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A Comparison of Blind and Laryngoscopic Insertion of the EasyTube

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Abstract

***Introduction*: The EasyTube is a disposable, polyvinyl-chloride, double-lumen, supraglottic airway device, which allows ventilation in either esophageal or tracheal position. The EasyTube may be positioned into the esophagus blindly or using a laryngoscope. *Methods*: Our study compared blind versus laryngoscopic-guided esophageal EasyTube insertion. Thirty two anesthesiologists inserted an EasyTube, size 41 Fr, into a mannequin, by using a blind and a laryngoscopic technique in a 2 × 2 crossover design. *Results*: No statistically significant difference in the time to achieve an effective airway was found: 23.9 ± 6 seconds for the blind and 29.5 ± 7.6 seconds for the laryngoscopic-guided technique. *Conclusion*: EasyTube insertion was equally successful with or without a laryngoscope in a mannequin when used by anesthesia providers.**

Keywords

Airway Management, Supraglottic Airway Devices, EasyTube

1. Introduction

The EasyTube Teleflex Medical (Ruesch, Kernen, Germany) is a double-lumen tube with a pharyngeal proximal cuff and an esophageal distal cuff, which are separately inflated with 80 and 10 mL of air, respectively, using two separate syringes [1]-[3]. The pharyngeal cuff occludes the oropharynx and prevents aspiration of blood or secretions from the oral or nasal cavity, while the distal cuff seals the esophagus and prevents aspiration of gastric contents [2] [3] (**Figure 1**).

The EasyTube enables ventilation with the distal opening in either an esophageal or tracheal position; however, the distal opening is expected to enter the esophagus in most cases [2]-[4]. In a difficult airway situation where it is challenging to visualize the glottic opening, the EasyTube can be inserted into either aperture [1]-[4].

Sethi *et al.* [5] demonstrated no significant difference in ventilator parameters in comparison of laryngoscope-

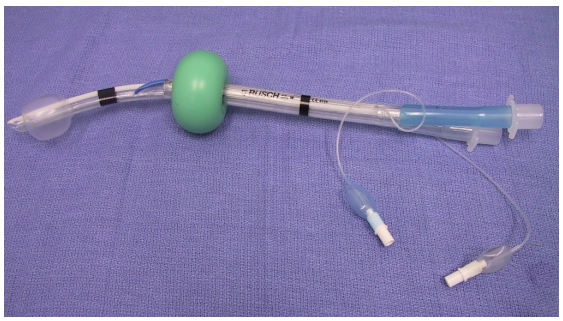

Figure 1. EasyTube.

cally placed EasyTube, Combitube or endotracheal tube airway devices. EasyTubes have also been shown to provide sufficient seal for ventilation even under elevated ventilatory pressures and are latex free, both characteristics enhancing the safety profile [6] [7]. Our study compared blind vs. laryngoscopic insertion of the EasyTube, using an airway mannequin, by inexperienced anesthesiologists. We hypothesized that both methods of EasyTube insertion would be equivalent with regard to the time necessary to achieve an effective airway.

2. Methods

This study received Institutional Review Board approval. Volunteers were solicited from among the anesthesiology residents, attending anesthesiologists, and certified registered nurse anesthetists. Verbal consent was obtained from all participants. A short explanation about the EasyTube and insertion techniques was given to the participants. The demographic data collected was: prior experience with supraglottic airway devices, prior experience with the EasyTube, and the participant's overall anesthesiology experience and training level.

Each subject was allowed up to two minutes to familiarize themselves with the device. Trials were performed using the TruCorpAirSim mannequin (TruCorp, Belfast, Ireland). Each participant performed two EasyTube insertions by using each technique. A random number generator was used to determine which technique would be attempted first by each participant. Insertions were timed, using a stopwatch, from the moment a subject picked up the device until mannequin lung ventilation was visually confirmed. A single observer measured the insertion time and observed the success to ventilate the mannequin's lungs. When participants used the blind insertion technique, the head of the mannequin was placed in a neutral position, and the EasyTube was inserted blindly, in a cranial-to-caudal movement starting at the oral pharynx, until the black ring mark at the distal end of the device was even with the incisors. When participants used the laryngoscopic technique, they performed direct laryngoscopy using a number three Macintosh laryngoscope blade, and then introduced the EasyTube into the esophagus.

