ISSN: 1607-8322, e-ISSN: 2220-5799 Anaesthesia, Pain & Intensive Care
Vol 28(2); April 2024 DOI: 10.35975/apic.v28i2.2428

ORIGINAL RESEARCH AIRWAY MANAGEMENT

# A trial for smooth intubation of obese patients by lubricating the Glidescope® blade: a prospective randomized controlled trial

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## ABSTRACT

**Background:** Obese patients often pose endotracheal intubation (ETI) and/or ventilation difficulties, when compared to non-obese patients. Reducing the duration of intubation helps to prevent the associated respiratory and hemodynamic complications. We evaluated the effect of lubricating the undersurface of the Glidescope® blade at the intubation time as well as other associated drawbacks while intubating obese patients.

**Methodology:** A total of 54 adult patients undergoing elective bariatric surgery requiring general anesthesia and oral ETI were included in this study. Out of these 27 patients were included in Group L, in which the underside of the GlideScope® blade used for intubation was lubricated by soluble lidocaine jelly, taking care not to touch the camera or the source of light. The rest of the patients (n = 27) were included in Group C (control group). In the control group, the patients were handled with the same technique but using a standard non-lubricated blade. Intubation time, staring from blade introduction in the mouth to tube entrance into the glottis was registered.

**Results:** There was a statistically significant difference in intubation outcomes between the Group L and the Group C. The mean intubation times were 15.15 ± 4.24 sec vs. 23.98 ± 5.94 sec (P = 0.0001) for the Group L and C respectively.

**Conclusion:** Lubricating the blade can be an independent factor that can reduce the time of tracheal intubation, such as smoothening the insertion of the blade during tracheal intubation and preventing the tongue from being curled up. The maneuver can also reduce bleeding during the tracheal intubation due to dry tongue.

**Abbreviations:** ETI: endotracheal intubation; ETT; endotracheal tube;

**Keywords:** Blade; Endotracheal Intubation; GlideScope; Obesity

**Citation:** Barsoom Ayoub SN, Rabah Alharbi RS. A trial for smooth intubation of obese patients by lubricating the Glidescope® blade: a prospective randomized controlled trial. Anaesth. pain intensive care 2024;28(2):254–258; **DOI:** 10.35975/apic.v28i2.2428

**Received:** December 09, 2023; **Reviewed:** February 16, 2024; **Accepted:** February 16, 2024

## 1. INTRODUCTION

The GlideScope® is a rigid, indirect video laryngoscope that facilitates exposure of the larynx for insertion of an endotracheal tube. The steep, curved blade design reduces the need for anterior tongue movement. The blade provides a better view of the glottis than the slightly curved blade of the direct laryngoscope, to insert the endotracheal tube (ETT), especially in difficult airways. The neutral head position provides more oropharyngeal space than the atlanto-occipital extension, which narrows the pharynx.[1] Using the GlideScope® to expose the vocal cords can sometimes result in soft tissue

 

injury ranging from minor damage to the palate to severe soft tissue injury. Perforation of the palatine-pharyngeal arch is one of the risks associated with the use of the video laryngoscope. A rigid stylet used in conjunction with the GlideScope® poses a rare risk of lingual nerve injury.[2]

According to some authors, obesity is not a risk factor for endotracheal intubation.[3,4] However, the presence of obstructive sleep apnea (OSA), high Mallampati score, older age, male gender, short neck, high Wilson score and larger neck circumference may be indicators of ventilation or intubation difficulties while intubating obese people.[5,6] Reducing the duration of intubation helps to prevent respiratory complications such as hypoxia, lung aspiration, and mucosal damage when intubating obese patients.
The purpose of this trial is to study the effect of lubricating the undersurface of the GlideScope® blade on the intubation time and the other associated drawbacks of intubating obese patients.

# 2. METHODOLOGY

## 2.1. Study profile

A prospective, comparative trial was carried out at King Salman Specialist Hospital, (obesity center), Hail, KSA. A total of 54 adult patients undergoing elective bariatric surgery requiring general anesthesia and oral ETT were included in the study. The inclusion criteria were: patients between the ages of 18 and 60 y; physical status (ASA II or III); and BMI over 35 kg/m$^2$. Exclusion criteria were: patients with loose teeth; and patients who may need rapid sequence induction, e.g., hiatal hernia.

