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Original contribution

Use of the Laryngeal Mask Airway-Aintree Intubating Catheter-fiberoptic bronchoscope technique for difficult intubation☆

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Abstract

Study Objective: To determine whether intubation using an Aintree Intubation Catheter (AIC), fiberoptic intubation (FOB), and Laryngeal Mask Airway (LMA) is safe and effective for securing the airway in patients who are difficult to intubate after induction of general anesthesia.

Design: Retrospective review of departmental difficult airway database procedures completed between July 2006 and December 2009.

Setting: Academic medical center.

Measurements and Main Results: During the study period, 128 of 500 patients entered into the difficult airway database underwent the LMA-AIC-FOB technique for intubation. One hundred nineteen (93%) of the 128 patients were successfully intubated by the LMA-AIC-FOB technique, and 9 required an alternate technique. No patient who underwent the LMA-AIC-FOB technique experienced an airway-related mortality or required an emergency surgical airway procedure.

Conclusion: The LMA-AIC-FOB technique is safe and effective for patients who are difficult to intubate after induction of anesthesia.

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1. Introduction

Anesthesiologists encounter difficult endotracheal intubation in 0.9% to 6% of cases [1-3]. To facilitate management of difficult intubation and reduce adverse outcomes, the ASA developed guidelines for management of the difficult airway in 1992 [4]. This practice guideline was revised in 2003 to include use of the Laryngeal Mask Airway (LMA) as a rescue device for ventilation and as a conduit for insertion of an endotracheal tube (ETT) either blindly or guided by a fiberoptic bronchoscope (FOB) [5]. Anesthesia providers who used this technique at our institution reported difficulty with LMA removal after the ETT was in place, and they expressed concern that the ETT could potentially be dislodged if it became caught on the LMA [6,7].

To overcome this problem, an alternative method has been adopted, as described in previous case reports of difficult airway management [8-13]. An Aintree Intubation Catheter (AIC; Cook Critical Care, Bloomington, IN, USA) is threaded onto a FOB and inserted through the Classic LMA that is being used to ventilate the patient. After the AIC and FOB are advanced together into the trachea, the FOB is removed, leaving the AIC in the trachea and allowing the LMA to slide out easily over the AIC. An ETT is passed over the AIC into the trachea and the AIC is then removed. We hypothesized that this LMA-AIC-FOB technique is effective for routinely securing the airway in patients who are difficult to intubate after induction of general anesthesia.

2. Materials and methods

2.1. Description of the LMA-AIC-FOB technique

After a Classic LMA (LMA North America, San Diego, CA, USA) is placed to ventilate the patient, an AIC is threaded onto a FOB. The FOB and AIC are inserted together through the LMA (Fig. 1). Using the FOB for direct visualization, the vocal cords and trachea are identified, and the AIC-FOB is advanced into the trachea until the carina is visualized. The FOB is removed, leaving the AIC in the trachea; the LMA then slides out easily over the AIC while the AIC is held securely in the airway. An ETT (size 6.5 or larger) is then threaded onto the AIC and advanced into the trachea. The AIC has an adaptor that permits ventilation and/or detection of end-tidal carbon dioxide at any point during this procedure.

2.2. Data collection and analysis

Since 2004, our department has maintained a database of patients with difficult airways. The difficult airway database was designed by using Adobe Cold Fusion® software (Adobe Systems, Inc., San Jose, CA, USA) with data fields and drop-down boxes for data entry. Anesthesiology providers enter patient data via a secure, password-protected website maintained by the Anesthesia and Critical Care Medicine Department. Table 1 lists patient characteristics included in the database.

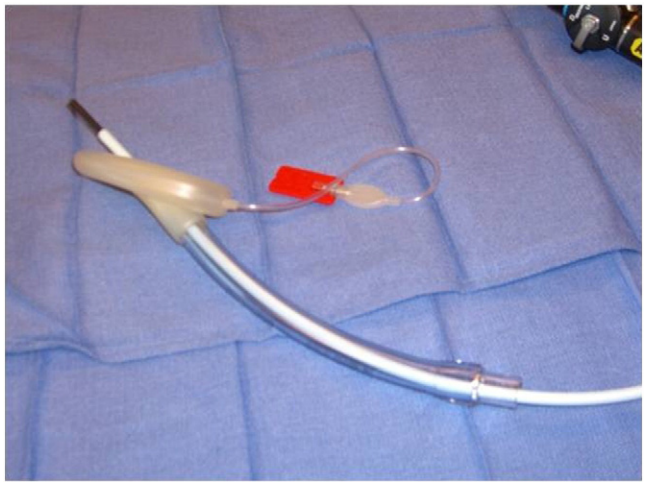

Fig. 1 A Laryngeal Mask Airway (LMA; LMA North America, Inc., San Diego, CA, USA) inserted over the Aintree Intubation Catheter (Cook Critical Care, Bloomington, IN, USA) -fiberoptic intubation combination.

After obtaining Internal Review Board approval from the Johns Hopkins University School of Medicine, we retrospectively examined our difficult airway database for cases occurring between July 2006 and December 2009 to investigate the frequency of use and success rate of the LMA-AIC-FOB technique. Data extracted from the database included age, gender, Mallampati class, airway characteristics, and intubation details.

Proportions were compared using Fisher's exact test. Mean ages of groups were compared by unpaired t test. Statistical analysis was performed with GraphPad Prism 2003 version 4 (GraphPad Software, Inc., San Diego, CA, USA). Statistical significance was considered to be $P < 0.05$.

Table 1 Patient information gathered in departmental difficult airway database

Age
Gender
Procedure performed
Anesthesia team
Date and location of event
History of difficult airway
Mallampati class
Thyromental distance (finger breadths)
Oral excursion (finger breadths)
Neck flexion and extension
Presence of beard
Dentition
Details of intubation
If airway cart present and/or used for intubation
If extubation planned