Trachlight®-guided Nasotracheal Intubation in a Pediatric Patient with Oral Fibrosarcoma

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INTRODUCTION

Management of a difficult airway in infants and children is a challenge to the anesthetist. Awake fiberoptic bronchoscope (FOB)-guided intubation is the safest technique for tracheal intubation in patients with a known difficult airway. However, awake intubation is not an option for children, who cannot be expected to cooperate with the procedure. In addition, in patients with tumors of the upper airway, FOB intubation is more difficult because direct vision can be lost. Bleeding, abnormal anatomy due to the tumor itself, or prior radiation therapy are major contributors to FOB intubation failure, and advancement of the FOB through a severely compromised airway may itself lead to bleeding, coughing, or acute edema. Trachlight® (TL) (Laerdal, Stavanges, Norway)-guided intubation represents an alternative technique to FOB in patients with pathological lesions in the upper airway. TL is also a useful aid to nasotracheal intubation.

CASE REPORT

A six-year-old girl weighing 28 kg presented for emergency tracheostomy. She was referred to our hospital because of a 2.5 cm x 2.0 cm mass on her hard palate. Fibrosarcoma was diagnosed on histopathological examination and she received primary chemotherapy using vincristine sulphate, ifosfamide, and doxorubicin. After a few days of chemotherapy, the tumor mass had rapidly grown to the size of 5.0 cm x 5.0 cm and bleeding had begun from the partially ruptured mass.

On hospital day 22, the child was transported to the operating room for emergency tracheostomy under general anesthesia. On gross evaluation, her mouth was filled by a huge and hard mass (Fig. 1). However, she had no respiratory difficulty in a supine position. We decided to try TL-guided intubation through a nostril as a first attempt. If this method is failed, we planned awake fiberoptic intubation as a backup. Glycopyrrolate (0.1 mg) was given intravenously. The patient breathed spontaneously with 100% oxygen via a translucent face mask for 3 minutes, after which sevoflurane was added...
to the fresh gas starting from 1 vol%. Sevoflurane was gradually increased % by % to 7 vol% while spontaneous breathing was maintained. The patient tolerated the inhalation of sevoflurane well. We decided to insert an uncuffed 4.5-mm internal diameter (ID) tracheal tube (TT) through the nostril as a nasopharyngeal airway and then attempt TL guided intubation using the same TT if a secure airway was confirmed. The TT was put in warm water to make it pliable prior to insertion.

When the end-tidal concentration of sevoflurane became 3.5 vol%, the TT was inserted into the nostril and advanced to the desired level without resistance. The tube was connected to the breathing circuit and adequate ventilation was confirmed by capnogram. When the end-tidal concentration of sevoflurane reached 5 vol%, the blade of the TL with the stiff stylet removed was inserted through the TT and advanced downward with slight flexion of the patient’s head. When a bright glow was seen on the jugular notch, the TL was slightly advanced and the TT was threaded over the TL and into the trachea without any resistance (Fig. 2). After the removal of the TL, the TT was connected to the breathing circuit and ventilation was confirmed with a capnogram and bilateral breathing sounds.

During this procedure, the patient’s respiration was well maintained spontaneously. However, the TT was a little small for the patient and gas leakage was relatively high. Following 30 μg of fentanyl and 15 mg of rocuronium intravenously, the TT was changed to a cuffed TT using a Cook Airway Exchange Catheter with Rapi-Fit Adaptors® (Cook Critical Care, Bloomington, IN, USA) and secured at the appropriate level. After surgery, the patient recovered from anesthesia without event and transferred to the postanesthesia care unit.

**DISCUSSION**

In patients with a known difficult airway, awake FOB-guided intubation is the method of choice for tracheal intubation.(1,2) However, awake oral or nasotracheal intubation by either laryngoscope or FOB is not a preferred choice in cases with an airway obstruction, such as oral cancer.(6) The presence of oral cancer makes it difficult to handle the device due to limited mouth opening, limited upper airway space resulting from the tumor, edema or distorted airway anatomy from tumor expansion, and tissue fixation of
the oral cavity, pharynx, or larynx by the tumor.(7-9) Moreover, awake intubation is very difficult to perform in children as they cannot cooperate fully.