The sample size was determined by setting the power (1-β) to 0.8 and the type 1 error (α) to 0.05 and β = 0.20 in the STATA program. Based on the results of a previous study,[8] the mean ± (standard deviation) time to endotracheal tube placement during intubation using a standard Glidescope® was 21.3 ± 5.6 sec. Modifying the stylet is estimated to reduce tubing insertion time by 20%, so 27 patients were needed in each group (i.e., 54 patients in total). We recruited 30 patients in each group to compensate for cases that dropped out.

The group randomization was based on the randomization plan provided at http://www.randomization.com.

## 2.2. Anesthesia technique

Preoperative assessment included patients' age, gender, BMI, ASA status, and recorded airway information. Thyromental distance, Mallampati score, neck movement, mouth opening, and airway difficulty score (ADS) were part of the airway assessment.[7]

Patients were monitored in the operating room using an electrocardiogram, non-invasive blood pressure measurement, pulse oximetry, and capnography. A compressible pillow was placed under the arms and head to achieve horizontal alignment of the sternal notch with the external auditory meatus in a ramp position. Each patient was preoxygenated for two minutes, and fentanyl 1-1.5 µg/kg, propofol 2-2.5 mg/kg, and rocuronium 0.6 mg/kg were injected during the induction process. Intubation began two minutes after the administration of the relaxant. All physicians involved in the intubation had at least three years of experience with the GlideScope®.

## 2.3. Intubation technique

Enrolled patients were divided into one of the two groups: 27 patients were included in Group L. A difficult airway tray, an ETT with a diameter of 7.5 mm, and a disposable rigid blade size 3 (Cobalt AVL System-single use) were prepared for the female patients. ETTs with a diameter of 8.00 mm and disposable rigid blades of size 4 (Cobalt AVL System-single use) were prepared for the male patients. GlideScope® (Video Monitor, serial number: AN174806) was charged and used for intubation. The underside of the blade was lubricated by soluble lidocaine jelly, taking care not to touch the camera or the source of light. The blade was inserted within the midline of the mouth. The tube was held from the top third and introduced in the midline, sliding over the blade, and being introduced into the glottis). The stylet was taken out, and the tube was advanced farther into the trachea after the tip of the tube had been inserted within the glottis**.** 27 patients were included in Group C (control group). The patients were handled with the same technique but using a standard dry blade. We intended to intubate the patients using intubating LMA if the GlideScope® wasn't successful. Sugammadex (16 mg/kg) was prepared to rouse the patients if all intubation attempts failed. After intubation, the large gastric tube was inserted into the esophagus for surgical purposes.

## 2.4. Measurements

The primary outcome was the intubation time in seconds identified from inserting the blade inside the mouth to introducing the tube inside the glottis. The intubation time was calculated from the video screen. Secondary outcomes were the mucosal injuries to the oral cavity or to the teeth or tongue as evident by blood seen on the blade's underside. The operator suctioned the oropharynx three times in a back-and-forth sweeping motion with a suction catheter and then qualitatively graded the amount of blood present in the suction tubing

 

as none, trace, moderate, or severe. The oral cavity was then examined for mucosal damage or blood that obscured the view. The postoperative sore throat was then questioned in the recovery room and graded as none, mild, moderate, or severe.

### 2.5. Statistical analysis

We used IBM SPSS version 21.0 for Windows® to conduct all of our statistical analyses. We analyzed the normality of the distribution of continuous variables using the Shapiro-Wilk test. The independent t-test was used to examine continuous data, and the chi-square or Fisher's exact tests were used to analyze categorical data between the groups. $P < 0.05$ was used to determine statistical significance for data presented as mean ± SD, the interquartile range, or the proportion of patients.

## 3. RESULTS

Six of the sixty patients selected for the study were excluded because they did not meet the inclusion criteria. The rest of the patients were then randomly assigned equally to the Group L and the Group C. Preoperative airway assessment, ADS, physical ASA status, and demographics were not statistically different in both groups (Tables 1 & 2).

