

Management of Difficult Airway in a Failed Intubation with Videolaryngoscopy in an Infant Patient

İnfant Bir Hastada Başarısız Videolarinoskop ile Entübasyondaki Zor Hava Yolu Yönetimi

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The videolaryngoscope is a useful alternative airway device for anaesthesia management of difficult airways. However videolaryngoscope intubation may fail due to lack of experience, incorrect application, inappropriate stylet, prior traumatic attempts, restricted cervical movement and limited oropharyngeal airspace. Using a stylet and correctly shaped endotracheal tube is important to facilitate tracheal intubation with the videolaryngoscope, especially in paediatric patients. However, anatomical difficulty in the placement of the laryngoscope blade, association with facial deformities such as micrognathia, having a short neck, cleft palate and being younger than 1 year increase the likelihood of a difficult airway. In this report, we present our approach to difficult airway management in a failed intubation with a videolaryngoscope in an infant undergoing cleft palate surgery.

Key Words: Laryngoscopy, stylet, difficult airway, cleft palate

Zor laringoskopi ve başarısız endotrakeal entübasyon, morbidite ve mortalitenin önemli nedenlerindedir. Zor hava yolu pediatrik hastalarda yetişkinlere göre daha az rastlanır, fakat anatomik kusurlar, zor laringoskopi ve entübasyon riskini arttırmaktadır. Yarık damak ameliyatlarında zor hava yolu insidansı %4,7-8,4 arasında değişmektedir. Laringoskop bleydinin yerleştirilmesini zorlaştıran anatomik zorluk, mikrognati, kısa boyun gibi yüz deformiteleri ve 1 yaşından küçük olmak, zor hava yolu olasılığını arttırmaktadır. Birçok olgu sunumunda zor hava yoluna ait anestezi yönetiminde videolarinoskop faydalı bir havayolu aracı olarak bildirilmiştir. Buna rağmen videolarinoskop ile entübasyon; deneyimsiz klinisyen, uygunsuz stile, başlangıçta travmatik entübasyon girişimi, kısıtlı boyun hareketi ve kısıtlı orafaringeal ağız boşluğuna bağlı başarısızlıkla sonuçlanabilir. Bu olgu sunumunda, yarık damak ameliyatı geçiren ve entübasyonu videolarinoskopi ile başarısız olan bebekteki zor hava yolu yönetimini sunmayı istedik.

Anahtar Kelimeler: Videolarinoskop, stile, zor havayolu, yarık damak

Introduction

Difficult laryngoscopy and failed tracheal intubation are important causes of morbidity and mortality. Cases of difficult airway in paediatric patients are less common than in adults (1), but anatomical defects increase the risk of difficult laryngoscopy and intubation. The incidence of difficult airway in cleft palate surgery ranges between 4.7% and 8.4% (2-4). The anatomical difficulty in the placement of the laryngoscope blade, which is associated with facial deformities such as micrognathia, having a short neck and being younger than 1 year, increases the likelihood of a difficult airway (1). In many case reports, the videolaryngoscope has been reported as a useful alternative airway device for anaesthesia management of difficult airways. However, videolaryngoscope intubation may fail due to inexperienced clinicians, incorrect positioning, inappropriate stylet, prior traumatic attempts, restricted cervical movement and limited oropharyngeal airspace (1). In this report, we share our airway management in a failed videolaryngoscope intubation in an infant undergoing cleft palate surgery.

Case Presentation

A 6-month-old male infant, weighing 7 kg, ASA physical status I, was scheduled for cleft palate surgery. Pre-anaesthetic physical examination did not reveal any respiratory system problems. The Mallampati classification was not assessed preoperatively.

With the knowledge that intubation might be difficult in some cleft palate malformation patients, alternative airway devices were prepared for a possible difficult airway, which included appropriately sized airways and endotracheal tubes (ETT),

