Original Article

Comparison Of Time Taken Towards Successful Tracheal Intubation Using A Stylet Or Gum Elastic Bougie In A Simulated Difficult Airway

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Abstract

Objective: Aim was to compare the time taken towards successful tracheal intubation using a stylet or gum elastic bougie in a simulated difficult airway.

Study Design: Randomized control trial

Place and Duration: This study was conducted at Tertiary Care Hospital in Peshawar and the duration of this study was from January 2017 to January 2018.

Methods: Total 78 patients of elective surgical procedure requiring tracheal intubation were included in this study. Detailed demographics of enrolled cases were recorded after taking informed written consent. Patients were equally divided in two groups. Group I received gum elastic bougie for intubation in 39 cases and 39 cases of group II received stylet intubate. The results of both groups' intubation attempts and total success rates were then compared. Implementation of the Chi-Square test and Students' T-test was used for statistical analysis. SPSS 23.0 was used to analyze all data.

Results: In 78 cases, 54 (69.2%) were males and 24 (30.8%) were females. Patients mean age was 27.9±10.89 years and had mean BMI 23.8±4.38 kg/m^2. We found a higher number of intubated cases in group I 38 (97.4%) as compared to group II in 31 (79.5%) cases with p value <0.005. Mean time of intubation in group I was 22.3±8.44 sec and in group II was 26.7±14.49 sec. Frequency of intubated cases in first attempt was also higher in group I 30 (76.9%) as compared to group II found in 18 (46.2%) with p value <0.003. There was no any significantly difference found in complications among both groups.

Conclusion: Tracheal intubation with a gum-elastic bougie had a greater success rate than stylet aided intubation in the simulated difficult airway and ought to be used in a difficult intubation situation.

Keywords: Stylet, Gum Elastic Bougie, Simulated difficult intubation

INTRODUCTION

To guarantee the patient's airway safety while under general anesthesia, endotracheal intubation is the first and most crucial step. The safety of the patient's airway is more crucial when endotracheal intubation is used. The cervical spine's range of motion must be restricted in some challenging airway circumstances, and cases must be retained where neck movement is restricted. In patients with neck trauma, neck movements must be kept to a minimum. For this patient's vital functions, it is crucial to intubate them swiftly and simply. The tracheal tube introducer, sometimes

known as the bougie, was first introduced by Macintosh[1] in 1949 to help with orotracheal intubation, and it is a straightforward, affordable device that may increase first-attempt success.[2] The bougie, however, is typically utilized for patients with poor laryngeal views or as a backup method when initial intubation attempts fail and has only been employed in less than 5% of ED first attempts.[3] In a retrospective research conducted in the ED, routine bougie use was linked to better first-attempt success[4], but to our knowledge, no randomized clinical trials have been conducted to evaluate its effectiveness.

One of the biggest problems anesthetists have to deal with is managing the difficult airway. As the anesthetist repeatedly tries tracheal intubation, it creates a condition that can result in patient hypoxia as well as airway trauma, tooth damage, and increased cardiovascular responses, making it a leading cause of anaesthetic morbidity [5]. The bulk of these circumstances occur as a result of direct laryngoscopy's inadequate laryngeal visualization [6]. It is widely acknowledged that it is challenging to forecast these issues with accuracy prior to anesthesia induction [7].

Although it may take several attempts to intubate the trachea rather than the esophagus, the gum elastic bougie is a common tool in the UK for managing difficult intubations [8]. There have been a lot of gadgets and intubation aids developed during the past 15 years to help with managing difficult airways. In this circumstance, the employment of fixed fiberoptic devices like the Augustine, Bullard, Upsher, or Wu [9]'scopes has been recommended. The flexible fiberoptic laryngoscope is readily accessible, but its usage necessitates a level of expertise, education, and ongoing practice that is not always present in anesthetists, especially trainees.[10]

Depending on the resources available in each region, it may be necessary to modify the current standards due to inconsistencies in training and a lack of experience with these latest intubating tools. These aids and the essential knowledge for their best usage may not always be available in the management of the difficult airway because most hospitals in Pakistan lack the resources and the employees to use these tools. Applying a stiff cervical collar and challenging direct laryngoscopy might replicate a challenging intubation condition for teaching reasons. [11,12] Two tools are developed to make intubation easier in challenging situations: the stylet and gum elastic bougies. These are less priced and more accessible. In order to successfully intubate a challenging simulated airway, this study compared the use of a stylet with a gum elastic bougie.

MATERIAL AND METHODS

This randomized control trial was conducted at Tertiary Care Hospital in Peshawar and the duration of this study was from January 2017 to January 2018 and comprised of 78 patients. Detailed demographics of enrolled cases were recorded after taking informed written consent. Included patients were both males and females of age group 20-50 years. Patients having conditions that would make it difficult to apply the stiff cervical collar, such as pathologies of the head, neck, or respiratory system, were excluded.