There was a statistically significant difference in intubation outcomes between the Group L and the Group C. The intubation process took 8.83 sec less in the Group L, the mean intubation time was 15.15 ± 4.24 sec versus 23.98 ± 5.94 sec for the Group C (P = 0.0001).

After lubricating the underside of the blade, the bleeding rate was significantly reduced. It was only mild (P = 0.035*) in the Group L 2(7.4%) compared to the Group C 8 (29.66%). There was no moderate or severe bleeding in either group. In both groups, there was no need to walk up to the patients or use the intubating LMA. A sore throat after surgery was not a significant effect. In both groups, the incidence of sore throats was not statistically significant, with mild and moderate pain occurring in both groups. Mild to moderate sore throat was observed in 8 (29.6%) and 2 (28.57%) patients respectively, in the Group L (9/27 = 33.33%) and (3/27 = 11.11%) in the Group C.

**Table 1: Patient's demographic data, BMI and ASA classification**

| Parameters | Group C (n = 27) | Group L (n = 27) | P- value |
|---|---|---|---|
| Age (y) | 30.81 ± 8.2 | 31.25 ± 8.5 | 0.425 |
| **Gender:** | | | |
| • Males | 26 (96.3) | 25 (93) | 0.552 |
| • Females | 1 (3.7) | 2 (7) | |
| Height (cm) | 163.1 ± 6.32 | 162.22 ± 6.15 | 0.2973 |
| Weight (Kg) | 117.518 ± 12.78 | 116.48 ± 12.37 | 0.3837 |
| BMI (Kg/m$^2$) | 44.1 ± 4.1 | 43.31 ± 3.8 | 0.4241 |
| **ASA grade:** | | | |
| • ASA II | 25 (93) | 24 (88.88) | 0.638 |
| • ASA III | 2 (7) | 3 (11.22) | |

**P < 0.05 considered as significant; Data presented as Mean ± SD or n (%)*

However, no severe postoperative sore throat was reported in either group (P = 0.38, Table 3).

## 4. DISCUSSION

Obese patients who are going for bariatric surgeries usually have challenges regarding the airway and ventilation. The primary goal when intubating an obese patient is to do so as quickly and efficiently as possible. The probability of hypoxia increases with increasing intubation time.[9] Therefore, most studies have attempted to redesign the GlideScope® stylet to reduce intraoral

**Table 2: Preoperative airway assessment**

| Parameters | Group C (n = 27) | Group L (n = 27) | P- value |
|---|---|---|---|
| **Mallampati score:** | | | |
| • II | 21 (77.77) | 18 (66.66) | 0.66 |
| • III | 4 (14.81) | 6 (22.22) | |
| • IV | 2 (7.4) | 3 (11.11) | |
| **Mouth opening** | | | |
| • < 4 cm | 2 (7.4) | 3 (11.11) | 0.63 |
| • ≥ 4 cm | 25 (92.6) | 24 (88.88) | |
| **Thyromental distance** | | | |
| • < 6 cm | 13 (48.14) | 10 (37.03) | 0.4 |
| • ≥ 6 cm | 14 (51.85) | 17 (62.96) | |
| Limited neck mobility | 1 (3.7 | 0 (0.00) | 1.0 |
| **Upper incisors** | | | |
| • Normal | 24 (88.88) | 25 (92.6) | 0.63 |
| • Prominent | 3 (11.11) | 2 (7.4) | |
| Airway Difficulty Score (median) | 8 | 8 | 0.298 |
| Difficult Intubation Score [Median (Interquartile range)] | 2 (9-7) | 1 (8-7) | |

**P < 0.05 considered as significant; Data presented as n (%)*

 

**Table 3: Intubation measures**

| Parameters | Group C (n = 27) | Group L (n = 27) | P- value |
|---|---|---|---|
| Intubation time in sec (mean ± SD) | 23.98 ± 5.94 | 15.15 ± 4.24 | 0.0001* |
| Incidence of bleeding: | | | |
| • None | 19 (70.37) | 25 (92.6) | 0.035* |
| • Mild | 8 (29.66) | 2 (7.4) | |
| • Moderate | 0 (0) | 0 (0) | |
| • Severe | 0 (0) | 0 (0) | |
| Need to use intubating LMA | 0 (0) | 0 (0) | 0.5 |
| Need to awake the patient | 0 (0) | 0 (0) | 0.5 |
| Incidence of postoperative sore throat | | | 0.38 |
| • Mild | 9 (33.33) | 8 (29.6) | |
| • Moderate | 3 (11.11) | 2 (7.4) | |
| • Severe | 0 (0) | 0 (0) | |