Miller and Macintosh laryngoscope blades, laryngeal masks such as LMA and Pro-Seal LMA (PLMA), a videolaryngoscope and a fiberoptic bronchoscope. After informed patient consent, standard monitoring showed a heart rate of 150 beats min^{-1} , a respiratory rate of 25 breaths min^{-1} and a non-invasive blood pressure of 86/48 mmHg. The patient was preoxygenated with 100% oxygen for 3 min. General anaesthesia was induced with 8% sevoflurane in 50% O_2 + 50% N_2O . Face-mask ventilation was easy. For muscle relaxation, 2 mg kg^{-1} mivacurium was administered intravenously. Direct laryngoscopy proved to be difficult, as the epiglottis could not be visualized (Cormack-Lehane 4) using a size I Macintosh blade by an experienced anaesthetist. External laryngeal pressure did not improve the view. As a result of failed laryngoscopy, intubation with Miller blade size I was re-attempted. After two intubation attempts with direct laryngoscopy, we failed to visualize the vocal cord, and the same anaesthesiologist decided to use a paediatric-sized videolaryngoscope (size #2) (GlideScope, Verathon Inc. Corporate Headquarters, USA). Despite optimal positioning and external laryngeal pressure, only the epiglottis was visible (Cormack-Lehane 3). The styletted endotracheal tube (#3.5 mm) could not be directed through the vocal cords. Another intubation was attempted by applying cricoid pressure. The patient could not be intubated again and an oropharyngeal airway was inserted. Oxygenation was maintained using bag-valve mask ventilation with 100% oxygen because of desaturation (80%). Pro-Seal LMA (PLMA, Laryngeal Mask Company, UK) #1.5 was inserted and adequate ventilation was achieved. A paediatric fiberoptic bronchoscope (2.2 mm, Karl STORZ GmbH & Co. KG, Germany) was then loaded with a 3.5 mm ETT and used to intubate the patient's trachea through the PLMA. A tube exchanger (8 French, Cook Airway Exchange Catheters, Bloomington, USA) was used to exchange the 3.5 mm ETT for a 4 mm tube and the PLMA was removed. The patient was extubated when fully awake at the end of surgery, when in the lateral decubitus position and spontaneously breathing. Recovery was uneventful.

Discussion

Congenital syndromes in paediatric patients such as cleft palate can be associated with a difficult airway. The experience of the anaesthesiologist and the available equipment determine the success of difficult airway management. A wide range of airway devices such as modified laryngoscope blades, supraglottic airway devices, rigid and flexible endoscopes and videolaryngoscope is available (5). The choice of airway management strategy and device depends on the patient characteristics that lead to a difficult airway.

Using a videolaryngoscope improves the glottic view and facilitates tracheal intubation in patients who have a grade 3-4 Cormack-Lehane view by Macintosh blade. Cooper et al. (6) reported that in 35 patients with Cormack-Lehane grade 3 or 4 views by direct laryngoscopy, the view improved to

Cormack-Lehane 1 in 24 and Cormack-Lehane 2 in three patients, and intubation with the Glidescope was successful in 96.3% of 133 patients. Nevertheless, despite a good glottic view, failed intubation using a videolaryngoscope has been reported in 6-14% of patients (7, 8). An obstructed view due to blood, gastric contents, secretions and fogging could be the reason for failure of visualization of the glottis (9). However, the main limitation of the videolaryngoscope when compared to direct laryngoscopes is the difficulty in direction and advancement of the tracheal tube to the glottis despite a good view (7). Although an adult-size videolaryngoscope blade has its own intubation stylet, paediatric sizes do not have their own appropriate stylet. We believe that in our case, failed intubation with the videolaryngoscope could be related to incorrect shaping of the tracheal tube. An appropriately sized stylet for a paediatric videolaryngoscope blade could allow adjustment of the tip of the tube and result in successful intubation. The tracheal tube has to pass around an acute angle to enter the larynx, and thus has great potential to come in contact with the anterior tracheal wall. The tracheal tube loaded with a stylet is not used in most intubations with a Macintosh laryngoscope (9). We had a glottic view rated as Cormack-Lehane Grade 4 with the direct laryngoscope, and the videolaryngoscope changed the glottic view to Cormack-Lehane Grade 3. A better laryngeal view was obtained, but we could not direct the endotracheal tube with an elastic and soft stylet, and thus failed to intubate. We placed a supraglottic airway device (PLMA) and used a paediatric fiberoptic bronchoscope to intubate the patient's trachea through the PLMA. In one report (10), LMA-guided fiberoptic tracheal intubation was applied uneventfully in a 1200-g infant with difficult airway. PLMA seems to be a useful tool for fiberoptic intubation in infants and children when faced with a difficult airway (10-13).

We conclude that a videolaryngoscope can improve the view of the glottis in difficult intubation cases and that this technique should be included in airway management algorithms. Although using a videolaryngoscope may result in quicker visualization of the glottic aperture, this does not always result in a more rapid and successful intubation (14, 15). However, the clinician should bear in mind that using a stylet and correctly shaping the tracheal tube play an important role in facilitating tracheal intubation with a videolaryngoscope, especially in the paediatric patient.

Conclusion

The videolaryngoscope is a useful tool in difficult intubations, although it may fail in some patients with congenital malformation. We think that alternative methods should be available at all times for patients with difficult airways.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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