Intubation of underestimated airway in a patient with epiglottis adhesion to the posterior wall of the laryngeal cavity -A case report-

Gayoung Jin, Sukyoung Lee, and Jungchan Park

Department of the Anesthesiology and Pain Medicine, Samsung Medical Center, Seoul, Korea

Background: Epiglottis abnormality is rare condition and can lead embarrassing intubation to anesthesiologists. Here, we reported a case of successful management in a patient with unexpected hidden vocal cords due to epiglottis adhesion to the posterior wall of the laryngeal cavity.

Case: A 60-year-old female with no underlying disease was scheduled for general anesthesia to undergo a left-cochlear implant operation. After the induction procedure (including intravenous injection of rocuronium), an epiglottic adhesion to the posterior wall of the laryngeal cavity and invisible vocal cords were confirmed. Although the first trial of intubation failed, the patient’s airway was successfully managed using a technique that combined a video-stylescope (Markstein Sichtec Medical Co., 5.0 mm ID) with a video-laryngoscope (Insights®, Cedrus Medical).

Conclusions: Anesthesiologists may unexpectedly encounter asymptomatic abnormal airways with unknown causes. In such a situation, it is essential to establish a strategy and to select appropriate device according to patient circumstances.

Keywords: Abnormalities; Airway management; Epiglottis; Etiology; Intubation; Methods.

Epiglottis abnormality is rare condition caused by congenital and acquired reasons. It is known that congenital diseases such as Bardet-Biedl syndrome, Pallister-Hall syndrome can cause bifid epiglottis and epiglottis adhesion after radiation therapy have been introduced several times. Preoperative evaluation and visit are an important portion that must be performed before general anesthesia for preparation of unexpected difficult airway, heart disease, lung problems etc. in advance. For these patients with congenital diseases, radiation therapy or previous upper airway surgery, it is especially important to perform an airway evaluation in advance during the pre-anesthesia evaluation. However, in most of hospital, preoperative evaluation may have not been properly conducted by a busy resident with insufficient experience. We would like to introduce an unexpected case of epiglottis adhesion to posterior wall of laryngeal cavity who had no complaining symptoms or previous underlying diseases and overlooked during preoperative evaluation but was well overcome by teamwork using intubation technique and tools. We want to share these unexpected situations and the successful manage of them.
CASE REPORT

A 60-year-old female (height: 157 cm; weight: 62 kg) was scheduled for left-ear cochlear implant surgery for hearing loss. The patient was diagnosed with hypertension and was on medication for it but had no other history of underlying disease or surgery. The patient had undergone an esophagogastroduodenoscopy (EGD) five years prior without any problems. A pre-operative evaluation revealed normal laboratory findings, electrocardiogram, chest X-ray, and pulmonary function testing results but Mallampati classification was not evaluated. Preoperatively, the patient fasted for 10 h with intravenous hydration, and dexamethasone (5 mg) was administered intravenously prior to the operation. Upon arrival at the operating room, pulse oximetry, electrocardiography, and noninvasive blood pressure monitoring were established.

General anesthesia was induced with intravenous administration of lidocaine (40 mg), remimazolam (12 mg), and sevoflurane as the volatile agent. After successful mask ventilation was confirmed, rocuronium (30 mg) was administered to facilitate positive pressure ventilation. Following 2 min of mask ventilation (FiO₂ 80%, Flow 4 L/min), we attempted endotracheal intubation with a 7.0-mm-diameter plain endotracheal tube (ETT) using a video-laryngoscope (Insighters®, Cedrus Medical) and observed an abnormal structure of the epiglottis. Epiglottis adhesion to the posterior wall of the laryngeal cavity blocked the view of the vocal cords (Fig. 1). After external laryngeal manipulation, the vocal cords were observed through a small hole between the adhesive epiglottis and the uvula (Fig. 2). To overcome this unexpected airway management, we prepared a video-styletscope (Markstein Sichtec Medical Co., 5.0 mm ID, 345 mm length) to retain the view of the vocal cords and 6.0 mm outer diameter (O.D.) ETT, 6.5 mm O.D. ETT also prepared for another option. Following more than 2 min of mask ventilation (FiO₂, 80%, Flow 4 L/min), while external laryngeal manipulation was maintained, we attempted intubation again using a video-styletscope and a video-laryngoscope. We initially confirmed that the location of a small hole entering the vocal cord using videolaryngoscope. While securing a view of the larynx using videolaryngoscope, we entered the small hole using videostytletscope and once again confirmed that it had entered the inside of the trachea (Fig. 3).

