A case report of retrograde intubation as rescue procedure in unanticipated difficult airway: an old technique still relevant in low resource settings

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Abstract

In cases with an unanticipated difficult airway, retrograde intubation can be used as an alternative procedure for airway management when a fiber optic bronchoscope is unavailable. We here report a case of successful management of an unanticipated difficult airway following a failed intubation in a 34-year-old 54 kg male patient with carcinoma lateral border of tongue using retrograde intubation guided technique. Maintaining oxygenation and minimizing airway trauma should be the priority following a failed intubation. Decisions seeking alternative techniques following failed intubation are easy, if valid and applicable techniques (as per anesthesiologist’s skills and available resources) are discussed before induction of anesthesia.

Key words: airway management; difficult airway; endotracheal intubation; failed intubation; retrograde intubation

doi: 10.4103/2045-9912.337998
How to cite this article: Tiwari T, Sharma B, Rajput SK. A case report of retrograde intubation as rescue procedure in unanticipated difficult airway: an old technique still relevant in low resource settings. Med Gas Res. 2022;12(4):158-160.

INTRODUCTION

Management of difficult airway is always a challenge for anesthesiologists and emergency physicians. Proper preoperative evaluation of airway helps in predicting difficult airways and thereby reduces associated morbidity and mortality by proper planning. However, we should always remember that no test is reliable enough and one should be prepared for difficult airway at all times.1

Preventing hypoxic damage to the brain with effective oxygenation and limiting airway trauma remains the cornerstone for the management of unanticipated difficult airways following induction of anesthesia. Conceptualization and preparation for a backup plan in an event of failure is always rewarding for the anesthesiologist and is the philosophy behind the airway guidelines by Difficult Airway Society.2

Retrograde intubation is an easy technique which requires only few equipment and once learned has a high level of skill retention.3

CASE REPORT

A 34-year-old, 54 kg, 154 cm, American Society of Anesthesiologists Physical Status I, Indian male patient was scheduled for an elective wide local excision for carcinoma right lateral border of the tongue. His airway examination revealed an interincisor distance of 6.5 cm, a thyro-mental distance of 7 cm, with no restriction of neck movement, mallampati class of III, and bilateral nasal patency of the patient was also found to be adequate. Other than mallampati grade of 3, no other parameter of difficult airway was present and hence rapid induction with nasotracheal intubation was planned using conventional direct laryngoscopy. Due to unavailability of fiber-optic bronchoscope, retrograde intubation and surgical tracheostomy were our backup plans in the event of failure. Proper explanation of the procedure and consent for tracheostomy was obtained from the patient.

In the preoperative room injection glycopyrrolate (Neon Laboratories Ltd., Mumbai, India) 0.2 mg intramuscularly along with nasal instillation of 0.1% xylometazoline (Novartis Ltd., Mumbai, India) nasal drops in both the nostrils was given 30 minutes before the surgery and 16-gauge intravenous (IV) cannulation was done in the left forearm. Routine monitoring using pulse oximeter probe, non-invasive blood pressure, and electrocardiogram were attached, and monitoring was started on arrival in the operating room. Oxygen supplementation using nasal cannula at 3–4 L/min and pre-oxygenation with 100% oxygen for 4 minutes with adequately fitted facemask was started and general anesthesia was induced using fentanyl (2 µg/kg; Celon Labs Ltd., Hyderabad, India) IV and 1% (w/v) propofol (2 mg/kg; Neon Laboratories Ltd.) IV. With visible chest rise with bag and mask ventilation, succinylcholine (100 mg; Neon Laboratories Ltd.) IV was given. Armored tube with an internal diameter measuring 7.5 mm was inserted and proceeded through the right nares, under direct laryngoscopy (McIntosh#3) for nasal intubation, Cormack Lehane grade 3 view (epiglottis was visible with no view of the glottis) was appreciated even with optimal external laryngeal manipulation. To reduce the risk of hypoxemia, peri-intubation oxygenation was continued with the nasal cannula at 6 L/min throughout the procedure. A repeat attempt with mcintosh #4 blade and gum elastic bougie found that the epiglottis was not liftable and attached to the pharynx (Cormack Lehane grade 3b). No further attempts were performed to limit the airway trauma and associated risk of conversion into cannot ventilate situation. Oxygen saturation of the patient during the process remained above 95%.

