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Original Research

Preliminary Report: Comparing Aspiration Rates between Prehospital Patients Managed with Extraglottic Airway Devices and Endotracheal Intubation

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A B S T R A C T

Introduction: There has been a shift from endotracheal intubation (ETI) toward extraglottic devices (EGDs) for prehospital airway management. A concern exists that this may lead to more frequent cases of aspiration.
Methods: This was a retrospective study using a prehospital quality assurance database. Patients were assigned to groups based on the method that ultimately managed their airways (EGD or ETI). Cases with documented blood/emesis obscuring the airway were considered inevitable aspiration cases and excluded. Aspiration was defined by the radiology report within 48 hours.
Results: A total of 104 EGD and 152 ETI patients were identified. Aspiration data were available for 67 EGD and 94 ETI cases. Of those, 8 EGD and 3 ETI cases had blood/emesis obscuring the airway and were excluded as planned. After exclusions, there were 5 EGD and 11 ETI cases in which aspiration was later diagnosed (EGD aspiration rate = 8%, ETI aspiration rate = 12%; χ^2: $P = .359$; relative risk = .841; 95% confidence interval, .329-2.152).
Conclusion: In this small quality assurance database, aspiration rates were not significantly different for prehospital patients managed with an EGD versus ETI.

Prehospital airway management has undergone a substantial evolution over the past 20 years with a much greater focus now on the use of extraglottic devices (EGDs) compared with endotracheal intubation (ETI).[1,2] This includes both the use of EGDs as a primary invasive device (used instead of any attempt at ETI) or as a secondary device (placed after failed ETI) but with a much lower threshold for placement. In the most extreme manifestation, EGDs are now placed with medication facilitation as a primary airway management strategy, an approach termed rapid sequence airway (RSA).[3]

The major advantages to the use of EGDs are the faster insertion times with higher first-pass success compared with ETI, especially in the setting of common predictors of airway difficulty such as obesity, secretions, and spinal precautions.[2,4] In addition to these advantages, EGD placement generally requires less training. The greatest barrier to even more widespread adoption of EGDs in the prehospital setting is the concern for increased aspiration risk because of the perception that these devices do not adequately seal off the airway, but evidence is limited.[5-7] In the controlled operating suite setting with fasted patients, the risk for aspiration from

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the use of an EGD compared with ETI is considered quite low.[8,9] However, patients encountered by emergency medical services (EMS) are likely to have full stomachs so the theoretical risk of aspiration is clearly greater.

This work seeks to add to the collective knowledge regarding the relative aspiration risk for patients who have EGDs placed in the prehospital arena compared with those who undergo ETI.

Methods

This retrospective study using data collected in a prehospital quality assurance airway database was approved by the Human Research Committee at the University of New Mexico Health Sciences Center, Albuquerque, NM. Patient charts were initially reviewed and data extracted from the database by 1 of the study authors (K.P.). The database included patients transported by a large air medical service staffed by flight nurse and flight paramedic teams that performed both rapid sequence intubation (RSI) and RSA, as well as a small, rural, advanced life support, ground service that used only RSA for medication-facilitated airway management although all providers are paramedics with experience in intubation.

Two cohorts of patients were identified: 1) those who ultimately had an EGD placed and 2) those who ultimately were intubated. Of the patients who were ultimately managed with an EGD, the cohort was subdivided into 3 groups: those who underwent RSA, those for whom the EGD was placed during a crash airway situation, and those who had the EGD placed after a missed attempt at intubation. Of the patients who were intubated, the cohort was further broken down into 2 groups: those who had the ETT placed after RSI and those who had the tube placed during crash airway management.

We defined RSA as the use of an induction agent and paralytic with the expressed intent of placing an EGD. RSI was defined as the use of an induction agent and paralytic for the expressed intent of placing an endotracheal tube. If the providers gave an induction agent and paralytic with the intention of RSI and then placed an EGD before any attempt at intubation, usually because of immediate refractory hypoxemia, this was still considered a failed intubation attempt rather than a primary RSA. The protocols and medical direction encouraged very early movement to an EGD in that scenario. The induction agent was primarily 0.3 mg/kg etomidate, and the paralytic was primarily 1.0 mg/kg rocuronium for all study patients.

Crash airway management was defined as a patient in cardiac arrest (or in a near-arrest condition) who did not require any medications to facilitate oral intubation. An ETT or EGD could be placed in this situation, and, thus, patients needing crash airway management were in both study groups. Per programmatic quality assurance definitions in place at the time of this study for both agencies, an attempt at ETI was defined as placing the laryngoscope into the mouth, whereas an attempt at EGD placement was defined as inserting the device into the mouth.

