Tzu Chi Medical Journal 2017; 29(3): 174-176

Case Report

Successful endotracheal intubation with Trachway after failed fiber-optic manipulations in a patient with retropharyngeal cervical chordoma

*Yi-Ting Chen[a], Chun-Ning Ho[b], Kuo-Chuan Hung[b]**

[a]Department of Anesthesiology, E-DA Hospital, Kaohsiung, Taiwan, [b]Department of Anesthesiology, Chi Mei Medical Center, Tainan, Taiwan

Received : 16-Jan-2017
Revised : 16-Feb-2017
Accepted : 27-Feb-2017

Abstract

A retropharyngeal mass may distort the airway anatomy and reduce the space available for manipulation of intubation devices. We encountered a patient with a cervical chordoma occupying the retropharyngeal space. Fiber-optic orotracheal intubation was attempted to secure the airway. Although the fiber-optic bronchoscope (FOB) was successfully placed into the trachea, the tracheal tube could not be passed through the glottis. An airway was then successfully established with the Trachway device, a video-assisted system with a rigid but malleable intubating stylet. In conclusion, although a FOB is commonly used to secure a difficult airway, the present case report demonstrates that fiber-optic intubation is not always successful. Video intubation devices with a rigid stylet (such as Trachway) may be helpful in patients with a cervical chordoma. We suggest this device be available as backup for patients with distorted airway anatomy.

Keywords: *Chordoma, Fiber-optic intubation, Retromolar intubation, Trachway*

Introduction

The Trachway intubating stylet (Biotronic Instrument Enterprise Ltd., Taichung, Taiwan, ROC) is a video-assisted system equipped with a rigid but malleable intubating stylet [1]. The light source at the tip allows it to be used as a light wand. This device is reportedly effective when a difficult airway is anticipated, especially in patients with limited neck movement or mouth opening [2,3]. We describe the use of the Trachway for airway rescue after failed fiber-optic endotracheal intubation in a patient with a cervical chordoma. The patient reviewed the Chinese translation of this article and gave written permission for the authors to publish the report.

Case report

A 49-year-old woman (the American Society of Anesthesiologists Physical Status II, weight 48 kg, height 159 cm, and body mass index 19 kg/m^2) was scheduled to undergo surgical excision of a cervical chordoma. She was previously healthy but presented with a history of difficulty swallowing for several months. The preoperative diagnostic fiberscope examination revealed a mass centrally located in the retropharyngeal space [Figure 1, left]. Imaging demonstrated a well-circumscribed, homogeneous lesion (1.8 cm × 1 .4 cm × 3.3 cm) in the retropharyngeal space [Figure 1, right]. Preoperative airway examination showed unrestricted mouth opening, Mallampati Class 2, and adequate neck extension. Because difficult intubation was a possibility, we advised the patient that awake fiber-optic endotracheal intubation would be the best intubation technique, but the patient refused.

To increase patient safety, we opted to assess the feasibility of fiber-optic endotracheal intubation while the patient was sedated and breathing spontaneously. Routine monitoring was applied and the patient was preoxygenated with 6 L/min of oxygen. After administering intravenous fentanyl, 50 μg, and airway topicalization, a fiber-optic bronchoscope (FOB) with an outside diameter of 4.1 mm (Olympus LF-GP; Olympus Optical Co., Ltd., Japan) was used to assess the airway anatomy, demonstrating a Cormack–Lehane Grade 1 laryngeal view (most of the glottic opening could be seen). We decided to perform fiber-optic endotracheal intubation after induction of anesthesia. An otolaryngologist was on standby to perform an emergency tracheostomy if needed.

Anesthesia was induced with intravenous fentanyl (50 μg), 2% lidocaine (40 mg), and propofol (2 mg/kg). After the patient was asleep, succinylcholine (60 mg) was given intravenously for muscle relaxation. After induction of anesthesia and muscle relaxation, ventilation through facemask was unproblematic. With an attending anesthesiologist supervising, endotracheal intubation was attempted

**Address for correspondence:*
Dr. Kuo-Chuan Hung,
Department of Anesthesiology, Chi Mei Medical Center, 901, Chung-Hwa Road, Yung Kung District, Tainan, Taiwan.
E-mail: ed102605@gmail.com

How to cite this article: Chen YT, Ho CN, Hung KC. Successful endotracheal intubation with Trachway after failed fiber-optic manipulations in a patient with retropharyngeal cervical chordoma. Tzu Chi Med J 2017;29:174-6.