**P < 0.05 considered as significant; Data presented as n (%) unless specified.*

manipulations, thereby reducing side effects and ensuring rapid and successful intubation.[10-12]

Preparation for gastric sleeve or gastric bypass surgeries requires fasting for a long time, and they usually develop a dry mucosa, which is more likely to be injured easily while introducing the blade or stylet inside the mouth.[13] This increases the possibilities of associated

complications and some difficulties when doing manipulations inside the mouth, especially with a narrow oral cavity, large tongue, or highly positioned larynx.[2,14] The bloody field obscures the light source, prolonging intubation time, increasing the possibilities of aspiration, and increasing the risk of a postoperative sore throat. We added a minor step to the Group L by lubricating the underside of the disposable blade to make it easier for the blade to slide over the tongue and to smoothen the insertion of the blade during tracheal intubation, preventing the tongue from being curled and easily tilting it when needed. When the movement of the blade is soft, this can enhance the intubation process.

The time to intubation was significantly shorter in Group L than in Group C. Our results revealed a 31% reduction in intubation time from the standard use of the GlideScope®. In the Group L, the mean intubation time was 15.15 ± 4.24 sec versus 23.98 ± 5.94 sec for the Group C (P = 0.0001). Although, as a crude measure, it may be a clinically non-significant difference. A short intubation time might not be needed in a starved patient with a normal airway, but it is highly needed when dealing with obese patients with low functional residual capacity, high intra-abdominal pressure, and rapidly developing hypoxia.[15] Any modification that helps to decrease the possibility of intubation difficulties and their associated complications should be considered.

In our results, the complications were less in the Group L. After lubricating the underside of the blade, the bleeding rate was significantly reduced. It was only mild in the Group L (2/27 = 7.4%) compared to the Group C (8/27 = 29.66%) (P = 0.035*). There was no moderate or severe bleeding in either group. However, the sore throat incidence after the surgery was not a statistically significant result in both groups; mild and moderate pain occurred in both groups. Mild to moderate sore throats (8/27 = 29.6%) and (2/27 = 28.57%), respectively, in the Group L (9/27 = 33.33%) and (3/27 = 11.11%) in the Group C. However, no severe postoperative sore throat was reported in either group (P = 0.38). The changes made had no noticeable impact on the postoperative sore throat. This may be related to the large gastric tube used in the bariatric procedures.

# 5. LIMITATIONS

This study was conducted on a small sample of the patients and we restricted it to the use of GlideScope® only. This simple trial can be applied to all patients who are undergoing intubation by all types of laryngoscopes with different makes of blades over a larger sample to assess the ease of intubation, as well as postoperative sore throat or other complications more accurately. We selected obese patients for the intubation challenges that we face in our center with those patients.

# 6. CONCLUSION

Lubricating the blade can be an independent factor that can reduce the time of tracheal intubation, such as smooth insertion of the blade during tracheal intubation and preventing the tongue from being curled up. Therefore, by easily tilting the tongue when needed, it is easy to see, and the movement of the blade is smooth, which can reduce the intubation time and reduce bleeding due to dry mouth.

## 7. Data availability

The numerical data generated in this study is available with the corresponding author for the researchers.

 

## 8. Ethical considerations

The trial was approved by the Ethics Committee of King Salman Specialist Hospital Institutional Review Board (Hail. KSA. ethical IRB: 3-2023) from KACS, KSA: H-08-L-074), and it was registered at the clinicaltrials.gov (No NCT05744388.). Before being enrolled in the study, each patient signed a written informed consent.

## 9. Disclosure of interest

The authors report no conflict of interest.

## 10. Funding

No external or industry funding was involved in the conduct of this study.