We finally used a 7.0 mm O.D. ETT. The ETT was secured at 21 cm. Mechanical respiration was performed with a volume of 425 ml and a respiratory rate of 12 breaths per min. Sevo-
flurane was maintained throughout the surgery. We discussed with the attending surgeon regarding the patient’s adhesive epiglottis, and an ENT surgeon was recruited to perform adhesiolysis through a laryngomicroscope with ligature while the patient was administered 10 mg dexamethasone intravenously. The surgery was uneventful.

The surgery was completed, and sugammadex 200 mg was administered intravenously. After verifying the response of Bispectral Index and train of four monitoring, the patient was extubated successfully. The patient was transferred to the postoperative care unit, where she stayed for 41 min and then was moved to a ward without any immediate postoperative complications.

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

**DISCUSSION**

Epiglottis adhesion to the laryngeal cavity is a rare condition caused by various reasons. In most cases, patients with an epiglottic abnormality have a congenital cause or a history of upper airway surgery, difficult intubation, or other related acquired condition.

Epiglottis anomalies can be caused by several congenital diseases. Pallister-Hall syndrome (PHS) is a rare congenital disorder with a wide spectrum of severity that is characterized clinically by bifid epiglottis. Airway management in patients with PHS is challenging due to their craniofacial anomalies, such as micrognathia, hard palate malformations, cleft larynx, gingival cyst bifid epiglottis, and uvula and mandibular hypoplasia. In case of PHS, the patient’s airway was successfully managed using a supraglottic device [1]. Cri-du-chat syndrome is caused by deletion of the short arm of chromosome 5, which results in cardiac, cerebral, renal, and facial malformations depending on the location and extent of the defect. Abnormalities in the structure and function of the larynx and vocal cords are the most common phenotype, which may lead to difficult airway management. In case of Cri-du-chat syndrome, the patient was intubated using a video laryngoscope (AceScope, Acemedical Co.) and an ETT of a smaller diameter [2].

Prolonged intubation frequently can cause posterior glottic stenosis, which may limit the movement of the vocal cords and obstruct the airway [3]. A previous case involved a 63-year-old female with adhesions in the posterior commissure of the vocal cords after undergoing mechanical ventilation due to organophosphate poisoning during an attempted suicide prior to 11 years of age [4]. Upper airway surgery also may cause adhesions near the larynx. A previously reported 46-year-old female who underwent adeno-tonsillectomy was reported to have adhesions of the anterior tonsillar pillars and inferior tonsillar fossa to the tongue base [5]. Some studies have observed a higher prevalence of postoperative oropharyngeal stenosis among patients who underwent more complicated upper-airway surgeries, such as pharyngoplasty for obstructive sleep apnea [6,7]. Other acquired reasons, including drinking caustic soda, hot water, or other beverages and airway burns, radiation therapy of upper airway also may be a cause. But in our case, the patient did not have any predicting factors or symptoms and had successfully undergone an EGD five years ago; she told that there were no unusual findings at the time. Adhesive epiglottis that is asymptomatic and idiopathic often induces unanticipated difficult intubation and may lead to significant risks for the patient.