Access this article online

Quick Response Code:

Website: www.tcmjmed.com

DOI: 10.4103/tcmj.tcmj_63_17

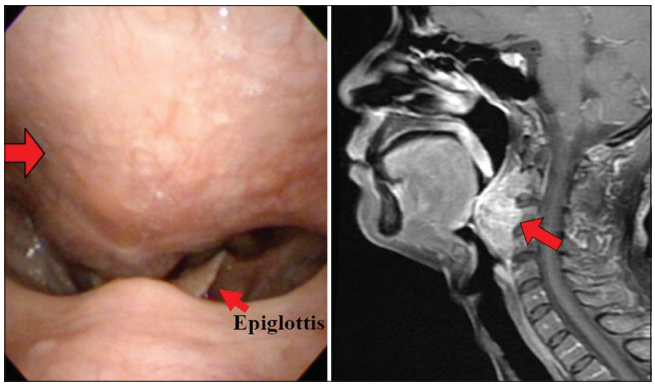

Figure 1: A 49-year-old woman presented with a history of difficulty swallowing. The preoperative diagnostic fiberscope examination revealed a centrally located mass in the retropharyngeal space (left, arrow). Sagittal magnetic resonance imaging demonstrated a well-circumscribed, homogeneous lesion (1.8 cm × 1.4 cm × 3.3 cm) in the retropharyngeal space (right, arrow)

by a 3rd-year anesthesiology resident who had performed fiber-optic endotracheal intubation successfully >200 times. The FOB with a preloaded 7-mm endotracheal tube (ETT) was inserted from the right side of the patient's mouth along the molars and advanced underneath the epiglottis. Although the FOB was successfully placed into the trachea, there was resistance to advancement of the ETT. The ETT was withdrawn over the FOB, rotated 90° counterclockwise, and advanced toward the trachea [4]. However, it still could not be advanced despite several attempts to manipulate it. The FOB was withdrawn until its tip was at the bevel of the ETT where observation confirmed that the tube tip was near the laryngeal aperture.

To avoid traumatizing laryngeal structures, we decided to use the Trachway for airway rescue. Before airway manipulation, a bolus dose of propofol (1 mg/kg) was given intravenously. With the use of a two-hand jaw thrust technique, the Trachway with a preloaded 7-mm ETT was inserted into the mouth through the retromolar space. Because of the retropharyngeal mass, great skill was required to advance the stylet tip to identify the laryngeal aperture. After the tip of the stylet had been placed at the glottic entrance, the ETT was advanced over the rigid stylet and smoothly inserted into the trachea on the first attempt. No tumor bleeding was noted during the intubation procedure. Capnography confirmed endotracheal placement, and there were no significant changes in blood pressure or heart rate. The entire process from insertion of the Trachway to inflation of the tracheal tube cuff required <1 min, and pulse oxygen saturation was maintained at >95%.

The perioperative course was uneventful. Dexamethasone, 4 mg, was administered for prophylaxis of airway edema. As surgery might have interfered with postoperative airway control, the ETT was left in place, and the patient was transferred to the intensive care unit. She was extubated on the 1st postoperative day and discharged on the 4th day. Six months later, she underwent tumor excision with a vertebrectomy for recurrent chordoma with bony involvement (C1–C4). The Trachway was again used for airway management without complications.

Discussion

Chordomas arise from remnants of the primitive notochord, the embryonic precursor of the axial skeleton. Chordomas are slow-growing but locally aggressive tumors [5]. They are found predominantly in men, with a peak incidence at 40–60 years of age. The incidence is 0.08/100,000 people [6]. Chordomas may occur anywhere in the spine, most commonly in the sacrococcygeal region (45%–50%), followed by the spheno-occipital region (35%–40%) and the mobile spine (10%–15%) [6]. They may reach considerable size before the patient becomes symptomatic [5]. Chordomas may present with bony destruction and surrounding soft tissue invasion; therefore, huge chordomas located in the spheno-occipital region or cervical spine can present with airway obstruction or cervical spine instability [7,8].