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As the fiber-optic bronchoscope was unavailable, we decided to proceed with our backup plan of retrograde intubation. Intermittent bag and mask ventilation continued until the effect of succinylcholine disappeared. Once the patient was awake and breathed spontaneously, the patient was maintained in a supine position with slight neck extension and head elevation (Figure 1A). Peri-intubation oxygenation using nasal cannula was continued throughout the procedure (Figure 1A). Following strict asepsis under local anesthesia infiltration, the crico-tracheal membrane was punctured with an 18-gauge needle and the laryngeal lumen was identified by free aspiration of air through a saline-filled syringe (Figure 1A). Sterile flexible straight tipped guide-wire (TerumoTM, Tokyo, Japan; length 150 cm, size 0.018”) was then gently introduced and navigated through the needle bore to be retrieved from the right nostril (Figure 1B and C). A flexible bougie was railroaded over the guidewire with both ends of the guidewire carefully secured under direct vision. Flexometallic endotracheal tube was then railroaded over the bougie- and guide-wire (Figure 1D and E) with adequate use of lubricant water-based jelly to prevent any injury. After confirming the end-tidal carbon dioxide waveform, guidewire and bougie were removed and anesthesia was induced with IV propofol (2 mg/kg; Neon Laboratories Ltd.) and vecuronium (0.1 mg/kg; Neon Laboratories Ltd.). Anesthesia was maintained with intermittent positive pressure ventilation using oxygen, 1% to 2% sevoflurane (Baxter India Ltd., Gurgaon, India), and nitrous oxide. At the end of the surgery, the residual neuromuscular blockade was reversed using IV neostigmine (0.05 mg/kg; Neon Laboratories Ltd.) and glycopyrrolate (10 μg/kg; Neon Laboratories Ltd.).

The patient was conscious and following commands. He was shifted to the post-operative evaluation room (oncology intensive care unit) with endotracheal tube in-situ on T-piece with 4 L/min oxygen. His subsequent recovery was uneventful with mild discomfort reported for the retrograde intubation in the post-operative period.

The patient has given his consent for his images and other clinical information to be reported in the journal. The ethical approval is waived by the institutional review board of our hospital owing to the retrospective nature of the study and routine treatments performed on this patient in clinical practice. The writing and editing of the article were performed in accordance with the CASe REports (CARE) guidelines.

**DISCUSSION**

Tracheal intubation using conventional direct laryngoscopy remains the method of choice in most cases for airway management. But, direct laryngoscopy and intubation may be difficult in 1% to 4%, and impossible in 0.05% to 0.35%, of patients who have seemingly normal airways.9

Retrograde intubation was first described in 1960 by Butler and Cirilio5 and since then various studies6,7 have described the utility of this technique.

Retrograde intubation is one of the optional techniques which can be utilized for effective airway management in the absence of fiberoptic bronchoscope with minimal complications.5,6,7 The procedure includes a provision of non-surgical translaryngeal airway access to facilitate a guided orotracheal or nasotracheal intubation. Loss of vision with blood and secretions as seen with fiberoptic bronchoscope is not an issue with this technique and is therefore beneficial in such instances. Although the level of invasiveness of this procedure in comparison with a surgical tracheostomy is less, still the unfamiliarity and exaggerated perception of invasive nature has made this technique less practiced and taught.8

We utilized a flexible straight tipped urology guidewire (TERUMO GlideWire™) other than the central venous catheter guidewire because of hydrophilic coating which provides unmatched lubricity and kink resistance8 and thereby reducing chances of inadvertent injury to the airway, also the extra length of the urology guide-wire provides additional safety against catheter getting lost during the procedure.

In our case, the guidewire was retrieved naturally from the right nostril which can be explained by the suitable curvature and minimal resistance offered by nasal passage over the oral route. The angle of curvature provided by nasal exit is more obtuse and much better aligned in comparison to the oral exit, thereby making the guidewire follow the path of least resistance.9

No additional sedative drug during the procedure other than the inducing dose of propofol for direct laryngoscopy and intubation was given to mitigate the risks of oversedation and apnoea. Time taken from cricotracheal membrane puncture and visible end-tidal carbon dioxide waveform in our case was less than 5 minutes (280 seconds) and the patient was intubated in the first attempt which was similar to previous studies by Barriot and Riou10 and Tiwari et al.7

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**Figure 1: Retrograde intubation.**

Note: (A) Identification of laryngeal lumen using a saline-filled syringe with neck extension and oxygenation using a nasal cannula. (B) Flexible guide wire introduction through the needle bore and then directed cranially for retrieval. (C) Retrieval of the guidewire from the right nostril with both ends of guidewire secured. (D) Bougie rail roaded over the guidewire with the distal end of the guidewire secured with the other hand. (E) Flexometallic endotracheal tube railroaded over bougie and fixed after confirmation.
While this is only one case report, it does explain the utility of retrograde intubation as an alternative method in difficult airway management especially in the absence of fiberoptic bronchoscopes. As most of the steps involved are routinely practiced by the anesthesiologist (like local anesthesia infiltration, needle cricothyroidotomy, guide wire passage, railroad ing over an introducer, and use of sedation if required) this procedure can be easily learned and practiced.

Training during residency programs using audiovisual methods, simulation on manikins and cadavers can bring a resurgence of this forgotten simple technique, which is time-tested and is a valuable component of airway management armamentarium.

Author contributions
Conceptualization, methodology, manuscript reviewing and editing, supervision: TT; original manuscript drafting and data curation: BS; software and visualization: SKR. All authors revised the manuscript and approved the final version.

Conflicts of interest
No potential conflict of interest relevant to this article.

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Date of submission: May 20, 2021
Date of decision: June 24, 2021
Date of acceptance: August 30, 2021
Date of web publication: April 17, 2022