Journal of Craniomaxillofacial Research

Vol. 6, No. 2 Spring 2019

Retrograde fiberoptic intubation

Babak Babakhani [1], Mohammad Moharrami [2], Amir Jalal Abbasi [2,3*]

1. Brain and Spinal Cord Injury Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran.

2. Craniomaxillofacial Research Center, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.

3. Department of Oral and Maxillofacial Surgery, Sina General Hospital, Tehran University of Medical Sciences, Tehran, Iran.

ARTICLE INFO

Article Type:
Teqnichal Note

Received: 2 Nov. 2018
Revised: 8 Jan. 2019
Accepted: 15 Mar. 2019

**Corresponding author:*
Amir Jalal Abbasi

Craniomaxillofacial Research Center, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.

Tel: +98-21-84902473
Fax: +98-21-84902473
Email: aj-abbasi@Tums.sc.ir

ABSTRACT

This technical note aims to introduce a new approach for intubation of patients with restricted mouth opening in cases that conventional and fiberoptic-assisted endotracheal intubation are not possible. The proposed technique is a modification to the previously well-established retrograde intubation method. The main advantage of this new technique is the employment of fiberscope for direct visualization which eliminates the use of guide wire. The endotracheal tube enters through the nostril and is railroaded using the fiberscope as a guide. Using this new technique can prevent the complications of tracheostomy and the traditional retrograde intubation in patients that anterograde intubation is not feasible. The promising result of conducting the intubation with this approach can be considered the basis for future clinical investigation.

Keywords: Fiberscope; Modified retrograde intubation; Direct visualization.

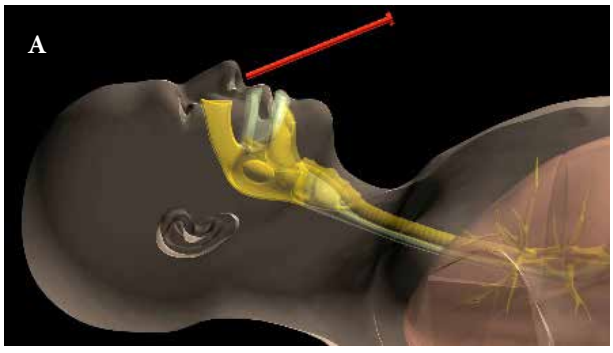
Introduction

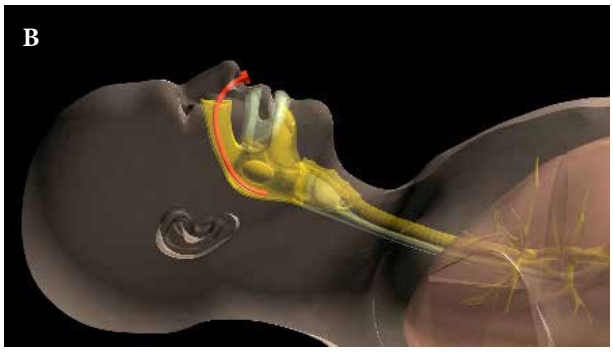
Vital organ hypoxia, cardiac arrest, or death may result from unsuccessful or delayed endotracheal intubation in cases of difficult airways and emergencies [1,2]. Retrograde intubation techniques have been used for over 50 years as an alternative for tracheostomy in such instances [3-5]. There have been many modifications to the retrograde intubation over the years which made its application easier for both experienced and young clinicians and improved its success rate [6]. The compiled experiences resulted in more efficient retrograde intubation techniques compared with the direct laryngoscopy for the problematic airways regardless of the clinician experiences [7]. In the retrograde technique, a guide is inserted precautansouly in the larynx which helps the endotracheal tube (ETT) to be railroaded to the larynx directly. Therefore, the need for identifying the laryngeal inlet (glottic opening) is eliminated which can be considered the main advantage of this technique. The promising data are available regarding the application of the retrograde technique and it is also charted as one of the applicable methods for difficult airway intubations by American Society of Anesthesiologist [8].