The American Society of Anesthesiologists defines difficult intubation as three or more attempts using an average laryngoscope or lasting for 10 min or more. A guideline newly published in 2022 recommend the following procedure for unexpected difficult intubations. If the intubation attempt after induction of general anesthesia fails, it is important to confirm adequate mask ventilation. Even if mask ventilation is not adequate, this guideline recommends using a laryngeal mask airway (LMA). If the LMA also fails (cannot intubate, cannot ventilate), anesthesiologists should attempt alternative intubation approaches, such as video-assisted laryngoscope, alternative laryngoscope blades, combined techniques, flexible bronchoscopy, and a lighted stylet or lightwand while simultaneously preparing emergency invasive airway techniques. If mask ventilation is adequate, anesthesiologists could consider alternative intubation approaches, but trials were limited and simultaneously consider awakening the patient. In our case, the first intubation trial after induction of general anesthesia was failed, but mask ventilation was easy and adequate. The patient was properly oxygenated with mask ventilation, so no other option was considered. Also, a LMA was not considered because LMA cuff had to be attached to vocal cord below the epiglottis, but in this patient had obstacle in front of vocal cord, so we thought that LMA could not be fitted properly. We immediately prepared a video-stylet scope and video-laryngoscope and used a combined technique. The view of the vocal cords was secured through the video-laryngoscope, and the patient was
intubated with the video-stylescope.

With development and diversification of intubation equipment, unanticipated difficult airway management may easily be overcome, and anesthesiologist’s proficiency has also increased. Therefore, to manage unexpected difficult airways, it is essential to strategize and choose appropriate intubation devices among various tools based on established guidelines and patient situation.

Looking back on this case, what was disappointing was that preoperative airway evaluation, such as checking Mallampati classification, was overlooked. In our case, the patient had surgery in an outpatient operating room, where the most of patients visited the hospital and underwent same-day surgery. Of course, this patient was a hospitalized patient, but it is thought that preoperative evaluation may have not been properly conducted by a busy resident with insufficient experience. If preoperative evaluation was done, we may have known about epiglottis abnormality in advance and prepared for it.

Also, we intubated using 7.0 mm O.D. ETT despite of small hole due to epiglottis abnormality. Although it was difficult to secure a view of the vocal cord due to the small hole caused by epiglottis adhesion, when external laryngeal manipulation was performed, the hole was enough to allow about 1/2 of the vocal cord to be visible and the vocal cord itself was judged to be intact, so a 7.0 mm O.D. ETT was used to intubation. Fortunately, it was intubated at once. In case of additional airway abnormality with narrow vocal cord, multiple attempts to intubate using different size may be needed which make intubation increasingly difficult due to complication such as airway edema. Intubating using bougie can be considered, because inserting ETTs of various sizes over the intubated bougie is possible without repeated intubation.

Most of the abnormalities of larynx structure may usually occur due to congenital and acquired causes, but in this case, patients had epiglottis adhesion to the posterior wall of the laryngeal cavity of unknown cause. When we took the history before surgery, the patient had no complaining symptoms or special underlying diseases. We were confirmed that the patient never experienced any unusual symptom related to airway during the revisit after the surgery. Anesthesiologists could encounter unexpected difficult intubation anytime, anywhere. In fact, according to the American Society of Anesthesiologists definition, this case does not constitute difficult airway. However, we want to show how to overcome the intubation of unexpected epiglottis abnormality by using intubation technique and tools. Also, we realized that preoperative airway evaluation is important factor even patients without any underlying disease.

In conclusion, anesthesiologists should have ability to establish a strategy for unexpected airway management and to choose the proper equipment and should not be negligent in evaluating patients before surgery.

**FUNDING**

None.

**CONFLICTS OF INTEREST**

No potential conflict of interest relevant to this article was reported.

**DATA AVAILABILITY STATEMENT**

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

**AUTHOR CONTRIBUTIONS**


**ORCID**

Gayoung Jin, https://orcid.org/0009-0009-6365-2632
Sukyoung Lee, https://orcid.org/0009-0007-0020-0802
Jungchan Park, https://orcid.org/0000-0002-7794-3547

**REFERENCES**


