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Video Laryngoscope-Guided Fiberoptic Intubation in Patients with Unanticipated Difficult Airway: Two Case Reports

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Abstract **Case Report**

Fiberoptic intubation plays a crucial role in airway management. In particular, it is considered a basic method in difficult airway management. To enhance the success rate and feasibility of fiberoptic intubation, various adjunctive methods are often used concurrently. Video laryngoscope can be a valuable adjunct during fiberoptic intubation by ensuring visualization of laryngeal space and facilitating real-time monitoring of fiberoptic bronchoscope movements. In this report, we present our experiences with video laryngoscopy-guided fiberoptic intubation in patients with unanticipated difficult airway.

Keywords: Difficult airway; intubation; fiberoptic bronchoscope; video laryngoscope.

INTRODUCTION

Endotracheal intubation is one of the most important techniques in general anesthesia. A difficult airway encountered during intubation is a life threatening event that increases morbidity and mortality of patient. When encountering a difficult airway, severe complications such as neurological injury or death may occur due to improper judgement and planning regarding securing the airway [1]. According to a previous study, 30 percent of anesthesia-related death events were related to inadequate airway management [2]. Therefore, airway difficulty should be evaluated in advance during the pre-anesthesia visit by checking mouth opening, the Mallampati classification, thyromental distance, neck circumference, obesity, facial trauma, mustache, no teeth and history of difficult intubation [3].

The 2022 difficult airway management algorithm of the American Society of Anesthesiologists suggests that alternative intubation approaches should be considered when intubation fails after general anesthesia induction. There are alternatives including video laryngoscope, alternative laryngoscope blade, combined techniques, supraglottic airway, flexible bronchoscopy, introducer, lighted stylet or lightwand [1]. There are several case reports that managed a difficult airway by combining two different equipment [4, 5].

We report that video laryngoscope-guided fiberoptic intubation (FOI) was performed successfully in two patients with unanticipated difficult airway, along with a literature review.

CASE REPORT

Case 1

A 60-year-old man visited our hospital to undergo video assisted thoracic surgery for a mass in the right middle lobe of lung. There was no indication suggesting a difficult airway on pre-anesthetic airway evaluation. The airway management equipment including video laryngoscope, double lumen tube and fiberoptic bronchoscope were prepared for intubation. On arrival at the operating room, noninvasive blood pressure, electrocardiogram, pulse oximetry, bispectral index, and neuromuscular transmission were monitored. Anesthesia was performed with total intravenous anesthesia (TIVA) using propofol and remifentanil. The neuromuscular blocking agent used was rocuronium 60 mg. The facemask ventilation was performed successfully for 3minutes. The first attempt at endotracheal intubation using a video laryngoscope failed because the glottis opening was not visualized (Figure 1a). For the second attempt, a blade with a more angulated design, suitable for difficult airways, was substituted and utilized. While a portion of the glottis became visible, the insertion of the double-lumen tube was unsuccessful (Figure 1b). On the third attempt, a simultaneously application of the fiberoptic bronchoscope and video laryngoscope was employed. Endotracheal intubation was successfully performed and

adequate ventilation was confirmed through capnography.