Direct laryngoscopy was not attempted in our patient since the chance of visualizing the vocal cords was judged to be low, and there would be little space in the retropharyngeal cavity for maneuvering the ETT. Fiber-optic endotracheal intubation is commonly used when difficult intubation is anticipated. As our patient refused awake fiber-optic endotracheal intubation, awake airway assessment was essential before induction of anesthesia to determine the feasibility of subsequent fiber-optic endotracheal intubation. This preinduction "awake look" has been described elsewhere and may further increase patient safety during difficult airway management [9,10]. In our patient, the mass occupied the retropharyngeal space, obstructing passage of a scope nasally, so only oral fiber-optic intubation was feasible.

Fiber-optic endotracheal intubation sometimes fails because the ETT tip impinges on laryngeal structures during advancement [4,11]. In most cases, reduction of the gap between the FOB and ETT or rotation of the ETT may decrease the difficulty in advancing the tube over the FOB [11]. In addition, several methods such as the use of the Parker Flex-Tip™ (Parker Medical, Englewood, CO, USA) tube or warming of a tracheal tube have also been suggested for reducing difficulty in advancing a tracheal tube over a fiberscope [11]. These methods may be helpful in achieving smooth fiber-optic intubation in these cases. There were several possible reasons for failure of ETT advancement in our patient. First, the considerable gap between the shaft of the FOB (outer diameter of 4.1 mm), and the ETT may have been the major contributor to the failed fiber-optic endotracheal intubation. Second, when an ETT still cannot be advanced, the ETT should be rotated counterclockwise by another 90° and a jaw-thrust (or chin-lift) maneuver should be performed. These techniques were not performed in our patient. Third, the centrally located mass may have caused deviation of the ETT tip away from the midline as it was advanced [12], increasing the likelihood that the ETT would get hung up on the laryngeal structures. The arytenoid cartilage and pyriform fossae are common sites for obstructed passage of a tube over a fiberscope [11]. Because visualization of ETT advancement is impossible during fiber-optic endotracheal intubation, the site of obstruction was unknown.

Because of the distorted airway anatomy, video intubation devices with a rigid stylet may be particularly beneficial

for airway rescue when fiber-optic endotracheal intubation fails. First, the Trachway design does not incorporate bulky blades, thus providing better maneuverability in a narrowed retropharyngeal cavity. Second, the Trachway's rigid but malleable intubating stylet can be shaped to adjust for the distorted anatomy and helps to displace collapsed retropharyngeal tissue. Third, advancement of the ETT over the stylet can be visualized on the monitor, minimizing the risk of airway injury. Finally, the Trachway is reportedly effective in patients wearing a halo vest or cervical collar [3,13], which may be necessary in patients with cervical spine instability caused by a cervical chordoma.

The Bonfils intubation fiberscope (Bonfils, Karl Storz GmbH, Tuttlingen, Germany) is a rigid, straight fiber-optic device with a 40° curved tip [14]. The characteristics, intubation technique, and indications for the Trachway are similar to the Bonfils. Both devices are lightweight and portable, making them useful in emergencies. In contrast to the Trachway, the Bonfils has a working channel within the shaft, allowing for oxygen insufflation and administration of local anesthetic solution for airway anesthesia [14]. The advantages of the Trachway are that its stainless steel shaft can be shaped to adjust for the patient's airway anatomy and its light source at the tip allows it to be used as a light wand if blood or secretions obscure the bronchoscopic view [1]. As its intubating stylet is malleable, successful nasotracheal intubation has been reported with this device [15]. One limitation of the Trachway is only tracheal tubes of larger bores (internal diameter of 6.0–8.0 mm) can be loaded onto the intubation stylet. Some problems that could have been encountered during airway management in our patient should be addressed. First, although the Trachway stylet can be used to displace excess airway tissue, the chordoma was solid and indeed impeded manipulation of the video intubating stylet in the patient. Successful tracheal intubation can only be achieved in the hands of experienced operators. Second, because of the rigidity of the stylet, tumor trauma was possible and tumor bleeding would have further impeded a free view. Third, we could not exclude the possibility that facemask ventilation would be impossible following the administration of a muscle relaxant in our patient with a distorted airway. In addition, the retropharyngeal mass would have probably prevented successful placement of a laryngeal mask airway, excluding effective airway rescue if required. In our case, the fiber-optic laryngeal view was Cormack–Lehane Grade 1. If mask ventilation had failed, airway rescue could have been attempted immediately with the FOB or Trachway. In addition, an otolaryngologist was on standby to perform an emergency tracheostomy if needed.