However, there are still some limitations and complication regarding the application of retrograded techniques. The main reasons for morbidity and mortality are due to the fact that retrograde intubation is a blind technique which may cause several complications such as injury and distortion of the normal anatomy of the neck which in turn may result in suboptimal ventilation and further on nasal intubation is almost impossible in restricted and complicated mouth opening cases [9-11]. Some authors suggested that the use of flexible fiberoptic endoscope for difficult airway intubations could be a promising alternative for traditional retrograde wire-guided intubation [12-14]. The main advantage of fiberoptic intubation is a direct visual control of the intubation procedures [15]. Fiberoptic nasal intubation may be used for the anterograde applications in patients with restricted mouth opening in pathological conditions such as temporomandibular joint (TMJ) ankylosis, oral submucous fibrosis (OSMF), infections in the head and neck region, or in non-pathologic conditions such as traumas to TMJ and jaw. However, anterograde application of fiberscope may not be feasible when there are considerable blood and secretions, pathologic lesions in the pharynx and pharyngeal and retropharyngeal abscess. Thus, the authors in this report tried to devise a new technique using fiberscope to avoid the complications of tracheostomy and the traditional retrograde intubation in patients that anterograde intubation is not feasible. A novel modification to the retrograde technique using fiberscope as a guide for nasal ETT is proposed for patients with limited mouth opening.

Technical Note

All the procedures in this study were performed on a cadaver of a thirty-year-old female patient who had died of leukemia three days before the procedure took place. The cadaver was donated for research purposes to the Department of Anatomy of Tehran University of Medical Sciences. To better demonstrate the endotracheal intubation procedure, besides images of the operation on the cadaver, the steps have been illustrated in schematic images .The cadaver was placed in a neutral supine position similar to the operation room set up. Shoulder roll and head rest were used in order to achieve more straight upper airway anatomy. The procedure began with introducing a 7mm nasopharyngeal airway (Robertazzi Airway, Telefex, NC, USA) to the nasopharynx (Fig. 1A and B). A 5mm horizontal skin incision at the cricothyroid membrane was performed (Fig. 2A, B, and C); the blunt and conservative dissection was followed horizontally and vertically. Next, in cephalad direction, similar to percutaneous dilated tracheostomy technique, the incision was dilated employing a 4mm dilatator, and then a 5mm cannula was inserted over the dilatator, and the dilatator was then removed. The flexible fiberscope (Olympus LF-P tracheal intubation fiberscope [2.2mm outer diameter], Olympus Inc., NY, USA) was introduced to the cannula and was passed in a cephalad direction through the larynx and nasopharynx (Fig. 1C, Fig. 2D), while real-time visualization of inner structures was being conducted. The fiberscope was directed to the nostril through the nasopharyngeal airway that was inserted into the nostril in the first place (Fig. 1D, Fig. 2E). The bag and mask ventilation should be stopped at this step in real alive cases to remove the nasopharyngeal airway (Fig. 1E). A 7mm cuffed ETT (Murphy cuffed endotracheal tube (Tri-anime Inc., CA., USA) was gently introduced over the fiberscope (Fig. 2F). The endotracheal tube then advanced from the nostril all the way down through the nasal cavity, nasopharynx, epiglottis, vocal cords, and larynx until it reached the proximal inner part of the fiberscope (Fig. 1F, Fig. 2G). Then the fiberscope was removed from the stoma in the patient's neck, and the ETT advanced further more to reach the carina of the trachea, which could be confirmed by anterograde endoscopy or auscultation of the symmetric lung sounds in alive cases (Fig. 1G). The procedure time from begging of the incision to the final placement of the ETT in the trachea lasted 140 seconds.





