The Journal of Emergency Medicine, Vol. ■, No. ■, pp. 1–4, 2017

0736-4679/$ - see front matter

http://dx.doi.org/10.1016/j.jemermed.2017.06.003

Clinical Communications: Adult

SUCCESSFUL RETROGRADE INTUBATION AFTER FAILED FIBEROPTIC INTUBATION AND PERCUTANEOUS CRICOTHYROTOMY

Stephanie Brenman, MD,* Sachin Gupta, MD,† and Stephanie Tseeng, MD*

*Department of Emergency Medicine, University of California-Los Angeles, Los Angeles, California and †Department of Anesthesiology, Olive View-UCLA Medical Center, Sylmar, California

Reprint Address: Stephanie Brenman, MD, Department of Emergency Medicine, University of California-Los Angeles, 924 Westwood Blvd, Suite 300, Los Angeles, CA 90095

☐ **Abstract—Background: An obstructive neck lesion presents an airway challenge for any emergency physician. Retrograde intubation is an infrequently used airway alternative that can be employed in the difficult airway algorithm that requires little training and is less invasive than surgical cricothyrotomy. Case Report: We report a case of a 31-year-old male patient who presented with respiratory distress progressing to respiratory failure from upper airway obstruction. The patient had significant tracheal thickening at the level of the thyroid gland based on a computed tomography report from 3 weeks prior to his presentation. Awake upright fiberoptic intubation and subsequent percutaneous cricothyrotomy were unsuccessful secondary to obstructive neck mass. We performed a retrograde intubation via tracheal approach and secured the airway via manipulation of a small-diameter endotracheal tube over the guidewire using visualization with video laryngoscopy. This case describes a combination of difficult airway techniques utilizing retrograde intubation with a Glidescope (Verathon Inc., Bothell, WA) as a rescue maneuver for a difficult airway secondary to a tracheal obstruction and supraglottic and subglottic stenosis. Follow-up confirmed the patient's diagnosis as granulomatosis with polyangiitis. Why Should an Emergency Physician Be Aware of This?: In cases of supraglottic and subglottic narrowing or mass lesions, retrograde intubation can be a life-saving technique that is an important consideration in the difficult airway algorithm. This technique may be combined with other difficult airway techniques and is especially relevant and potentially life-saving for patients in whom an open cricothyrotomy is undesirable, such as patients with a potentially vascular neck mass, subglottic stenosis, localized neck trauma, or morbid obesity.**

☐ **Keywords—airway management; retrograde intubation; difficult airway; neck mass; granulomatosis with polyangiitis; fiberoptic intubation; subglottic stenosis; video laryngoscopy**

INTRODUCTION

Retrograde intubation is an infrequently used airway alternative that can be employed when direct laryngoscopy is unsuccessful. It requires little training and is less invasive than surgical cricothyrotomy (1). However, since the advent of fiberoptic and video-assisted laryngoscopy, this technique has become less commonly used (2). Retrograde intubation is subject to fewer complications than open cricothyrotomy, but some reported complications include inability to locate the appropriate anatomical site, inability to pass the tube through the cords, or prolonged procedure time (1,3). This case illustrates the successful combination of retrograde intubation with video laryngoscopy after a failed fiberoptic intubation attempt in a patient with supraglottic and subglottic stenosis.