The primary end point was aspiration. Aspiration was defined by a radiology report of possible, probable, or definite aspiration on a chest x-ray or computed tomographic scan within 48 hours of admission; the absence of any such mention was considered negative. Cases in which providers documented the presence of blood or emesis obscuring the airway at the time of the procedure were considered inevitable aspiration cases.

Analysis was conducted on both the overall data set and on a restricted data set omitting the inevitable aspiration cases. The groups' incidence of aspiration was compared with a 1-tailed chi-square test and supplemented with a relative risk comparison. The use of the 1-tailed version of the chi-square test increased the study power to detect a difference in aspiration rates between the groups, given the common hypothesis that aspiration rates are higher with EGD than with ETI.

Results

A total of 104 EGD insertions and 152 ETI cases were identified (Fig. 1); 75% of all cases were related to trauma. Of the 104 EGD insertions, 15 were placed by a single ground service for RSA and 89 by a single air medical service (26 RSA, 14 crash, 49 and after missed RSI). The EGD models used included LMA-Unique (40 [38%], Teleflex Medical Europe Ltd, Athlone, Ireland), LMA-Supreme (37 [36%], Teleflex Medical Europe Ltd), Esophageal-Tracheal Combitube (26 [25%], Medtronic Covidien, Minneapolis, MN), and King LTS-D (1 [1%], Ambu, Ballerup, Denmark; Figure 2).

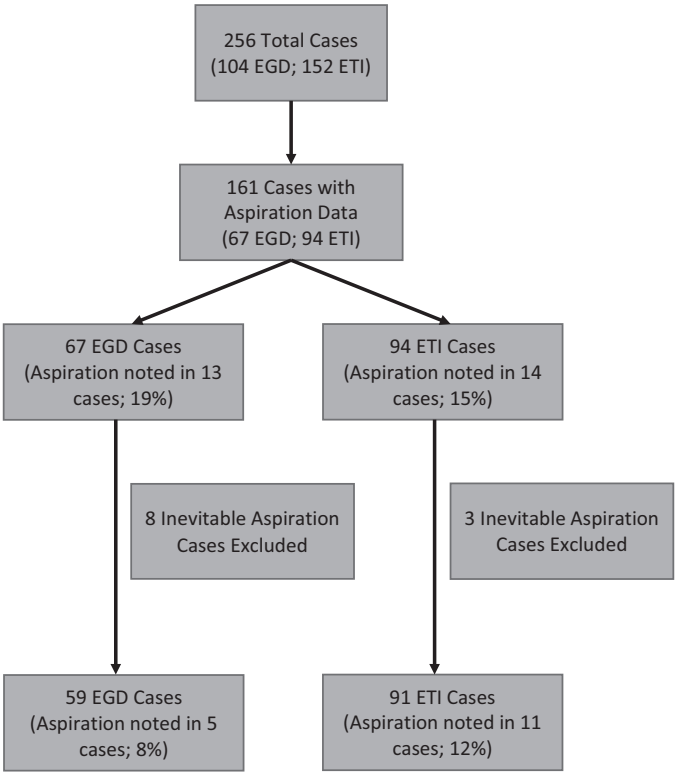

Figure 1. Study population.

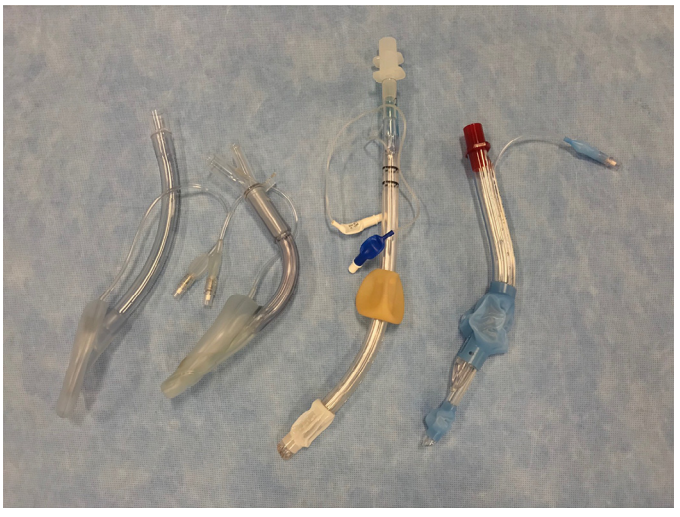

Figure 2. Left, the LMA-Unique; left middle, the LMA-Supreme; right middle, the Esophageal-Tracheal Combitube; and right, the King LTS-D.