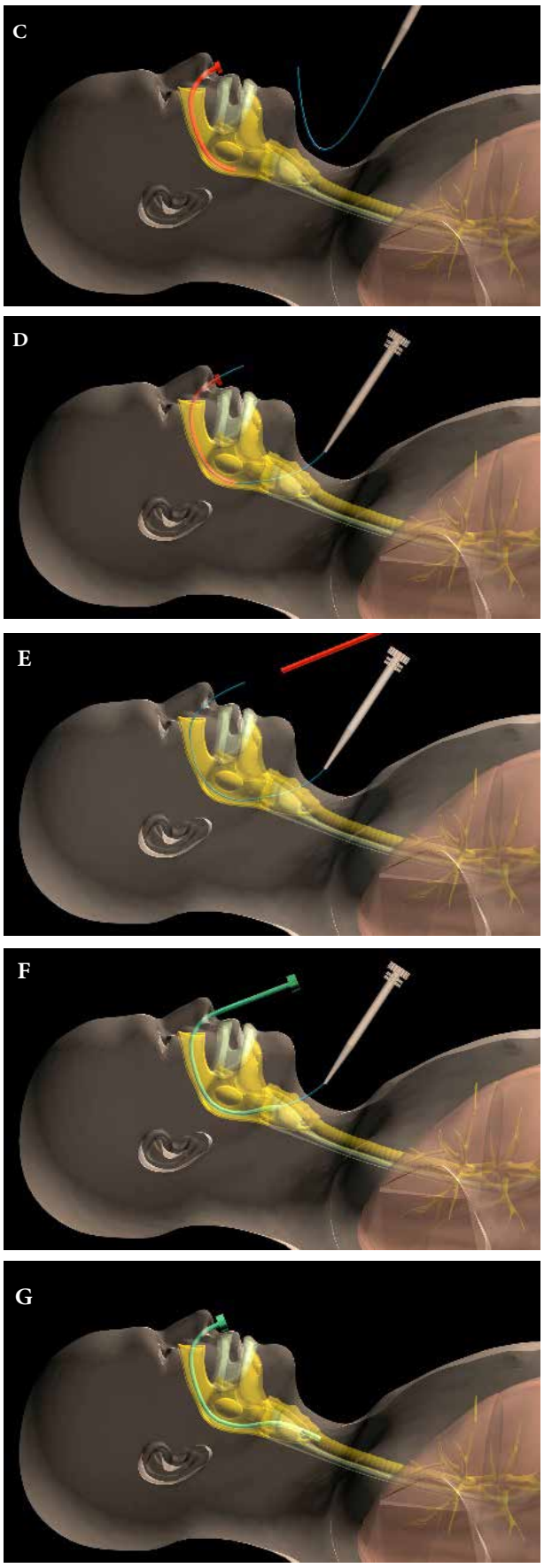


Figure 1. The schematic presentation of the fiberoptic retrograde intubation.

F

G

Figure 2. Fiberoptic retrograde intubation on the cadaver.

Discussion

The retrograde intubation is a preferred method compared to tracheostomy when conventional intubation is not feasible, and it can be used for emergency and planned intubation. There are many variations to this technique based on the patient condition. In one of these modifications, authors tried to incorporate fiberoptic scope to the traditional system to cope with blindness problem during the procedure [15-17]. However, unlike the method used in the present study, those studies used the fiberoptic scope as a carrier for ETT. The ETT was loaded on a fiberoptic scope and followed the track of a guide wire placed by retrograde technique. Alternatively, some authors just used the fiberscope to illuminate the path of the guide wire in the retrograde technique [13]. However, in the present study we introduced a new approach to the retrograde technique in which the wire guide was not needed anymore, and the fiberscope itself could play the key role as a guide for ETT. We simulated the clinical condition in which the anterograde approach with fiberscope was not feasible because of the difficulty in identifying the laryngeal structures due to significant soft tissue swelling and secretions or distorted airway anatomy in patients with restricted mouth opening.

The development of technology and availability of the new instruments made this approach possible as we could use the small diameter (2.2mm) fiberscope for the retrograde approach. Up to the authors' knowledge, the use of fiberscope in a retrograde approach as a guide for ETT was reported in two other studies as well. However, in both studies, the distal end of fiberscope was retrieved from the mouth [3,18]. Besides that, there were some differences regarding the methodology. In one study the patient had undergone a previous tracheostomy procedure which was not sufficient for the proper ventilation. Therefore, the previous entrance made for tracheostomy was used for the fiberscope which was different in size and site from the present study [3]. In the other study, a 4.4mm fiberscope was used as an assist to guide the wire, and ETT railroaded over the guide wire and not the fiberscope [18].

The novel technique presented in the present report is particularly useful for patients with severe restricted mouth opening. Traditionally, in these cases, if attempts fail for conventional and fiberoptic-assisted endotracheal intubation through the nose because of secretions, TMJ ankylosis, maxillofacial trauma, pathologic lesions in the pharynx or pharyngeal and retropharyngeal abscess, the last traditional approach would be tracheostomy. That being said, despite that our suggested technique can reduce the need for tracheostomy and its complications, there are still some limitations that should be pointed out. First, the fiberscope is still considered as an expensive instrument; besides that, it is technically demanding, and clinicians need much experience to use it properly. Second, since the size of the stoma made on the neck for the entrance of the fiberscope is larger than those made for the wire-guide approach, it may increase the chance of post-operative complications and infections. Third, although the results of this new technique were promising, without in vivo clinical study, the result cannot be extended to the clinical settings.