Statistical Analysis: This was a 2 × 2 crossover design with replication and a repeated measures analysis of variance (RM ANOVA) was applied to the data. The study was designed, based on prior pilot data, to have a statistical power of 80% and a confidence interval of 95% in order to detect whether the two insertion methods displayed a difference of ±10.0 seconds (as our region of equivalence) with a standard deviation of 10 seconds.

3. Results

Thirty-two volunteers participated in the study. Nineteen were anesthesia resident physicians, eight were attending anesthesiologists and five were certified registered nurse anesthetists. The mean age of the participants was 33.8 ± 8 years old and they had between 0.4 and 30 years of anesthesia experience with a mean of 5.3 ± 7 years of experience as anesthesiologists. All participants had prior experience with a laryngeal mask airway. Eight participants had prior experience with a supraglottic airway device other than a laryngeal mask airway. Three participants had previous experience with the EasyTube. With regard to prior experience with supraglottic airways other than laryngeal mask airway, the range was 0 - 1000 times with the mean of 35.9 ± 177 times. With regard to prior experience with the EasyTube device, the range was 0 - 100 times with only three participants indicating prior use; the mean was 6.72 ± 38 intubations.

First-insertion success rates were 100% (32/32) for laryngoscopic placement and 96.8% (31/32) for the blind placement. Second insertion attempt rates were identical with 100% for laryngoscopic and 96.8% for blind

placement. One of the participants was unable to place the device adequately within 90 seconds on both blind attempts. Overall, the blind insertion rate was 60/62 attempts or 96.8%, and the laryngoscopic placement rate was 62/62 attempts or 100%. The mean time of blind placement was 23.9 ± 6 seconds while the mean time of laryngoscopic placement was 29.5 ± 7 seconds. The 95% confidence interval for insertion times was −7.5 to −3.0 seconds, within the ± 10.0 second region of equivalence. The conclusion is that the procedures are statistically equivalent.

4. Discussion

This study suggests that the EasyTube can successfully be inserted in the esophagus by using the manufacturer recommended blind technique or with laryngoscopic guidance. In this study, even anesthesia providers, who were previously unfamiliar with the device, were able to insert the device by using both methods. Our times of insertion results are similar to prior studies comparing EasyTube and Combitube placements in mannequins [8]-[10]. One advantage of the EasyTube over an endotracheal tube is that it can be blindly inserted without a laryngoscope. The EasyTube can be used for ventilation with placement in either the esophagus or trachea; if the glottis opening is difficult to visualize, the device can be inserted into either aperture. EasyTube has been successfully used for airway management in both routine and difficult airway patients [1] [2] [4]. However, blind insertion can potentially result in trauma, such as upper airway and esophageal injury. Laryngoscopic insertion may mitigate potential trauma given improved visualization of the anatomical structures and the displacement of the tongue. Although no severe trauma has been reported with the EasyTube, esophageal trauma has been documented with the Combitube, a similar airway device which can be used infra-glottically or supra-glottically [1] [8] [9] [11]-[14]. The EasyTube is similar to the Combitube, but has several advantages. It has a thinner distal end, a smaller pharyngeal cuff (which will inflate with 80 mL air as opposed to the Combitube which inflates with 100 mL air), and is available in a pediatric size [1]. The distal tip diameter of the 41 Fr EasyTube is 7.5 mm and the distal tip of the 28 Fr EasyTube is 5.5 mm [1]-[4]. These are comparable to a standard tracheal tube size. The smaller size of the EasyTube may decrease the incidence of possible mucosal trauma [1] [11] [13] [14].

As participation was not mandatory, there was an unavoidable element of self-selection bias introduced into the study. In this study only three providers had previous experience with the EasyTube device. Use of manikins for EasyTube insertion allowed providers to trial these devices in an environment where patients could not be harmed. Studies have shown that providers benefit from attempting new skills in a simulated environment before use in patients [15]-[17]. However, insertion times with mannequins may not accurately reflect insertion times for patients especially in difficult airway situations [10].

Difficult airway guidelines increasingly stress the importance of the use of supraglottic airway devices [18]-[20]. Larygoscopic-guided insertion can facilitate the placement of the EasyTube in either the esophagus or the larynx for rescue ventilation. Overall, this study suggests an ease of use and the equivalence of blind and laryngoscopic placement methods of the EasyTube. This simulation study provides a foundation for a clinical study.

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