Original article

Effect of Second Person Aid for Upward Displacement of Laryngoscope on Laryngeal View during Laryngoscopy

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Abstract:

Introduction: Difficulties or failure in airway management is among leading causes of death due to anesthesia. Secure airway management necessitates an acceptable level of prediction, regarding the probability of difficult intubation and in occasions of difficulty, quick lifesaving reaction is required. This study aimed to assess a novel manual technique that enhances the exposing of laryngeal view by upward displacement of laryngoscope.

Methods: In this study, 300 patients in the age range of 18-88 and ASA class I and II were studied. Mallampati score of each patient was estimated before intervention. After anesthesia, an expert would attempt laryngoscopy and laryngeal view was recorded. Immediately after checking laryngeal view by the first expert, a second person aide and lifts the laryngoscope upward in order to provide a better laryngeal view, then the new laryngeal view is recorded.

Findings: A significant improvement was shown in patients' laryngeal view after performing the upward lifting of the laryngoscope (P value < 0.001).

Conclusion: The result of this research indicates that the simultaneous upward displacement of laryngoscope during laryngoscopy provides a better laryngeal view for the clinician, making the process of intubation easier and more successful.

Keywords: Laryngeal View, Laryngoscopy, Tracheal Intubation, Upward Displacement

Introduction:

Difficulties or failure in airway management is one of the major causes of death due to anesthesia. This may occur because of difficulty in visualizing a patient airway during laryngoscopy and thus eventuating in unsuccessful intubation, which will threaten oxygenation of the patient and ultimately results in death or severe neurological sequelae (1, 2). The reported incidence of difficult laryngoscopy is experienced in a range of 1.5% to 20% of patients (3, 4). Secure airway management necessitates a definitive prediction regarding the probability of difficult intubation in the first place (5). To avoid probable difficulties and complications, different methods have been established for

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prediction of difficult intubation before anesthesia, most of which rely on the use of Mallampati score. Mallampati score, also known as Mallampati classification, is an indirect method for assessing the easiness of intubation. In this method, patients are asked to open their mouth making the oral cavity visible. Scoring depends on degree of visibility. The higher the score, the more difficult the intubation is (6).

Patient's history, structures and anatomy of oral cavity, pharynx and larynx along with cervical spine mobility are among factors which must be assessed preoperatively (2, 7). Irrespective of the applied techniques, a maximum of three attempts should be considered as failure in tracheal intubation and persuade the clinician to seek another alternative procedure in maintaining an open airway (8). So far, different methods have been suggested in previous studies for times of difficult intubation, among which changing laryngoscope type and blade, use of a guide in the tube, maneuver of repositioning of patient's head, retrograde intubation, lighted wand and flexible fiberoptic scope can be mentioned (2, 9). The key point in airway management is that the top priority should be maintaining an uninterrupted oxygenation and ventilation, and not accomplishing a specific technique at any costs, particularly if difficulties are anticipated (10). In this study, we aimed to assess and suggest a new method for better visualization of larynx during laryngoscopy by upward displacement of laryngoscope and consequently bringing about an easier intubation procedure.

Methods:

In this clinical trial study, 300 patients with the age range of 18 to 88years old and ASA class I and II, who underwent tracheal tube insertion in various elective surgeries, were studied. Exclusion criteria consisted of uncontrolled hypertension, high intracranial pressure, coagulopathies and patients with full stomach. Before conduction of the operation, all patients were evaluated regarding airway and Mallampati score. An informed written consent was provided from each participant of the study; also approval for this study was obtained from the local ethics committee of Shiraz University of Medical Sciences.

Afterwards, patients were administered Midazolam 0.05 mg/Kg and Morphin 0.1 mg/Kg as premedication. 4-7 mg/kg Sodium thiopental was used for induction of general anesthesia and 0.5 mg/Kg Atracurium besylate as a non-depolarizing muscle relaxant. Three minutes after injection of muscle relaxant drug, a senior anesthesiology resident or an anesthesiology expert with more than 2 years of experience would perform the laryngoscopy by the use of Macintosh blade procedure and record the degree of laryngeal view according to a modified classification of the Cormack and Lehane scoring system for grading of direct laryngoscopy reported by Yentis et al (9). The first expert could exert the maximum pulling upward without any assistance. Patients' head were positioned in sniffing position; 35 degrees neck flexion and 15 degrees head extension. Simultaneously, a second expert would aid and pull the laryngoscope handle upwards. The pressure, which the 2nd expert would apply to the laryngoscope during the upward displacement, was 20 newtons. Marinating