Conflicts of Interest

There is no conflict of interest to declare.

References

[1] Weksler N, Klein M, Weksler D, et al. Retrograde tracheal intubation: beyond fibreoptic endotracheal intubation. Acta Anaesthesiol Scand 2004; 48:412-6.

[2] Dhara SS. Retrograde tracheal intubation. Anaes-

thesia 2009; 64:1094-104.

[3] Sawardekar A, Jagannathan N, Patel PK, Nadkarni A. Retrograde fiberoptic technique to avoid tracheostomy in a patient with a tracheocutaneous fistula and Treacher Collins syndrome. J Craniofac Surg 2011; 22: 255-6.

[4] Butler FS, Cirillo A. Retrograde tracheal intubation. Anesth Analg 1960; 39:333-8.

[5] Barriot P, Riou B. Retrograde technique for tracheal intubation in trauma patients. Critical care medicine 1988; 16:712-3.

[6] Bhola N, Jadhav A, Borle R, Khemka G, ali Ajani A. Awake endotracheal retrograde intubation in restricted mouth opening: a 'J'-tipped guide wire technique—a retrospective study. Oral Maxillofac Surg 2014; 18: 393-6.

[7] Sanguanwit P, Trainarongsakul T, Kaewsawang N, Sawanyawisuth K, Sitthichanbuncha Y. Is retrograde intubation more successful than direct laryngoscopic technique in difficult endotracheal intubation? Am J Emerg Med 2016; 34:2384-7.

[8] Apfelbaum JL, Hagberg CA, Caplan RA, et al. Practice guidelines for management of the difficult airwayan updated report by the American Society of Anesthesiologists task force on management of the difficult airway. Anesthesiology 2013; 118:251-70.

[9] Wijesinghe HS, Gough JE. Complications of a retrograde intubation in a trauma patient. Academic Emerg Med 2000; 7:1267-71.

[10] Bowes WA, Johnson JO. Pneumomediastinum after planned retrograde fiberoptic intubation. Anesth Analg 1994; 78:795-7.

[11] Gill M, Madden MJ, Green SM. Retrograde endotracheal intubation: an investigation of indications, complications, and patient outcomes. Am J Emerg Med 2005; 23:123-6.

[12] Jain G, Singh DK, Yadav G, Gupta SK, Tharwani S. A modification in the tube guide to facilitate retrograde intubation: a prospective, randomised trial. Indian J Anaesth 2011; 55:499.

[13] Dey S, Ninu M, Yunus M, Syiemiong N. Fiberoptic Guided Retrograde Intubation in an Anticipated Difficult Airway: Revival of an Antiquated Technique. J Clin Diagn Res 2016; 10:UD06-UD07.

[14] Lechman MJ, Donahoo JS. Endotracheal intubation using percutaneous retrograde guidewire insertion followed by antegrade fiberoptic bronchoscopy. Crit Care Med 1986; 14:589-90.

[15] Bissinger U, Guggenberger H, Lenz G. Retrograde-guided fiberoptic intubation in patients with laryngeal carcinoma. Anesth Analg 1995; 81:408-10.

[16] Audenaert SM, Montgomery CL, Stone B, Akins RE, Lock RL. Retrograde-assisted fiberoptic tracheal intubation in children with difficult airways. Anesth Analg 1991; 73:660-4.

[17] Gupta B, McDonald JS, Brooks JH, Mendenhall J. Oral fiberoptic intubation over a retrograde guidewire. Anesth Analg 1989; 68:517-9.

[18] Rosenblatt WH, Angood PB, Maranets I, Kaklamanos IG, Garwood S. Retrograde fiberoptic intubation. Anesth Analg 1997; 84:1142-4.

Please cite this paper as:
Babakhani B, Moharrami M, Abbasi AJ; Retrograde fiberoptic intubation. J Craniomax Res 2019; 6(2): 80-84