

# Anesthetic management for an infant undergoing endoscopic resection of a large subglottic papilloma

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**Background:** An infant with a large subglottic papilloma that caused severe respiratory distress needed anesthesia during resection of the papilloma. **Aims:** We planned an approach to the airway management this infant that we thought would be successful. **Methods:** We used three main tactics in managing the airway – inhaled sevoflurane, intravenous fentanyl and the patient's resumed spontaneous breathing. We also allowed the otolaryngologist to quickly resect some of the papilloma before intubation. **Results:** Our patient's airway was managed successfully, and the papilloma was removed. **Conclusions:** Management of the airway in a small child with obstruction can be aided by inducing anesthesia with sevoflurane, deepening anesthesia with intravenous fentanyl, and allowing the patient to resume spontaneous breathing. (Shen X, Li W. Anesthetic management for an infant undergoing endoscopic resection of a large subglottic papilloma. *North Am J Med Sci* 2009; 1: 83- 85).

**Key words:** Airway, obstruction, anesthesia, sevoflurane, spontaneous breath, papilloma.

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## Introduction

The risk of respiratory distress is related to the size, location and shape of a subglottic papilloma. Although resection of a subglottic papilloma in conscious patients is an effective and less invasive therapeutic option, the associated management of the airway is difficult, especially in infants.

We describe a 4-month-old infant who had a severe airway obstruction secondary to a large subglottic papilloma. In this case, spontaneous breathing with sevoflurane was effective and facilitated the successful resection of the papilloma.

## Case report

A 4-month-old male infant (weight 8 kg; height, 52 cm) presented with a three-month history of a non-productive cough, wheezing and increasing respiratory distress. A physician treated him unsuccessfully for an upper respiratory tract infection. His parents brought him to our hospital. Video laryngoscopy demonstrated a 1.5 cm×2.0 cm papilloma, 1.5 cm below the vocal cords, lying at the right-anterior wall of the trachea. Three quarters of the cross-sectional area of the trachea was obstructed (Fig.1A). A decision was made to resect the papilloma in 3 steps under general anesthesia. The first step was to resect part of the papilloma as quickly as possible before tracheal intubation. The second step was to resect most of the visible papilloma around the endotracheal tube and the last step was to remove the residual upon full visualization of the airway.

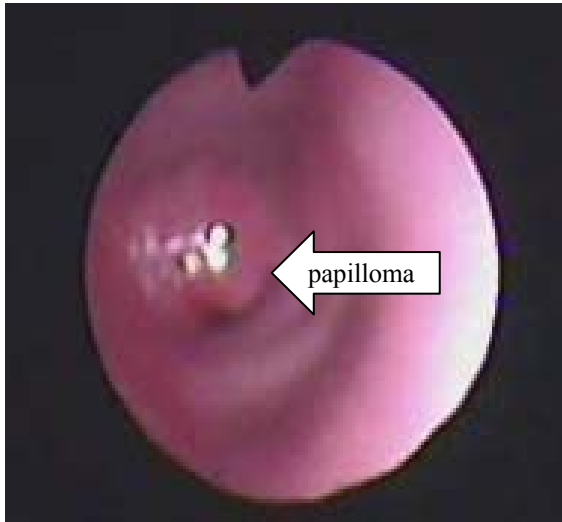
The patient was not premedicated. On arrival in the operation room, the patient showed obvious signs of inspiratory dyspnea. His heart rate was 136 beats min<sup>-1</sup>, arterial pressure was 83/41 mm Hg and SpO<sub>2</sub> was 98%.

