougie, rescue airways, continuous downloadable saturation and heart rate monitors).

In our flight program, we have elected to continue RSI. Because of the rural nature of service area, we commonly transport critical patients from remote locations with relatively long transport times. To maximize patient safety, our program adheres to the recommendations in NAEMSP's position paper on drug-assisted intubation.[7] Our program uses experienced providers, enhanced training, close medical oversight and quality improvement, and aggressive use of backup airways. In the event of failed intubation during RSI, our providers may opt for optimal bag-valve-mask ventilation[8] and/or placement of a "rescue" or "backup" airway. We define "rescue airways" as those used after an attempt at endotracheal intubation has failed. Common rescue airways include the LMA and the Combitube™(Tyco Healthcare Group LP, Mansfield MA) (we carry both), though numerous new devices are being introduced.

Prior to the development and widespread availability of rescue airways, surgical airways were the backups. Today, surgical airways are rarely used and primarily considered "alternative airways" of necessity rather than backup airways. We define an alternative airway as an airway used when direct visualization with a simple laryngoscope, with or without pharmacological assistance, is not available or appropriate in the clinical circumstances. Alternative airways in the prehospital setting have included blind nasotracheal intubation for the breathing patient and surgical airways when the oral route is unavailable. Noninvasive positive pressure ventilation might be considered an alternative airway as well. In the hospital setting additional alternative airways include fiberoptic intubation and awake intubation among others.

In the prehospital setting, laryngeal and dual-lumen airways, such as the various LMA products and Combitube™, have generally been restricted to failed RSI scenarios or to use by providers without training in endotracheal intubation.[9–11] These devices are thought of as "secondary" because they are perceived to have inadequate airway protection and deliver inadequate airway pressures. In reality, these devices may provide better airway protection than commonly recognized[12–18] and generate enough airway pressure to ventilate most patients; they may therefore serve as alternative or rescue airway devices. Some devices also allow for intubation through the device after placement, either blindly or with fiberoptic visualization. These devices have been reviewed elsewhere.[19–23]

Beginning in 2002, our guidelines and training began to prioritize oxygenation, ventilation, and short scene times over placement of an endotracheal tube. While endotracheal intubation success rates are monitored, we emphasize and encourage crews to move very early to a rescue airway in the setting of a failed RSI. As a result, we are becoming more experienced with rescue devices—specifically the Combitube™and the LMA-Unique™. Our anecdotal success with these devices has been so compelling (rapid insertion, no cases of aspiration, and excellent oxygenation) that we began to question if theses devices could be primary rather than secondary approaches to airway management. Others are having similar experiences and there is evidence that paramedics have higher success rates in securing the airway with an LMA as compared to endotracheal intubation.[12,24]

In 2005, we advised our flight crews that if the situation warrants, such as in-flight airway management or short transport time, they may elect to administer an induction agent and paralytic but forego any attempt at endotracheal intubation and move directly to the LMA or Combitube™. We call this novel approach Rapid Sequence Airway (RSA). This case presentation describes our first experience with this approach. The procedure was well tolerated and without complication. Quality assurance review indicates this was likely the best thing for this patient in this circumstance.

CONCLUSION

We describe our first experience with a novel prehospital airway management strategy: Rapid Sequence Airway (RSA). We believe this approach addresses many of the concerns with prehospital RSI highlighted by recent research and deserves further consideration and prospective evaluation. We have also proposed definitions for alternative and rescue airways which we have found useful.

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