Conclusion

A cervical chordoma may substantially distort the airway and reduce the retropharyngeal cavity, impeding airway management with commonly used devices. Although the FOB is commonly used to secure a difficult airway, the present case report demonstrates that fiber-optic intubation is not always successful. Video intubation devices with a rigid stylet (such as Trachway or Bonfils) may be helpful in patients with a cervical chordoma. We suggest this device be available as backup for patients with distorted airway anatomy.

Declaration of patient consent

The authors certify that the patient has obtained appropriate patient consent form. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initial will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Ong J, Lee CL, Lai HY, Lee Y, Chen TY, Shyr MH. A new video intubating device: Trachway intubating stylet. Anaesthesia 2009;64:1145.
2. Tsay PJ, Hsu SW, Peng HC, Wang CH, Lee SW, Lai HY. Trachway intubating stylet for tracheal intubation in an ankylosing spondylitis patient undergoing total hip replacement under general anesthesia. Acta Anaesthesiol Taiwan 2011;49:159-61.
3. Kim JK, Kim JA, Kim CS, Ahn HJ, Yang MK, Choi SJ. Comparison of tracheal intubation with the Airway Scope or Clarus Video System in patients with cervical collars. Anaesthesia 2011;66:694-8.
4. Johnson DM, From AM, Smith RB, From RP, Maktabi MA. Endoscopic study of mechanisms of failure of endotracheal tube advancement into the trachea during awake fiberoptic orotracheal intubation. Anesthesiology 2005;102:910-4.
5. Walcott BP, Nahed BV, Mohyeldin A, Coumans JV, Kahle KT, Ferreira MJ. Chordoma: Current concepts, management, and future directions. Lancet Oncol 2012;13:e69-76.
6. McMaster ML, Goldstein AM, Bromley CM, Ishibe N, Parry DM. Chordoma: Incidence and survival patterns in the United States, 1973-1995. Cancer Causes Control 2001;12:1-11.
7. Radzikowska J, Gronkiewicz Z, Kukwa A, Lisik W, Czarnecka AM, Krzeski A, et al. Nasopharyngeal chordoma in a patient with a severe form of sleep-disordered breathing: A case report. Oncol Lett 2015;10:1805-9.
8. Strayer A. Upper cervical spine chordoma: A case study. J Neurosci Nurs 2003;35:276-80.
9. Gupta S, Macneil R, Bryson G. Laryngoscopy in conscious patients with remifentanil: How useful is an "awake look"? J Clin Anesth 2012;24:19-24.
10. Costa F, Mattei A, Massimiliano C, Cataldo R, Agrò FE. The Clarus Video System as a useful diagnostic tool. Anaesthesia 2011;66:135-6.
11. Asai T, Shingu K. Difficulty in advancing a tracheal tube over a fibreoptic bronchoscope: Incidence, causes and solutions. Br J Anaesth 2004;92:870-81.
12. Wulf H, Brinkmann G, Rautenberg M. Management of the difficult airway. A case of failed fiberoptic intubation. Acta Anaesthesiol Scand 1997;41:1080-2.
13. Cheng WC, Lan CH, Lai HY. The Clarus Video System (Trachway) intubating stylet for awake intubation. Anaesthesia 2011;66:1178-80.
14. Thong SY, Wong TG. Clinical uses of the Bonfils Retromolar Intubation Fiberscope: A review. Anesth Analg 2012;115:855-66.
15. Lee MC, Tseng KY, Shen YC, Lin CH, Hsu CW, Hsu HJ, et al. Nasotracheal intubation in patients with limited mouth opening: A comparison between fibreoptic intubation and the Trachway®. Anaesthesia 2016;71:31-8.