Anesthesia was induced with an inhalation technique consisting of sevoflurane (5%) at a fresh gas flow of 4 L min<sup>-1</sup>. A 22-gauge catheter was placed in an arm vein. 1 minute later, fentanyl 15 µg was given. The otolaryngologist performed direct laryngoscopy with a 2.4 mm endoscope, revealing an obstructing lesion at the level of the subglottis, and resected some of the papilloma. At this time the SpO<sub>2</sub> fell from 100% to 91%. A cuffed tube (internal diameter, 2.5 mm) was inserted (Fig. 1B). The patient was ventilated through the tube by manual ventilation (rate, 20-25 min<sup>-1</sup>; tidal volume 60-80 ml; maintaining ETCO<sub>2</sub> at 40-45mm Hg). After intubation, the obstructing papilloma around the tracheal tube was resected using a suction debrider.

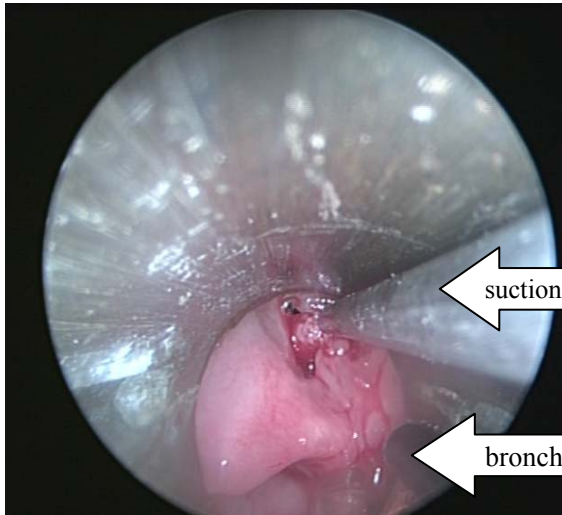
After spontaneous breathing resumed, we decided to allow the patient to continue to breathe spontaneously. Anesthesia was maintained with sevoflurane 5-6% with oxygen flow of 3-4 liters min<sup>-1</sup>. When the patient's tidal volume and respiratory rate reached 6-8 ml·kg<sup>-1</sup> and 25-30 min<sup>-1</sup> respectively, we decided to withdraw the endotracheal tube to the laryngeal cavity to provide the otolaryngologist with a full visualization of the airway (Fig. 2). Oxygen and sevoflurane were transmitted by the tracheal tube. The procedure was not interrupted due to SpO<sub>2</sub> falling, light anesthesia or breath inhibition.

When the surgeon confirmed complete resection of the papilloma by endoscopy (Fig.3), sevoflurane was discontinued, while endoscopy, direct laryngoscopy, and the endotracheal tube were removed simultaneously. The patient inhaled 100% oxygen by face-mask.

The operation lasted 26 minutes. The total duration of anesthesia was 45 minutes, and absence of the endotracheal tube was 5 minutes.