RECEIVED: 23 July 2016; FINAL SUBMISSION RECEIVED: 30 May 2017;
ACCEPTED: 2 June 2017

CASE REPORT

The patient was a 31-year-old, previously healthy man presenting to an emergency department with severe respiratory distress in the setting of progressive hoarseness for 6 months and subsequent inability to speak for the prior week. On arrival, his oxygen saturation was 80% on room air in triage, and he was placed on a nonrebreather facemask, with improvement in his oxygenation to 99%. The patient was initially awake, following commands, and responsive with head nodding. He brought reports of a computed tomography (CT) scan from an outside hospital 3 weeks prior to presentation that described circumferential tracheal thickening at the level of the vocal cords, without specific measurements noted or accompanying images, and he had not received follow-up care since that time. He denied chest pain, fever, or cough, but endorsed a 20-lb weight loss in the last 2 months. His initial examination revealed a thin man in acute respiratory distress with a respiratory rate of 30 breaths/min with suprasternal and abdominal retractions. His lungs were clear to auscultation bilaterally with minimal air movement, and auscultation over the neck revealed faint stridor. An initial blood gas revealed a pCO_2 of 85 with a pH of 7.27. A bedside chest x-ray study available immediately showed no acute cardiopulmonary disease. Heliox was not available from the respiratory therapist. We administered inhaled racemic epinephrine and intravenous dexamethasone to attempt to reduce possible airway edema because infectious or inflammatory etiology remained in the differential for the patient's acute decompensation. Discussion with Anesthesiology and Otolaryngology occurred shortly after initial evaluation, given concern for upper airway obstruction necessitating fiberoptic evaluation and possible tracheostomy. Over the subsequent minutes, the patient became progressively more agitated and then obtunded, requiring intubation for mental status and impending respiratory failure.

Intubation was attempted initially with an awake fiberoptic approach using nebulized lidocaine and a pediatric 3.8-mm fiberoptic scope. This revealed severe supraglottic narrowing with inability to visualize the vocal cords, although bubbling at the level of the obstruction was visualized. After multiple attempts at repositioning and cricoid manipulation, we remained unable to pass the fiberoptic scope beyond the arytenoid cartilage. During the initial attempts, the patient's pulse oximetry desaturated to the 70s, and the fiberoptic scope was removed. He was re-oxygenated using a laryngeal mask airway. We subsequently attempted video laryngoscopy in the upright position, which failed to visualize the vocal cords due to significant stenosis. We proceeded to lay the patient supine and prepared the neck for a cricothyrotomy. Using a percutaneous cricothyrotomy kit, we accessed the cricothyroid membrane with an 18-gauge needle, with aspiration of air. A guidewire was advanced through the needle, but was unable to pass significantly beyond the needle, despite multiple repositioning attempts. Based upon the description of the mass from prior CT, we had a high level of suspicion for an obstruction at the level of the cricothyroid membrane. We decided to attempt percutaneous tracheal aspiration at the level of the second tracheal ring space using the same equipment, which was successful. Subsequent caudad advancement of the wire was unsuccessful after multiple repositioning attempts, so we advanced the guidewire in the cephalad direction into the oropharynx. We then attempted retrograde intubation using assistance of a Glidescope (Verathon Inc., Bothell, WA). A wire was visualized exiting the supraglottic space, but attempts to pass both a 5-0 and 4-0 endotracheal tube were unsuccessful and resulted in brief hypoxia to the 60s. After the patient was re-oxygenated with a laryngeal mask airway, a 3-5 uncuffed endotracheal tube was passed over the guidewire only after the patient coughed, revealing a narrow view of the compressed vocal cords. The tube was secured, and the guidewire was retracted 2 cm and secured to the chest. The patient's oxygen saturation improved to 100%. The otolaryngologist arrived and used the guidewire to convert to an open tracheostomy at the bedside with significant difficulty. Eventually, a 4-0 uncuffed endotracheal tube was placed in the tracheal opening and the patient was taken to the operating room for a formal tracheostomy immediately. Once the patient had stabilized, a CT scan was performed, which revealed near-complete upper airway obstruction (Figure 1).

The patient developed complications, including postobstructive pulmonary edema with subsequent acute respiratory distress syndrome and a pneumothorax, which were treated effectively. Subsequent tracheal biopsy revealed a diagnosis of granulomatosis with polyangiitis, and the patient was started on appropriate treatment, with significant improvement of tracheal thickening on subsequent imaging. He was discharged from the hospital in stable condition with his formal tracheostomy in place, and reports no significant sequelae upon follow-up ED encounter for a medication refill.

DISCUSSION

Retrograde intubation has been well described in the literature as a rescue airway technique, which was more commonly used prior to development of fiberoptic scopes and video-assisted laryngoscopy (2). Although nearly half of emergency medicine residency programs have a retrograde intubation kit, its use as a rescue tool is extremely rare (4,5). However, this technique remains an important option in the event one does not have