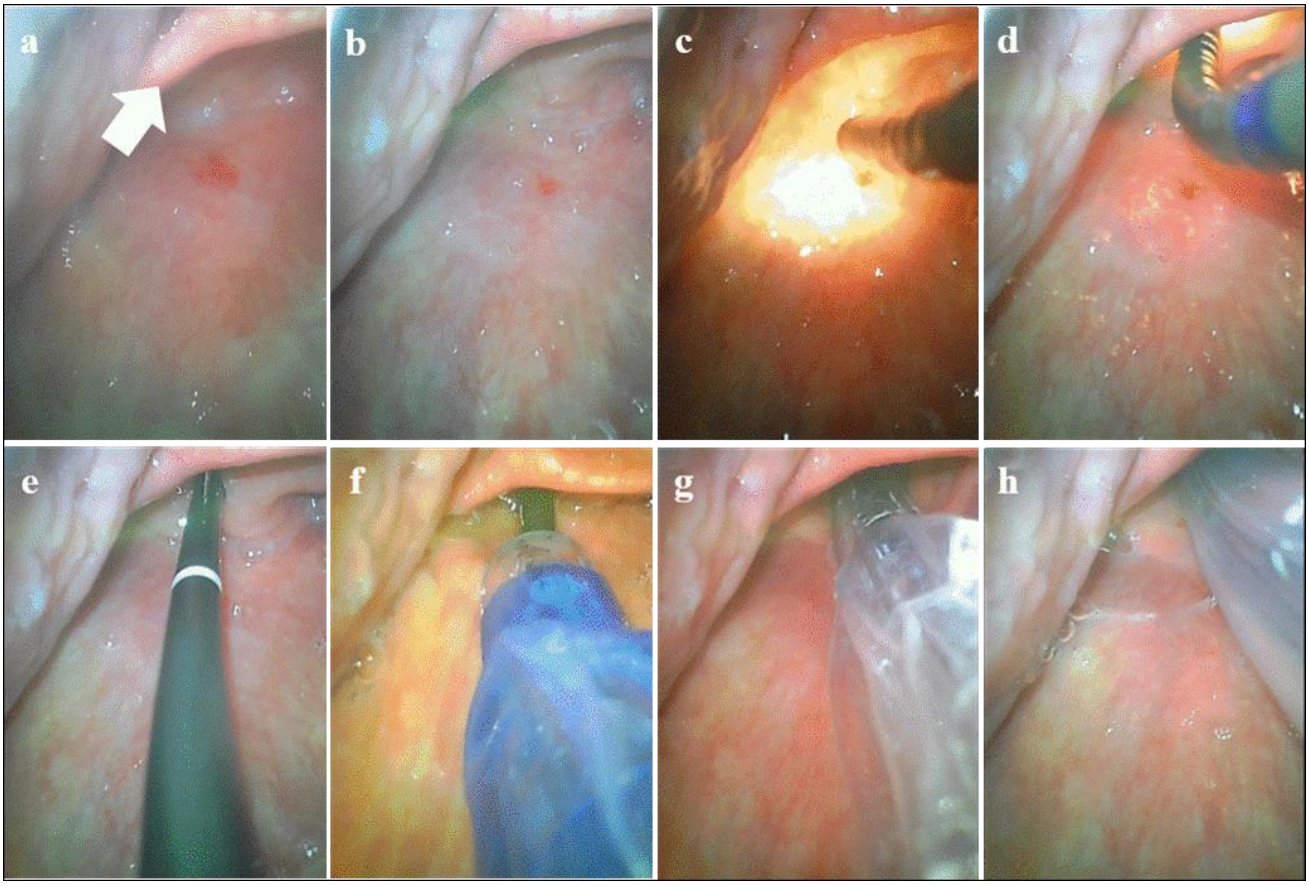

Figure 1: Video laryngoscopic views. a. Using the basic blade, b. Using the angulated blade, c-h. Video laryngoscope-guided fiberoptic intubation. When inserting the fiberopic bronchoscope downward through the posterior pharyngeal wall, initially observe the video laryngoscope screen until the tip of the bronchoscope is positioned below the epiglottis (white arrow). Subsequently, verify the glottis on the fiberoptic bronchoscope screen and advance it into the trachea. When inserting an endotracheal tube, refer to the video laryngoscope screen

Case 2

A 69-year-old woman visited our hospital to undergo clipping for right middle cerebral artery bifurcation aneurysm. The pre-anesthetic airway evaluation was near normal. Standard monitoring was conducted. TIVA was performed with propofol and remifentanil. 50mg of rocuronium was administered. The facemask ventilation was performed successfully for 3minutes. Endotracheal intubations were attempted using a video laryngoscope with/without angulated blade, however it failed because the glottis was not visualized (Figure 2a, b). Endotracheal intubation was performed successfully using video laryngoscope-guided FOI.

