Brief Clinical Reports

Intubation via LMA in pediatric patients with difficult airways

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Purpose: To report two cases of successful tracheal intubation in difficult pediatric airways using a conventional laryngeal mask airway (LMA) with an extended polyvinyl chloride (PVC) tube after laryngeal assessment with a fibreoptic device.

Clinical features: Two cases, Dandy-Walker and Pierre Robin syndromes, were scheduled for surgery. They were premedicated with 0.5 $mg \cdot kg^{-1}$ promethazine *po* 90 min before surgery. Both patients arrived in the operating room sedated, with dry mouth, and without evidence of increased intracranial tension or airway obstruction. Inhalational induction with isoflurane 0.5-3% was commenced. Conventional tracheal intubation was impossible in both cases. In each an LMA was inserted to maintain ventilation, anesthesia, and to facilitate intubation. Fibreoptic bronchoscopy was used to assess the larynx, followed by blind intubation via the LMA using extended PVC tracheal tube (TT). Anesthesia was maintained during intubation using Mapleson F anesthesia circuit attached to a connector with fibreoptic bronchoscope adapter.

Conclusion: This report describes the assessment of the airway with fibreoptic bronchoscopy after LMA insertion facilitated blind tracheal intubation in two children with difficult airways.

Objectif : Rapporter deux cas d'intubation endotrachéale réussie après une évaluation laryngée au moyen d'un fibroscope chez des enfants, pour qui l'intubation était difficile, en utilisant un masque laryngé traditionnel (ML) muni d'un tube allongé en polychlorure de vinyle (PVC).

Éléments cliniques : Deux enfants atteints des syndromes de Dandy-Walker et de Pierre Robin ont reçu une prémédication de 0,5 $mg \cdot kg^{-1}$ de prométhazine *po*, 90 min avant une intervention élective. Les enfants se sont présentés en salle d'opération sous sédation, la bouche sèche et sans signe d'hypertension intracrânienne ou d'obstruction des voies aériennes. On a amorcé l'induction de l'anesthésie par inhalation avec de l'isoflurane 0,5-3 %. L'intubation endotrachéale habituelle a été impossible chez les deux patients. On a inséré un ML afin de maintenir la ventilation et l'anesthésie, et de faciliter l'intubation. Une fibroscopie bronchique a été utilisée pour l'évaluation du larynx, suivie de l'intubation à l'aveugle au moyen du ML et du tube trachéal (TT) allongé en PVC. On a maintenu l'anesthésie pendant l'intubation à l'aide d'un circuit Mapleson F raccordé à un connecteur par un adaptateur de fibroscope bronchique.

Conclusion : Le présent article décrit l'évaluation des voies aériennes au moyen d'une fibroscopie bronchique à la suite de l'insertion d'un ML pour faciliter l'intubation endotrachéale à l'aveugle chez deux enfants pour qui l'intubation était difficile.

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ANDY-WALKER (Figure 1) and Pierre Robin syndromes are rare congenital malformations. The former syndrome is associated with hydrocephalus, and meningomyelocele. The latter is associated with micrognathia, glossoptosis, and cleft palate. In both syndromes, difficult airways are commonly encountered.[1]

FIGURE 1 A patient with Dandy Walker syndrome: Hydrocephalus; cleft lip, and micrognathia are also associated.

Case Reports

Case # 1

A five month, 5 kg, boy was scheduled for ventriculoperitoneal shunt. He had cleft lip and palate, micrognathia, and hydrocephalic head without signs of increased intracranial tension. Ventriculoperitoneal shunt insertion was previously performed after birth under general anesthesia following successful awake intubation.

Intraoperative monitors included pulse oximeter, indirect blood pressure and electrocardiogram. After venous access, a rubber head ring and a sandbag were used to improve airway exposure. Anesthesia was induced with isoflurane 0.5-3% in oxygen 100%. Direct laryngoscopy using #1 Macintosh blade followed by #1 Miller blade failed to expose the glottis. A #2 laryngeal mask airway (LMA) was inserted while maintaining anesthesia with isoflurane. A double swivel connector with a seal-around cap of a bronchoscope adapter was placed between the LMA connector and the Mapleson F anesthesia circuit.

An Olympus LF-1 5 mm OD fibreoptic bronchoscope was advanced through the sealed port of the bronchoscope adapter and the lumen of the LMA and enabled full vision of mobile vocal cords. Before withdrawing the bronchoscope, 2 ml lidocaine 2% were injected on the glottic structures.

A 3 mm ID PVC tracheal tube was connected to the tip of another 2.5 mm tube to extend its length, and was introduced via the bronchoscope adapter blindly with its concavity anteriorly (Figure 2). Tracheal intubation was confirmed by CO_2 exhalation. The connector of the introducing tube was removed; the LMA was withdrawn leaving the 3 mm tracheal tube *in situ*. At no time was ventilation interrupted and SpO_2 remained > 95%. Balanced anesthesia was maintained with O_2 33% in N_2O, isoflurane 0.5-1%, and 1 $\mu g \cdot kg^{-1}$ fentanyl. Controlled ventilation was facilitated by 0.3 $mg \cdot kg^{-1}$ atracurium. Recovery was uneventful.

