ALTERNATIVE METHOD FOR AIRWAY MANAGEMENT IN AN INFANT WITH PIERRE ROBIN SEQUENCE

Chong-Yuk Chan, Tsai-Hsin Chen, Cher-Ming Liou, Hsin-Ming Liao, Wei-Te Hung

Abstract

Pierre Robin sequence is rare in clinical practice, and may challenge airway management technique of anesthesiologist. We report an infant with Pierre Robin sequence, who received general anesthesia for tongue-lip adhesion. Laryngeal mask airway was used as a conduit for fiberscope intubation. We also report how to perform tube exchange with an alternative method when commercial airway exchange catheter is not available.

Key words: Pierre Robin sequence, Laryngeal mask, Fiberscope intubation, Tube exchange

Introduction

Pierre Robin sequence is a sequence of diseases which contribute with micrognathia, retrognathia, cleft palate and even congenital heart disease.\textsuperscript{1-4} Patients with Pierre Robin sequence are rare in clinical practice. Also, fiberscope-guide intubation via laryngeal mask airway (LMA) and tube exchange for removing LMA are rarely used in neonates or infants. Thus, this report describes an infant with Pierre Robin sequence being used a LMA as a conduit for fiberscope intubation. After intubation, tube exchange was performed by an alternative method to remove the LMA.

Case Report

A 5 month-old infant, with a body weight of 4Kg, was admitted to our hospital due to respiratory distress. Micrognathia, retrognathia and upper airway obstruction were noted. (Figs. 1, 2) Arterial blood gas analysis showed PaO\textsubscript{2} was desaturated to 36.7mmHg and SpO\textsubscript{2} was around 70% under room air. The patient’s airway was maintained by laryngeal mask airway (LMA) from 1 to 6 hours per day for months. Tongue lip adhesion was arranged to maintain his airway.

In operative theater, heart rate 150 beats/min, blood pressure 87/45mmHg, and SpO\textsubscript{2} 94% were observed by routine monitor. The patient was put in lateral position. After two puffs of 10% lidocaine sprayed inside his mouth for topical analgesia, we inserted a 1.5# classic LMA as an initial method to maintain his airway. After intubation, tube exchange was performed by an alternative method to remove the LMA.

Correspondence: Dr. Hsin-Ming Liao
Department of Anesthesiology, Chung Shan Medical University Hospital; No. 110, Sec. 1, Jianguo N. Rd., South District, Taichung City 402, Taiwan
Phone: 886-4-2473-9595 ext. 32530; Fax: 886-4-2472-8905; E-mail: shinming2002@yahoo.com.tw
sevoflurane and intravenous atropine 0.1mg, and cis-atracurium 1mg was then given. In our hospital, we have pediatric fibrescope with outer diameter of 3.1mm; hence, with adequate lubrication, a 4.0mm endotracheal tube can be used to intubate via a 1.5# classic LMA.

After inhalational induction with 5% sevoflurane in 5L oxygen for about 5 minutes, the endotracheal tube was lubricated and inserted into LMA. Then fibrescope was inserted into the endotracheal tube for guiding of intubation. Once carina was seen under fibrescope, endotracheal tube was intubated into trachea, and breathing circuit was reconnected. Endotracheal tube position was confirmed by clinical auscultation and capnography. After successfully intubated, we have to remove 1.5# classic LMA and leave 4.0mm endotracheal tube in place.

Breathing circuit was disconnected again for removing LMA. Another 4.0mm endotracheal tube was connected to the end of the endotracheal tube, which was intubated into trachae, in order to extend the length of the original endotracheal tube. LMA was then removed from the patient.

After clinical and capnographic confirmation of the endotracheal tube position, the endotracheal tube was then secured. The tongue-lip adhesion was performed successfully. When the operation was finished, the patient was then transferred to neonatal intensive care unit with endotracheal tube for further care.

After 5 days, the patient was extubated successfully without respiratory distress, and arterial blood gas analysis showed PaO₂ 69.3mmHg and SpO₂ 95% under room air.

Discussion

Pierre Robin sequence was first described in 1923 by Pierre Robin in which he described airway obstruction associated with micrognathia, glossoptosis, cleft palate and hypoplasia of the mandible.¹⁻⁴ Surgical intervention is considered for a patient with prolonged use of an appliance or intubation, failure of conservative management, and repeated problems related to airway obstruction.⁵⁻⁸ Surgical methods include tongue-lip adhesion, tracheostomy, and mandibular distrac-
When surgical intervention is needed in such patient, appropriate airway management/intubation is a key point of anesthesia. Endotracheal intubation in infants with the Pierre Robin sequence may sometimes be impossible to accomplish by conventional laryngoscope. Different methods for intubation in Pierre Robin sequence were reported. Using LMA as a method to maintain airway in Pierre Robin sequence is reported by many pediatric doctors, and this patient had used LMA for a period of time with good tolerance. Thus, LMA can provide a more safety environment for intubation (Table 1). No commercially available Fastrach-LMA can be used in infants or neonates, so we used a classic LMA. It is important to notice that different institutes have different equipments; thus, pre-operative rehearsal is very important to make sure that your method can be performed successfully.