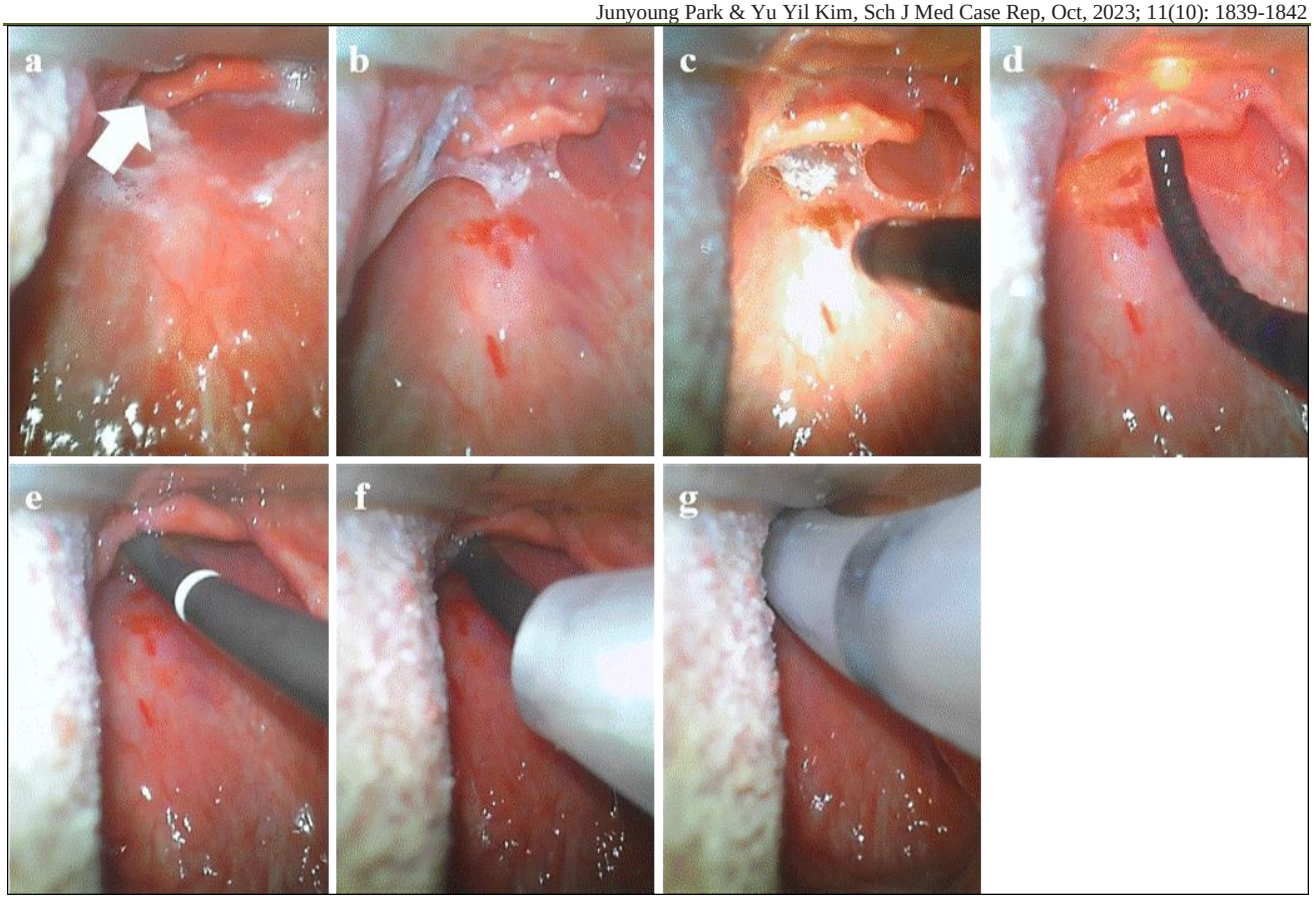

Figure 2: Video laryngoscopic views. a. Using the basic blade, b. Using the angulated blade, c-g. Video laryngoscope-guided fiberoptic intubation

The video laryngoscope-guided FOI was performed as follows: Firstly, an assistant secured a view of the larynx. Secondly, the main operator performed the endotracheal intubation using the fiberoptic bronchoscope. The fiberoptic bronchoscope movement was monitored in real-time through the screen of the video laryngoscope.

DISCUSSION

It is not easy to anticipate all difficult airways on pre-anesthetic airway evaluation, because bedside test has limitations in terms of sensitivity and specificity [6]. If there is a history of difficult intubation, additional tests such as CT and MRI may be performed. However, it is not appropriate in terms of cost and utility to perform such tests on all patients, and even if additional tests are performed, anesthesiologists inevitably encounter difficult airways. Therefore, the American society of Anesthesiologists and the Difficult Airway Society present a step-by-step approach on how to do when experiencing an unanticipated difficult airway [1, 7].

According to the difficult airway algorithm of the American Society of Anesthesiologists, if an intubation attempt fails after general anesthesia induction, the number of attempts should be limited and calling for help should be considered. After that, the most important factor is to check whether mask ventilation is appropriate through capnography. If capnography shows that ventilation is not appropriate, SGA device should be immediately considered. If capnography is not properly confirmed even through SGA, an emergency pathway including invasive access should be followed [1]. In the 2 cases we experienced, mask ventilation was done properly, we proceeded with the non-emergency pathway. At our hospital, video laryngoscope is used routinely during general anesthesia induction. If a difficult airway is anticipated in the pre-anesthetic evaluation, an angulated blade is prepared additionally. After first attempt failure, Second intubation was attempted using an angulated blade. Despite using an angulated blade, only the inferior portion of the vocal cord was secured in case 1, and the vocal cord could not be seen at all in case 2.

There are several studies that managed difficult airways by combining fiberoptic bronchoscope and video laryngoscope simultaneously [4, 5, 8-11]. According to one particular study [12], combining video laryngoscope and fiberoptic bronchoscope in a predicted difficult airway has advantages over other standard intubation techniques, such as increasing first-attempt intubation success and lowering airway injury incidence. Video laryngoscope is used to displace the tongue from the posterior pharyngeal wall to secure space for the fiberoptic bronchoscope to advance rather than to obtain a glottis view. The video laryngoscope-guided FOI is

performed as follows: The first participant insert a video laryngoscope into the oral cavity and displace the tongue from the posterior pharyngeal wall to clear the upper airway and facilitate tube passage over the fiberoptic bronchoscope. After that, the second participant is able to complete intubation by operating fiberoptic bronchoscope successfully. The fiberoptic bronchoscope movement is monitored in real-time through the screen of the video laryngoscope.

Limitation of this method is that it requires two operators. This limitation is not a major problem because the management of difficult airway intubation ideally needs more than two operators. If we intubate with only fiberoptic bronchoscopy, it is ideal that jaw thrust is performed by assistant to secure the airway.

CONCLUSIONS

Video laryngoscope and fiberoptic bronchoscope are both intubation tools with distinct advantages and disadvantages. The video laryngoscope-guided FOI can be a very useful option in patients with difficult airway.

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