



Orotracheal intubation in a patient with difficult airway by using fiberoptic nasotracheal intubation: A case report

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In cases of a difficult intubation where numerous intubation methods, including laryngoscopy, have failed, yet oral intubation is still necessary, the method of tube exchange after fiberoptic nasal intubation may be attempted. Fiberoptic nasal intubation allows intubation to be performed relatively easily when the laryngeal view grade is poor. We report a case in which our attempt at oral intubation for total maxillectomy with laryngoscopy and fiberoptic oral intubation had failed due to an unexpected difficult airway; subsequently, we successfully completed the surgery by performing fiberoptic nasal intubation to secure the airway, followed by using a tube exchanger to exchange to an oral endotracheal tube.

Keywords: Difficult Intubation; Endotracheal Tube Exchanger; Fiberoptic Nasal Intubation.

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Anesthesiologists sometimes face an unexpectedly difficult intubation. When oral intubation with a direct laryngoscope fails, other airway management devices may be considered if mask ventilation is possible. Video laryngoscope [1], light wand [2], fiberoptic scope [3], or a supraglottic device [4] may be used; however, the most appropriate choice may be to use the method that the anesthesiologist is most familiar with and in which there is the greatest confidence in a successful outcome. Depending on the situation, a nasal intubation may be attempted, rather than an oral intubation, if the former is believed to be more favorable than the latter. The degree of difficulty in performing nasotracheal intubation with a fiberoptic scope is known to be less affected by the laryngeal view grade [5]. We report a case in which our initial attempt at oral intubation failed; subsequently, we performed oral intubation with a tube exchanger after

a fiberoptic nasal intubation.

CASE REPORT

A 68-year-old man (American Society of Anesthesiologists Class II, weight 70 kg, height 171 cm), who had been diagnosed with stage 4 squamous cell carcinoma of the maxillary sinus (#21-23 area) and had undergone three cycles of adjuvant chemotherapy, was admitted for near total maxillectomy and reconstruction with rectus abdominis muscle free flap operation. In addition to the cancer, he experienced hypertension, for which he was treated with an antihypertensive drug. Laboratory tests, electrocardiography, and chest x-ray results were all within the normal ranges. Mouth opening was 3 finger breadths (FB), and there was no limitation of neck

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Fig. 1. The patient showed a thyromental distance of 3.3 cm. A short thyromental distance (< 6 cm) is associated with difficult intubation.

extension. However, radiographic findings indicated a thyromental distance of 2 FB and retroposition of the mandible [6] (Fig. 1).

Induction of anesthesia was performed by pre-oxygenation, followed by intravenous injection of 4 mg/kg of thiopental sodium and 0.2 mg/kg of cisatracurium. There were no problem with mask ventilation after loss of consciousness. When a laryngoscope was used to check the airway for oral intubation, structures associated with the oral airway were not identified due to the limited glottic view (Cormack Lehane Grade IV) [7]. After the initial attempt at oral intubation under direct laryngoscopy had failed, a second attempt was made with a flexible fiberoptic scope, which also failed. Based on the determination that intubation through the nasal cavity may be more favorable than oral intubation due to the poor view, nasal intubation with a fiberoptic scope was attempted. Intubation was successfully performed by passing the fiberoptic scope through the nasal cavity, locating and entering the vocal cord, and finally inserting the nasal endotracheal tube while checking the tracheal ring. Exchange to oral intubation was required for total maxillectomy; thus, a 14 Fr. airway exchange catheter (AEC) (Cook airway exchange catheter, Cook Critical Care, Bloomington, IN, USA) was inserted; the exchange



Fig. 2. (A) The nasal RAE tube was inserted. (B) After inserting the tube exchanger through the nasal RAE tube, the nasal RAE tube was removed. (C and D) The tube exchanger is taken out through the mouth with a direct laryngoscope and Magill forceps. (E) The tube exchanger was taken out through the mouth. (F) The oral RAE tube was inserted through the tube exchanger. (G) The oral RAE had been inserted successfully.

to an oral endotracheal tube was safely performed after removing the nasal endotracheal tube (Fig. 2). During the intubation procedure, SpO₂ did not drop below 95%, while a single dose of 5 mg ephedrine was administered for a single episode of blood pressure fluctuation.

The operation was completed in 12 h without any major events. For safety reasons, extubation was performed on the day after the operation. Meanwhile, there were no complications associated with the general anesthesia.

Consent: Informed consent was obtained from the patient for the case report.

DISCUSSION

Nasotracheal intubation was first introduced by Kuhn and popularized by Magill [8]. Currently, it is used primarily for securing the airway for intraoral operation, due to concerns about morbidities, such as epistaxis and sinusitis. However, Tintinalli et al. reported that when nasotracheal intubation was performed on 71 patients, only one patient required nasal packing due to severe

hemorrhage [9]. Compared with oral intubation in patients with facial trauma, nasotracheal intubation is easier to perform; because of this advantage, operators prefer this method [10]. Especially in situations involving difficult or failed oral intubation, fiberoptic nasotracheal intubation has been reported to be an excellent alternative [3]. This is because manipulation of the fiberoptic scope is easier through the relatively straight nasal route, rather than the oral route that requires insertion through an acute angle.