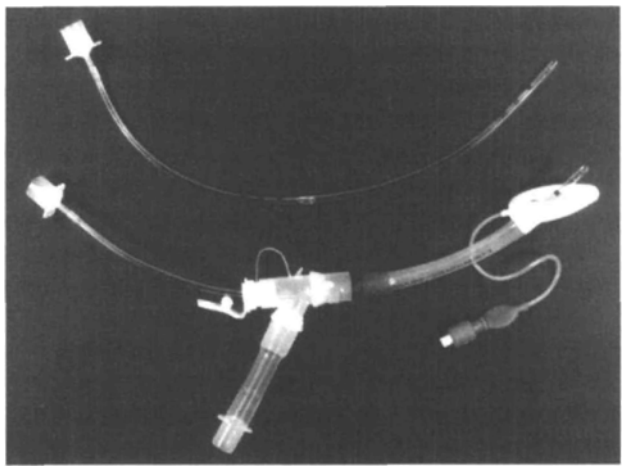

FIGURE 2 (lower) An extended TT passing via a conventional laryngeal mask airway #2, and bronchoscope adapter sealed port. (Upper) Extended pediatric PVC tracheal tube.

Case # 2

A nine month old, 6.6 kg boy with Pierre-Robin syndrome was scheduled for repair of cleft lip and palate. Enteral feeding was stopped four hours before operation. No oxygen desaturation > 95% was observed during sleep or feeding.

In the operating room; after attaching monitors as in case #1, venous cannulation, an inhalational induction was started using isoflurane 0.5-4% in oxygen. An oropharyngeal airway was inserted to avoid airway obstruction. After achieving a satisfactory depth of anesthesia, intubation failed using #1 Macintosh blade. Mask and bag ventilation was used to maintain anesthesia. A # 2 LMA was inserted successfully.

Fibreoptic bronchoscope was advanced through the LMA lumen via an attached bronchoscope adapter to visualize the cords. The vocal cords were clearly visible. Succinylcholine, 1 $mg \cdot kg^{-1}$ *iv*, was injected and a 3 mm PVC TT was introduced as described in case #1. Anesthesia was maintained as in case #1. The trachea was extubated when fully awake.

Discussion

Failed or difficult tracheal intubation remains an important cause of mortality and morbidity during anesthesia.[2] Difficulties are more frequent in pediatric patients because of their anatomical variations.

In these two cases, inhalational anesthetic induction was chosen to facilitate visualization of the glottis without cessation of respiration. Awake intubation in case #1 was avoided to guard against increased intracranial tension. Although successful awake intubation had been achieved during previous surgery; the subsequent hydrocephalic abnormal head development may have complicated laryngeal exposure during the current anesthesia.

The options for our patients after failed intubation were: 1) awaken the patient; 2) insert a 5 mm fibreoptic intubating bronchoscope with a guide wire in its suction channel and sliding the tube over it; or 3) ventilation and intubation via the LMA. The second option was excluded as face mask ventilation was difficult. The last option was chosen after confirming easy ventilation with LMA. The use of the fibreoptic device before insertion of a TT was to assess the patency and accessibility of the airway. The laryngeal mask created a conduit that provided better conditions for intubation.

Topical anesthesia application in case #1 helped to prevent breath holding and laryngeal spasm in response to intubation. In case #2 succinylcholine was used to provide satisfactory muscle relaxation, and allow manually controlled ventilation while the tube was advanced via the adapter port.

The pediatric tube was elongated with another smaller size tube to double its length, while keeping it patent. The production of a shorter pediatric LMA, or a longer sized pediatric TT may help to optimize this technique of intubation. A disadvantage of this technique is the inability to use a Latex armored tracheal tube because it is less rigid and more complaint than a PVC tube.

Several techniques for the management of pediatric airways have been described using LMA and fibreoptic bronchoscope. Hasan and Black described the use of a long guide wire through the suction channel of the fibrescope, OD 3.6 mm, passing through LMA lumen and introducing it into the trachea under vision. The tube was 'railroaded' over the wire blindly. The main disadvantage of their technique is the ability of the tube to flex the wire backward to the esophagus.[3] George *et al.*, used a Cook retrograde intubation Kit, which contained #11 Fr. stiffening stylet designed to be advanced over a long wire to avoid kinking during intubation.[4] Patel *et al.* successfully intubated the trachea of an infant with Robin sequence, using a pediatric fibrescope, OD 2.2 mm, mounted with 3 mm TT passed through #1 LMA.[5]

An intubating LMA "Fastrach" has been used successfully for intubation of difficult airways in adults. This modified LMA seems promising to facilitate difficult airway intubation.[6,7] We are unaware of any report of using a pediatric size intubating laryngeal mask to manage difficult intubation in children.

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