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the same pressure for all patients was accomplished by the 2nd expert standing on a scale and pulling the laryngoscope enough to increase his weight as much as 2 kgs. Then, the laryngeal view was determined for the 2nd time and intubation was completed. No other maneuvers such as BURP or Sellick were performed during laryngoscopy. Although different anesthesiology experts participated in the process of this study, all were educated sufficiently on how to conduct upward movement of the laryngoscope to achieve the same pressure, 20 newtons, for all patients. The data were collected, analyzed and reported as mean and standard deviation (mean± SD). Statistical calculations were performed by Friedman test, Wilcoxon signed-rank test and Spearman's rank correlation using SPSS software version 16.

Findings:

In this clinical trial study, a total of 319 subjects including 194 (60.8%) male and 125 (39.2%) female patients with the age range of 18 to 88 years old (Mean= 48.62, SD= 19.19), who underwent various elective surgeries, participated. Height of the patients was between 60 to 188 cm (Mean= 163.39, SD= 12.18). Weight range was between 6 to 106 kg (Mean= 65.83, SD= 13.82). Patients' Mallampati score was distributed in 4 classes before intervention (Table 1). The results showed a significant improvement in laryngeal view of the patients after upward displacement of laryngoscope in comparison to the laryngeal view before lifting (P value< 0.001).

Table 1: Mallampati Score; Laryngeal View: Before and After Upward Displacement

Mallampati Score			Laryngeal View				
				Before Upward Displacement		After Upward Displacement	
	Frequency	Percent		Frequency	Percent	Frequency	Percent
I	159	49.8	I	125	39.2	220	69.0
II	130	40.7	IIa	105	33.0	68	21.3
			IIb	72	22.5	28	8.8
III	29	9.1	III	15	4.7	2	0.6
IV	1	0.3	IV	2	0.6	1	0.3

Discussion:

As a concern for anesthesiologists, improving laryngeal view has motivated many researchers to seek better and more efficient approaches. A common method, known as backward-upward-rightward pressure (BURP), has been proved to facilitate glottic view in retrograde light-guided laryngoscopy for tracheal intubation (11). A study evaluating laryngeal view in three different methods, suggested bimanual laryngoscopy as the best way of obtaining a good laryngeal view, while BURP and cricoid pressure were mentioned to even worsen laryngoscopy (12). Not only manual

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techniques but also patient positioning has been a concern to researchers. Investigating different operating table heights, researchers have concluded that an operating table at the xiphoid and nipple level of the anesthetist results in improved laryngeal exposure and tracheal intubation performance (13). Another approach to improve laryngeal exposure is head and shoulder elevation. To perform, the clinician must reposition the patient so as the patient's ear lies at or higher than the level of the expert's sternum. This has been claimed to provide a greater laryngeal view, also in adults of different BMI (14). Another study, recommended that increasing head elevation and neck flexion has a good effect on the quality of laryngeal view during laryngoscopy (15). An experiment by Lee et al, studying into positioning of the patient, found that laryngeal views were significantly greater in a 25 degrees back-up than when the patient lies in the flat supine position (16). A study evaluating the effect of the 25 degree back-up or head-elevated laryngoscopic position in obese patients, came to conclusion that both these positions, whether achieved by placing blankets or other devices under the patient's head and shoulders or by reconfiguring the operating table, have equally significant improvement in the laryngeal view during direct laryngoscopy (17). In the suggested method described in this article, we aimed to maintain and manage the patients' airway through a simple way with the use of already available stuff and causing the least manipulation possible. In this method, after laryngoscopy and observing the patient's laryngeal view, without extubation, a second person aids to apply a greater and defined force to the laryngoscope. The results showed an improved laryngeal view, which will in turn help manage the patient's airway in a shorter time and thus prevent undesired complications for the patient. Our results showed that laryngeal view can be significantly improved if the process of laryngoscopy is aided by a concurrent upward displacement of laryngoscope. This novel simple to perform technique, which is to the best of our knowledge not investigated in previous literature so far, provides a better laryngeal view that can markedly ease intubation.

Conclusion:

One of the challenging steps in the course of intubation is achieving an appropriate laryngeal view during laryngoscopy. Various methods have been developed to accomplish this goal. In this paper, we presented a novel approach of providing a better laryngeal exposure by upward displacement of laryngoscope. Our results show a significant improvement in laryngeal view, therefore it is suggested that this practical method can assist in difficult intubations. Yet, further investigations with larger number of subjects are essential to elucidate more precise results.

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