When an experienced operator fails in two attempts at direct laryngoscope-assisted intubation, the case can be viewed as a difficult intubation case [11]. If mask ventilation is possible, other airway management devices may be considered [12]. Recently, clinical application of video laryngoscopy has been very helpful in resolving difficult intubation cases [1]. Moreover, the method of intubation after the insertion of a supraglottic device, such as a laryngeal mask airway, is also applied [4]. Meanwhile, the flexible fiberoptic scope has been in use for some time to resolve difficult intubation situations, and is especially useful for awake intubation [3,13]. In situations where oral intubation is impossible, and if fiberoptic can be used, then nasotracheal intubation may be attempted for airway management. Indeed, fiberoptic nasotracheal intubation is known to easily enable airway management, even when the laryngeal view is poor [5].

There are cases in which switching to nasal intubation becomes necessary for intraoral approach during an operation with oral intubation [1], or in which nasal to oral endotracheal tube exchange is necessary for nasal or facial surgery [14]. The method of switching from a nasotracheal tube to an orotracheal tube without extubation has been introduced [15], and there are reported cases of its use as well [14]. However, this method involves the nasal RAE tube itself being removed from the nose to the mouth; considering the rigidity of the tube, there are concerns of possible tissue injury during the process of removing the endotracheal tube from the oropharynx after passing through the

nasopharynx, as well as possible extubation due to the movement of the tube. In difficult airway patients with limited mouth opening, there may not be sufficient room to allow manipulation to remove the tube through the mouth.

By switching from a nasal to an oral approach with a tube exchanger, it becomes possible to perform the procedure, even with limited space inside the mouth [16]. Moreover, existing methods require two operators, whereas the method introduced in the present case offers the advantage of only requiring a single operator to perform the procedure. Compared with existing methods, the method of exchange using a tube exchanger is limited by the difficulty associated with preventing aspiration from nasal bleeding, which occurs after removing the nasoendotracheal tube. However, if the exchange can be made quickly with oral suction, blood aspiration may be avoided to a certain degree.

In conclusion, if oral intubation is absolutely necessary in a patient who presents difficult oral intubation, performing the fiberoptic nasal intubation and switching to oral intubation with a tube exchanger may be a viable alternative.

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REFERENCES

1. Ji S, Song J, Kim SK, Kim MY, Kim S. Fiberoptic bronchoscope and c-mac video laryngoscope assisted nasal-oral tube exchange: Two case reports. *J Dent Anesth Pain Med* 2017; 17: 219-23.

2. Jain S, Bhadani U. Lightwand: A useful aid in faciomaxillary trauma. *J Anesth* 2011; 25: 291-3.
3. Ovassapian A, Yelich SJ, Dykes MH, Brunner EE. Fiberoptic nasotracheal intubation--incidence and causes of failure. *Anesth Analg* 1983; 62: 692-5.
4. Chalam KS, Gupta J. Comparison of intubating laryngeal mask airway and fiberoptic bronchoscopy for endotracheal intubation in patients undergoing cervical discectomy. *J Anaesthesiol Clin Pharmacol* 2016; 32: 515-8.
5. Kim HW, Seo KS, Shin TJ, Kim HJ. The effect of laryngeal view grade and intraoral bleeding on intubation difficulty during fiberoptic nasotracheal intubation. *J Korean Dent Soc Anesthesiol* 2009; 9: 91-7.
6. King TA, Adams AP. Failed tracheal intubation. *Br J Anaesth* 1990; 65: 400-14.
7. Cormack RS, Lehane J. Difficult tracheal intubation in obstetrics. *Anaesthesia* 1984; 39: 1105-11.
8. Hall CE, Shutt LE. Nasotracheal intubation for head and neck surgery. *Anaesthesia* 2003; 58: 249-56.
9. Tintinalli JE, Claffey J. Complications of nasotracheal intubation. *Ann Emerg Med* 1981; 10: 142-4.
10. Rhee KJ, O'Malley RJ. Neuromuscular blockade-assisted oral intubation versus nasotracheal intubation in the prehospital care of injured patients. *Ann Emerg Med* 1994; 23: 37-42.
11. Combes X, Le Roux B, Suen P, Dumerat M, Motamed C, Sauvat S, et al. Unanticipated difficult airway in anesthetized patients: Prospective validation of a management algorithm. *Anesthesiology* 2004; 100: 1146-50.
12. Apfelbaum JL, Hagberg CA, Caplan RA, Blitt CD, Connis RT, Nickinovich DG, et al. Practice guidelines for management of the difficult airway: An updated report by the american society of anesthesiologists task force on management of the difficult airway. *Anesthesiology* 2013; 118: 251-70.
13. Kim H, So E, Karm MH, Kim HJ, Seo KS. Learning fiberoptic intubation for awake nasotracheal intubation. *J Dent Anesth Pain Med* 2017; 17: 297-305.
14. Cho JY, Kim HM, Ryu JY. A simple method of intraoperative intubation tube change. *J Korean Assoc Oral Maxillofac Surg* 2014; 40: 250-2.
15. Werther JR, Richardson G, McIlwain MR. Nasal tube switch: Converting from a nasal to an oral endotracheal tube without extubation. *J Oral Maxillofac Surg* 1994; 52: 994-6.
16. Lee SH, Kim JE, Kang JM. Alternative technique for changing from nasal to oral endotracheal tube for orthognathic and nasal surgery by using an airway exchange catheter: A case report. *Korean J Anesthesiol* 2014; 67: 48-51.