Patients were equally divided in two groups. Group I received gum elastic bougie for intubation in 39 cases and 39 cases of group II received stylet intubate. Both of the two groups might get the intubating tools at random. Consecutive sampling was the basis for the randomization process. Each subject had regular monitoring before having injections of atracurium (0.5 mg/kg) and propofol (2 mg/kg) to produce anesthesia. Sevoflorane and oxygen were used to maintain anesthesia. A hard cervical collar that had the right size and shape was placed around the patient's neck after giving them enough time to completely rest. The time taken for intubation was then recorded using a stop watch. By lifting up the laryngoscope and waiting until capnography confirmed successful tracheal intubation, this period was established. Failure to complete tracheal intubation within three minutes or after three tries was regarded as a failure. Once the gadget was in the mouth, even a single forward movement was regarded as an attempt. The cervical collar was taken off, and the trachea was then intubated with a laryngoscope under direct view if intubation failed or hypoxia (SpO290%) developed at any point throughout the effort. Another consultant who wasn't the intubating doctor took measurements and documented them on a proforma. The number of tries at intubation and the total success rate (1, 2, or 3) were recorded as metrics.

SPSS version 23 was used to analyze the data. Mean and standard deviation were used in both groups as descriptive statistics. The average number of unsuccessful attempts at intubation was compared between the two groups. In order

to compare the means between the two groups, the Student's T test was utilized, and the Chi-square test was used to get P-values. P value less than 0.05 was deemed significant.

RESULTS

In 78 cases, 54 (69.2%) were males and 24 (30.8%) were females. Patients mean age was 27.9±10.89 years and had mean BMI 23.8±4.38 kg/m^2. Majority of the cases 48 (61.5%) were had ASA I.(table 1)

Table 1: Demographics data of the enrolled cases

Variables	**Frequency**	**Percentage**
Gender		
Male	54	69.2
Female	24	30.8
Mean age (years)	27.9±10.89	
Mean BMI (kg/m^2)	23.8±4.38	
ASA Class		
I	48	61.5
II	30	37.5

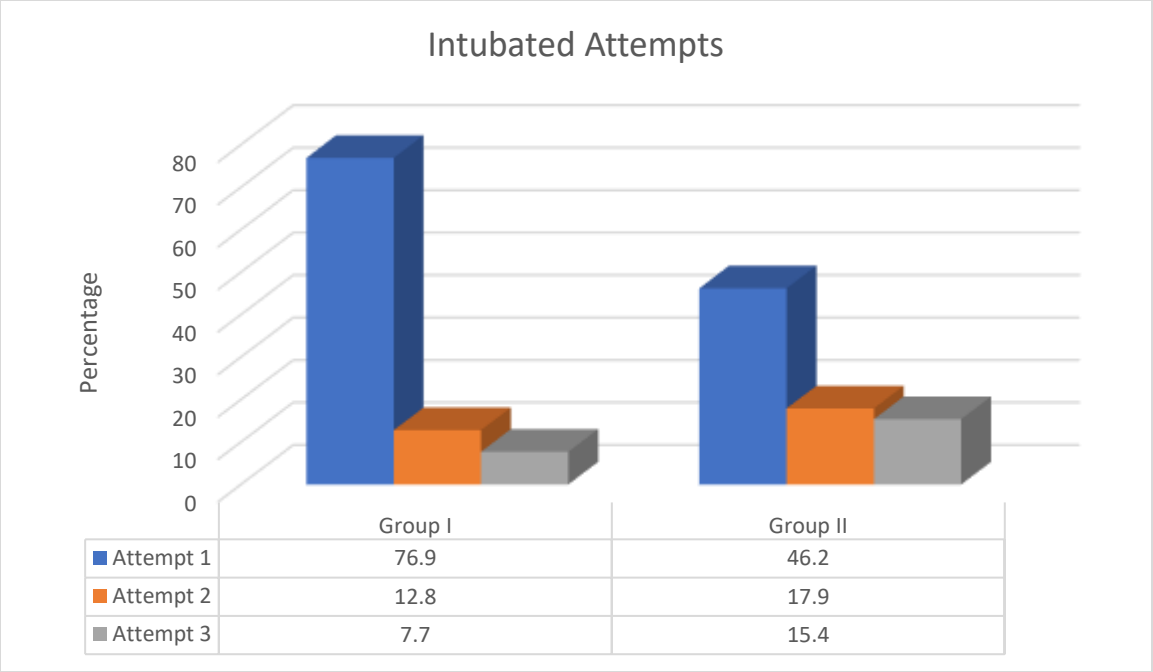
We found a higher number of intubated cases in group I 38 (97.4%) as compared to group II in 31 (79.5%) cases with p value <0.005. Mean time of intubation in group I was 22.3±8.44 sec and in group II was 26.7±14.49 sec.(table 2)