We began with inhalation induction with sevoflurane, maintaining spontaneous ventilation. Sevoflurane had been used in pediatric patients with difficult airways because it has low solubility and causes minimal airway irritation.(10-13) While intravenous induction can precipitate a sudden loss of airway control and apnea, inhalation induction using gradually increasing concentrations of sevoflurane allows for spontaneous breathing and adequate depth of anesthesia without losing control of the airway.(10,12) We chose to deliver sevoflurane with a face mask at first and then a TT inserted to the oropharynx like a long nasal airway.

The use of a nasopharyngeal airway inserted during light anesthesia seems to be a very versatile tool for patent upper airway maintenance and delivery of sufficient anesthetics and oxygen.(14,15) Holm-Knudsen and colleagues(15) used a TT as a nasopharyngeal airway introduced via the smallest nostril while fiberoptic-guided nasotracheal intubation was performed via the other nostril using a second TT. We elected to use the same TT and nostril for both nasopharyngeal airway and tracheal intubation to minimize chances of nasal bleeding.

We chose TL rather than FOB for nasotracheal intubation because we were concerned about limited visibility due to previous tumor bleeding and the large size of the mass itself. While there are no absolute contraindications to FOB, pharyngeal or laryngeal masses may distort anatomy and make FOB more difficult.(15) The failure rate of FOB intubation may be as high as 13% in emergency cases and 8% in patients with head and neck cancer.(3,17) Light-guided intubation using the principle of transillumination has proven to be a useful option in patients who can be ventilated but have a failed laryngoscopic intubation.

(5,18) The TL does not require a space in the pharynx to visualize upper airway structures, and TL-guided intubation does not appear to be influenced by anatomical variations of the upper airway.(19) Because of these advantages, TL-guided intubation may be a more reliable and safe technique in patients with pathological lesions such as tumors, infection, or trauma in the upper airway.(4) In blind nasal intubation, the most difficult aspect is the alignment of the tip of the TT and the glottis. As in this case, removal of the stylet before insertion of the TL makes the TT-TL pliable, but also less controllable. However, neck flexion during intubation may improve the alignment of the TT-TL tip and the glottis.(5).

We used TL for nasotracheal intubation and successfully introduced a TT at the first attempt. There was no breath holding, laryngospasm or epistaxis during the procedure.

We suggest that sevoflurane induction via nasopharyngeal airway and subsequent nasotracheal intubation by transillumination with TL is a safe and fast alternative method to awake FOB intubation in pediatric patients with an oral cavity mass.

**ABSTRACT**

구강 섬유육종을 가진 소아 환자에서의 Trachlight®을 사용한 경비 기관내 삽관

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구강 섬유육종을 가진 소아 환자에서의 기관내 삽관이 어려운 기관지경을 이용한 기관내 삽관이 가장 안전한 방법이다. 그러나 구강 내 악성종양은 굴곡성 기관지경을 이용한 기관내 삽관을 어렵게 한다. 우리는 경구개에 큰 섬유육종을 가진 환자에서의 기관내 삽관을 보고하고자 한다. 기관지 튜브를 비인두 기도유지기로 사용하여
여 sevoflurane으로 흡입마취유도를 시행하였다.

호기말 sevoflurane 농도가 5 vol %에 도달했을 때 탐침을 제거한 Trachlight®을 이용해 기존에 비인두로 가지해들 기관지 튜브를 통해 경비 기관내 삽관을 시행하였다. 기관지 튜브는 첫 번째 시도에 성공적으로 기관내 삽관되었고 전 과정에 걸쳐 호흡정지나 후두경련, 비출혈 등은 없었다.

우리는 비인두 기도유지기를 통한 sevoflurane 마취유도와 Trachlight®를 사용해 투조에 의한 경비 기관내 삽관이 구강내 종괴를 가진 소아환자에서 가성하 굴곡성 기관지경을 이용한 기관내 삽관을 대신할 안전하고 신속한 방법임을 제안한다.

중심단어: 기도관리, 어려운 기도, 마취, 소아, 장비, 투조

REFERENCES