Table 1. Advantages and disadvantages of various intubation techniques in infants with Pierre Robin sequence

<table>
<thead>
<tr>
<th></th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gum-elastic bougie</td>
<td>1. Useful in laryngoscope grade II or III airway</td>
<td>1. Not useful in laryngoscope grade IV airway</td>
</tr>
<tr>
<td></td>
<td>2. Usually use outside operation room (If FOB is unavailable)</td>
<td>2. Failed attempt may cause bleeding or edema</td>
</tr>
<tr>
<td>Shikani optical stylet</td>
<td>1. Useful in difficult intubation</td>
<td>1. Usually need assistant</td>
</tr>
<tr>
<td></td>
<td>2. Direct visualizing of glottis</td>
<td>2. More time needed</td>
</tr>
<tr>
<td></td>
<td>3. Easier to stabilize the tongue</td>
<td>3. Secretion or blood may interfere view field</td>
</tr>
<tr>
<td>Trachlight</td>
<td>1. Useful in difficult intubation</td>
<td>1. More difficult in distinguish esophageal or tracheal placement in infants</td>
</tr>
<tr>
<td></td>
<td>2. Inexpensive equipment</td>
<td>2. Smaller glottic target in infants</td>
</tr>
<tr>
<td>Retrograde intubation</td>
<td>1. Useful in difficult intubation</td>
<td>1. Not first line practice</td>
</tr>
<tr>
<td></td>
<td>2. Could be combined with FOB intubation</td>
<td>2. Risk for damage immature cartilage in larynx</td>
</tr>
<tr>
<td></td>
<td>3. Will not interfere by secretion or blood (After failed intubation)</td>
<td>3. Risk for airway obstruction, hemorrhage</td>
</tr>
<tr>
<td>Fibroptic bronchoscope (FOB)</td>
<td>1. Easier visualizing the glottis</td>
<td>1. More time needed</td>
</tr>
<tr>
<td></td>
<td>2. Less traumatic</td>
<td>2. Desaturation may occur due to low reserve of these patients</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Secretion or blood may interfere view field</td>
</tr>
<tr>
<td>LMA guide FOB intubation</td>
<td>1. Easy ventilation before and between intubation</td>
<td>1. Need another step to remove LMA</td>
</tr>
<tr>
<td></td>
<td>2. Intubation more easy</td>
<td>2. Unintentional extubation may occur during removal of LMA</td>
</tr>
<tr>
<td></td>
<td>3. View field less interfere by secretion or minor bleeding</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Bypass narrowed pharynx</td>
<td></td>
</tr>
</tbody>
</table>
As for the issue of removing LMA, LMA should be removed to provide a clean surgical field. To secure the endotracheal tube, the removing of LMA might be performed by either the help of a Cook Airway Exchange (CAE) catheter or by an alternative method. Commercial CAE catheters are 8, 11, 14, and 19 Fr in size. We did not have an 8 Fr CAE catheter, and an 11 Fr CAE catheter might be used for the patient. However, we found it was difficult to successfully use an 11 Fr CAE catheter in 4.0mm endotracheal tube in the preoperative rehearsal, because friction made it difficult to insert and remove. Therefore we used an alternative method for removing the LMA. We added another endotracheal tube with the same size to extend the length of endotracheal tube for successfully removing the LMA.

In this case, we found the following points need to be discussed. First, the possibility of local anesthetics toxicity should be concerned, especially in small infants. Second, cutting the adapter part of endotracheal tube might be necessary. The outer diameter of the adapter of an endotracheal tube was larger, so it might produce a resistance when removing the LMA. So, we suggest cutting the adapter part of endotracheal tube (about 1cm). Third, we used the extending endotracheal tube with the same size of the intubated tube, we think a smaller extending tube is also sufficient and with less friction. Fourth, continuous end-tidal CO2 monitoring during removal of the LMA with our method is possible because of the continuity of the extending and the intubated tubes.

In summary, Pierre Robin sequence is associated with difficult intubation. LMA as a conduit for fiberscope-guide intubation might be an acceptable method. If a CAE catheter is not available or not small enough for LMA removal, it might be an alternative to use another endotracheal tube as an extending tube for removing the LMA.

References
Pierre Robin Sequence 嬰兒患者氣道處理的變通方式

陳昶昱，陳在昕，劉哲銘，廖信明，洪維德

摘要

Pierre Robin sequence的患者在臨床上是極為罕見而且對麻醉醫師的呼吸道操作及插管能力是一個很大的挑戰。我們報告一位Pierre Robin sequence 嬰兒患者在全身麻醉下接受 Tongue-lip Adhesion 手術。使用喉頭罩作爲纖維內視鏡的插管通道。我們也報告了當沒有適當大小的換管器時，如何使用變通的方式來進行換管將喉頭罩移除。

關鍵詞：Pierre Robin sequence，喉頭罩，纖維內視鏡插管，換管