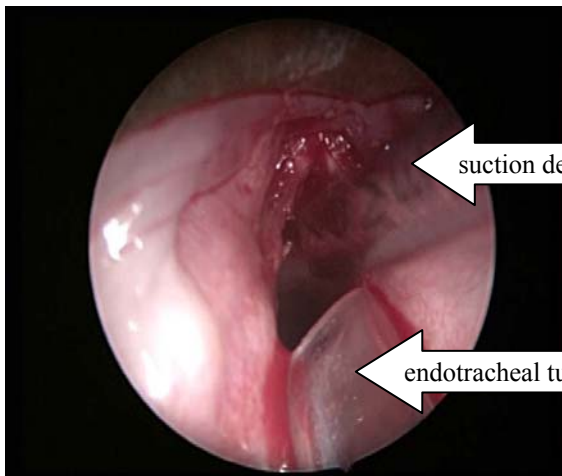
papilloma



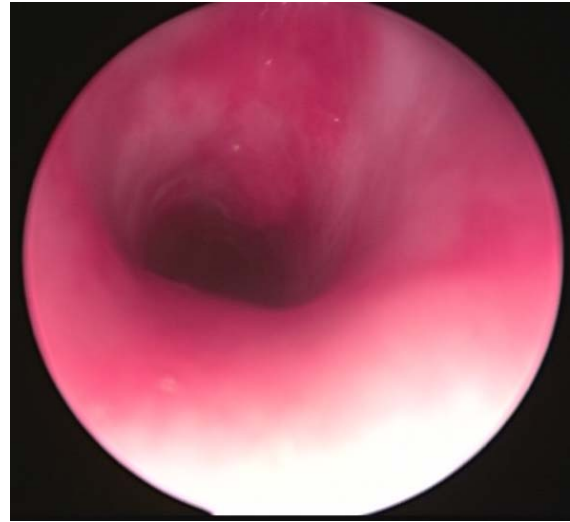
suction debrider

bronchoscopy

**Fig.1** A: Video laryngoscopy demonstrated a large subglottic papilloma lying at the right-anterior wall of the tracheal. 75% of the cross-section area of the trachea was obstructed. B: After intubation with ID 2.5 mm cuffed tube.



**Fig. 2** The endotracheal tube lies in the laryngeal cavity to provide the otolaryngologist with full visualization of the airway.



## Discussion

Airway obstruction is one of the most challenging problems facing anesthetists, and any airway difficulties require rapid intervention. Nowadays, there are still many controversies about the management of airway obstruction. No method was suggested as a guideline to manage the obstructed airway of an infant as in this case.

The hardest challenge of this case was how to control the airway. Jet ventilation could have been used to provide a route for oxygenation in this situation. Pressure of 0.4-2 bar giving a tidal volume of 2-3ml/kg at a frequency of 60-300 cycles/min would be typical [1]. Concerning the small airway diameter, inhalational technique and potential barotrauma[2], we chose an endotracheal tube to manage the airway. Percutaneous transtracheal jet ventilation through the cricothyroid membrane could also be used. But an infant cannot cooperate. Moreover, considering the lesion location, this method did not seem feasible.

In view of the proposed surgical procedure, we allowed the otolaryngologist to quickly resect some of the papilloma before the smallest endotracheal tube was inserted. Although this operation does carry a risk of massive bleeding, it enabled the anesthetist to intubate in such a small airway and manage the airway effectively. An otolaryngologist and anesthesiologist must coordinate and execute a plan that allows them to share the management of a patient's narrowed airway during surgery and general anesthesia.

Adults usually undergo fiberoptic examination while awake since it is safer than under general anesthesia. However, in an infant, this approach is problematic. In our patient, the maintenance of spontaneous respiration was

desirable because the airway needed to be examined, and the small diameter airway was being shared with the surgeon. We therefore allowed spontaneous breathing during surgery and retreated the tracheal tube to the laryngeal cavity when the patient was able to maintain sufficient tidal volume and breath rate.

The other consideration in this case was the anesthetic agent used. Anesthesia induction with inhalational agents is usually regarded as the technique of choice in view of its safety [3]. The use of inhalation agents in difficult airway settings is well described in children [4], and has been used in adults. The traditional agent of choice is sevoflurane. Sevoflurane has less cardiovascular side effects even at high doses [5]. This may have been advantageous in this case. Allowing the patient to continue spontaneous respiration during maintenance is the main benefit of sevoflurane. Disadvantages in this case would have included airway irritation, complete obstruction of the airway, and the inability to achieve sufficient depth of anesthesia [6]. So in this case, we added i.v. fentanyl at 15µg/kg to deepen anesthesia before direct laryngoscopy was attempted. During the rest of the procedure, no more fentanyl was added, and the patient maintained a tidal volume of 6-8 ml·kg<sup>-1</sup>, rate 25-30 min<sup>-1</sup>.

In summary, this case report describes the anesthetic management of an infant who successfully underwent endoscopic resection of a large subglottic papilloma. During the procedure, inhalational anesthesia with sevoflurane, i.v. fentanyl, and resumed spontaneous breathing allowed effective management of the airway. Since such airway management has not been previously reported, this case report may provide a useful example of a way to manage severe airway obstruction in small children due to subglottic papilloma.

## References

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