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Retrograde and antegrade intubation techniques under general anesthesia through the laryngeal mask airway

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Introduction

If failure to intubate a patient is accompanied by an inability to ventilate via a mask, then the patient's life is in danger [1]. Some reports [2,3] have demonstrated that a clear and unobstructed airway can be obtained using the laryngeal mask airway (LMA) when intubation proves difficult. However, endotracheal intubation is considered more appropriate than LMA in cases when there is a risk of aspiration, when the patients are in the prone position, or when intratracheal pressure is increased. We illustrated retrograde and antegrade intubation techniques through LMA during control ventilation. These two techniques were performed after approval of the Clinical Human Research Committee and informed consent from patient and families were obtained.

Case reports

Case 1

A 56-year-old man was scheduled for resection of the mandible and neck dissection. Insufficient mouth opening, an anteriorly placed larynx, and decreased neck mobility were present because of surgical scars from previous left-sided resection of the mandible. Preoxygenation and induction with thiamylal were performed which made controlled ventilation possible via a mask. After administration of succinylcholine chloride, many attempts at orotracheal intubation were unsuccessful. Neither the glottis nor the epiglottis could be visualized using direct laryngoscope. Although the mouth opening was small, it was possible to insert and position a size 3 LMA. Anesthesia was maintained with isoflurane, nitrous oxide, oxygen, and pancuronium bromide under controlled ventilation. A 16-gauge indwelling catheter was inserted in a cephalad direction through the cricothyroid membrane into the tracheal lumen at a 45-degree angle. A straight wire was passed via the indwelling catheter and tracheal lumen into the mask of LMA, and entered into the shaft of LMA. The wire was retrieved through a swivel bronchoscopic adapter attached to the shaft of the LMA (Fig. 1). A 70-cm 11 French teflon catheter (Cook retrograde intubation set) was passed from above the wire and down toward the trachea via the swivel bronchoscopic adapter, LMA, and vocal cords. Once the teflon catheter had passed through the cords, it stopped along the anterior trachea at the site where the wire entered. The wire was removed, and the teflon catheter was passed distally to the carina. Six-mm ID cuffed endotracheal tube was then passed over the teflon catheter into the trachea through the shaft of the LMA. After the LMA was removed, the endotracheal tube's location was confirmed by a capnogram.

Case 2

A 2-year-old physically retarded girl (5 kg) with pneumonia and atelectasis was examined by a bronchoscopy to determine the cause of the atelectasis. Anesthesia was induced with 4% sevoflurane, 64% nitrous oxide, and oxygen via mask and administered 0.5 mg/kg droperidol. A size 2 LMA was inserted through the mouth. Anesthesia was maintained with 66% nitrous oxide in oxygen with 1–1.5% sevoflurane and intermittent vecuronium bromide under controlled ventilation.

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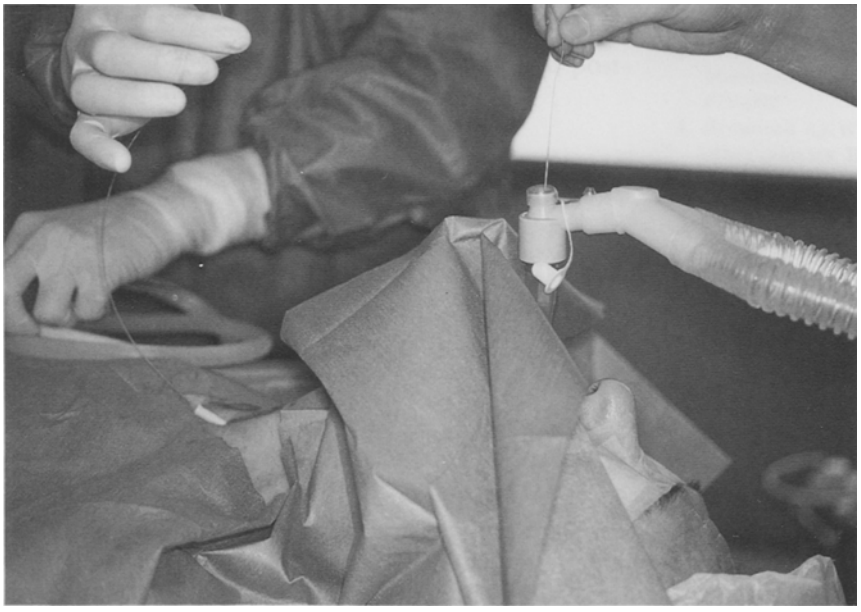

Fig. 1. The straight wire was retrieved through a swivel bronchoscopic adapter attached to the shaft of a laryngeal mask airway

A bronchoscope was introduced via a swivel bronchoscopic adapter through the LMA into the bronchus. No tumors, compression from outside, or other pathology were identified, and then only suction of the secretions was performed. A straight guide wire was passed through the operating channel of the bronchoscope into the tracheobronchial tree. The bronchoscope was carefully removed, and a 4.5 mm ID endotracheal tube was passed over the wire. The LMA was removed. After emergence from anesthesia, the endotracheal tube was left in place for therapy of the atelectasis.

Discussion

Chadd et al. [4] described cases in which LMA was used as an aid to intubation when it was impossible to visualize the larynx by conventional methods. A size 3 LMA was inserted and the position of the mask was checked using a fiberoptic laryngoscope, then a 60-cm gum elastic introducer was passed via the LMA into the trachea, and the LMA was exchanged for 7.0-mm or 7.5-mm latex armored tracheal tube railroading over the introducer.

As mentioned above, antegrade intubation through an LMA has already been described but the retrograde technique has not been reported yet. This is the first report of retrograde intubation through the LMA. According to our experience with seven cases, if a J-formed guide wire was used for the retrograde technique, it was impossible to retrieve the wire from the shaft of LMA in every case. The J-formed wire, which was passed via the cricothyroid membrane, stuck on the edge of the mask attached to the larynx wall and looped by itself in the laryngeal mask. It is essential to use a straight wire for the retrograde technique. If a straight wire had been used, it could have been retrieved within 2 min from a swivel bronchoscopic adapter.

In antegrade intubation using a fiberoptic bronchoscope, Stile [5] reported a technique involving placement of a fiberoptic bronchoscope into the hypopharynx and a wire passed via the operating channel through the vocal cords and into the trachea of an anesthetized, spontaneously breathing infant. After the fiberoptic bronchoscope was removed, a cardiac catheter was placed over the wire, and an endotracheal tube was then guided over the catheter into the trachea.

We used a technique similar to that described by Stile. However, we performed the procedure under controlled ventilation with adequate muscle relaxation. Swallowing or coughing may move the laryngeal structures out of the visual field. The LMA is superior to the usual or endoscopic mask because it does not require support of the jaw, thus leaving the anesthesiologist's hands entirely free and yet making guidance of the optic fiber to the vocal cords through the shaft of the LMA possible. Using an LMA makes fiberoptic bronchoscopy easy and safe.

We usually attempt the antegrade technique initially. However, significant difficulties may be encountered such as when the narrow space of the inside of LMA prevents the maipulation of a fiberscope, or when the

airway has a rapid S-shaped angulation consisting of the tracheal axis, laryngeal axis, and oral axis. Then we prefer the retrograde technique.

In conclusion, we reported retrograde and antegrade intubation through an LMA under general anesthesia with adequate muscle relaxation. Many cases of difficult intubation, in which LMA insertion is possible and not contraindicated, could be resolved in the same way. The bronchoscopy, Seldinger method, and/or retrograde technique with application of LMA may facilitate the management of cases of difficult intubation.

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