Table-2: Comparison of successful intubation among both groups

Variables	**Group I**	**Group II**
Successful Intubation		
Yes	38 (97.4%)	31 (79.5%)
No	1 (2.6%)	8 (20.5%)
Mean time of intubation (sec)	22.3±8.44	26.7±14.49

Frequency of intubated cases in first attempt was also higher in group I 30 (76.9%) as compared to group II found in 18 (46.2%) with p value <0.003.(figure 1)

Figure-1: Intubated cases with number of attempts among both groups



DISCUSSION

A key contributing factor to mortality from anesthesia is the inability to intubate when under anesthesia. It is advised to perform tracheal intubation utilizing manual in line stabilization (MILS) on trauma patients with "uncleared" cervical spines. A cervical collar is often left in place in these situations to limit the cervical spine's mobility somewhat. The restricted neck extension and limited glottis vision make direct laryngoscopy challenging in these individuals. [13,14]

Only 15–50% of patients who require difficult intubation may be identified during pre-operative airway examination.[15] In terms of intubation simplicity, patient morbidity, and mortality, GEB was shown to be more favorable. Patients who have had cervical injuries are thought to be challenging intubation patients. The optimum intubation technique for individuals who may have had cervical damage is still being studied. In addition, a number of techniques are being studied, including awake, blind nasal, oral, and fiberoptic intubation; direct laryngoscopy with neck and head stabilization; cricothyrotomy; indirect laryngoscopy using Bullard laryngoscopy; with blind mouth intubation with Augustine guide and Combi tube. [16,17]

In current study 78 patients were enrolled. 54 (69.2%) were males and 24 (30.8%) were females. Patients mean age was 27.9±10.89 years and had mean BMI 23.8±4.38 kg/m^2. Majority of the cases 48 (61.5%) were had ASA I. Findings were comparable to the previous studies. [18.19] The bougie's effect on the success of first-attempt intubation can be explained by a number of different possibilities. First off, the bougie's smaller diameter compared to the endotracheal tube means that when it approaches the glottic entrance, less of the operator's view is blocked, making it easier and more confident to intubate the trachea. In addition, the bougie is advantageous when just a partial view of the glottis is acquired (Cormack-Lehane grades 2-4), which was the situation for almost one-third of the patients in our research. In this situation, the coudé tip may be positioned under the epiglottis and can enter the glottic hole blindly. While doing so, the tip will click against the tracheal rings and will hold up until it reaches the bronchial tree, giving tactile feedback as to its appropriate placement. Comparing the bougie to the larger-caliber endotracheal tube, it is most likely more likely to successfully access the glottic hole blindly. [20,21]

In current study, we found a higher number of intubated cases in group I 38 (97.4%) as compared to group II in 31 (79.5%) cases with p value <0.005. Mean time of intubation in group I was 22.3±8.44 sec and in group II was 26.7±14.49 sec. In other experiments using manikin models, the bougie was selected as the initial intubating tool since it had a success rate of 96% as opposed to the stylet's rate of just 66%.[22] The difficult intubation model used in these

trials was a manikin, which gave the intubating doctor a more controlled environment and certainly introduced bias into the results. Instead of utilizing manikins, our study tried to more precisely mimic a real-life challenging intubation scenario in emergent settings by giving a simulated model of limited glottic vision by attaching a stiff cervical collar to live human patients presenting for elective surgery. The bougie demands similar psychomotor abilities to those already achieved by anesthetists who specialize in intubation with a direct laryngoscopy. It is a very useful, lightweight, and reasonably priced instrument.[23] There are many other useful adjuncts, but in Pakistan, knowledge of instruments like video laryngoscopes as well as airway scopes is scarce due to their high cost, which prevents most hospitals from having them, as well as the lack of the intensive training and experience necessary for their effective use.

Our investigation showed that the stylet was a less efficient tool for quickly securing the airway. Additionally, the stiff nature of the stylet has been linked in past research to injury to soft tissues in the supraglottis, glottis, and oral cavity, which may result in significant bleeding and glottic edema. Pharyngeal and palatal injuries have been linked to stylet use difficulties, which may have been brought on by the blind insertion of the tracheal tube on the stylet.[24] This can obviously worsen an emergency scenario by changing "difficult to intubate" into "cannot intubate." Our intubating doctors encountered a lot of the same issues.[25]

CONCLUSION

Tracheal intubation with a gum-elastic bougie had a greater success rate than stylet aided intubation in the simulated difficult airway and ought to be used in a difficult intubation situation

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