## 11. Authors' contribution

SA: Design, data interpretation and manuscript
RA: Concept, conduction of the study work, data analysis and manuscript editing

# 12. REFERENCES


1. Doyle DJ. The GlideScope video laryngoscope: A narrative review. Open Anesthesiol J. 2017;11:48-67. DOI: 10.2174/1874321801711010048
2. Joseph P, Linda J. Soft palate trauma induced during GlideScope intubation. J Clin Anesth. 2016 Dec;35:278-280. PMID: 27871543 DOI: 10.1016/j.jclinane.2016.08.011
3. Hekiert AM, Mandel J, Mirza N. Laryngoscopies in the obese: Predicting problems and optimizing visualization. Ann Otol Rhinol Laryngol. 2007;116:312–6. PMID: 17491533 DOI: 10.1177/000348940711600416
4. Kim JA, Lee JJ. Preoperative predictors of difficult intubation in patients with obstructive sleep apnea syndrome. Can J Anaesth. 2006;53:393–7. PMID: 16575040 DOI: 10.1007/bf03022506
5. Juvin P, Lavaut E, Dupont H, Lefevre P, Demetriou M, Dumoulin JL, et al. Difficult tracheal intubation is more common in obese than in lean patients. Anesth Analg. 2003 Aug;97(2):595-600. PMID: 12873960 DOI: 10.1213/01.ANE.0000072547.75928.B0
6. Brodsky JB, Lemmens HJ, Brock-Utne JG, Vierra M, Saidman LJ. Morbid obesity and tracheal intubation. Anesth Analg. 2002; 94:732–6. PMID: 11867407 DOI: 10.1097/00000539-200203000-00047
7. Janssens M, Lamy M. Airway difficulty score (ADS): A new score to predict difficulty in airway management. Eur J Anaesthesiol. 2000:17:35. DOI: 10.1097/00003643-200000002-00114
8. Wakabayashi R, Shiko Y, Kodaira T, Shiroshita Y, Otsuka H, Baba K, et al. Efficacy of stylet angulation at the holding position during tracheal intubation with a videolaryngoscope: a randomized controlled trial. Sci Rep. 2021 Oct 20;11(1):20713. PMID: 34671041 DOI: 10.1038/s41598-021-00115-x
9. Mazzinari G, Rovira L, Henao L, Ortega J, Casasempere A, Fernandez Y, et al. Effect of Dynamic Versus Stylet-Guided Intubation on First-Attempt Success in Difficult Airways Undergoing Glidescope Laryngoscopy: A Randomized Controlled Trial. Anesth Analg. 2019 Jun;128(6):1264-1271. PMID: 31094798 DOI: 10.1213/ANE.0000000000004102
10. Kelly FE, Cook TM. Seeing is believing: getting the best out of videolaryngoscopy. Br J Anaesth. 2016 Sep;117 Suppl 1:i9-i13. PMID: 27095240 DOI: 10.1093/bja/aew052
11. Walls RM, Samuels-Kalow M, Perkins A. A new maneuver for endotracheal tube insertion during difficult GlideScope intubation. J Emerg Med. 2010 Jul;39(1):86-8. PMID: 20097502 DOI: 10.1016/j.jemermed.2009.11.005
12. Alekberli T, Yarmush L. A Novel Special-shaped Stylet Technique for Intubation with GlideScope® Video Laryngoscope Devices. Res Inno in Anesth 2021;6(2):57–60. DOI: 10.5005/jp-journals-10049-0097
13. Simon P, Pietsch UC, Oesemann R, Dietrich A, Wrigge H. Präoperative Flüssigkeitskarenz in der bariatrischen Chirurgie [Preoperative fasting period of fluids in bariatric surgery]. Anaesthesist. 2017 Jul;66(7):500-505. PMID: 28474243 DOI: 10.1007/s00101-017-0314-4
14. Oh MW, Yarmosh A, Francis D, Moon TS. Soft palate perforation from Glidescope® intubation: A case report. Clin Case Rep. 2021 Sep 24;9(9):e04864. PMID: 34594557 DOI: 10.1002/ccr3.4864
15. Liew WJ, Negar A, Singh PA. Airway management in patients suffering from morbid obesity. Saudi J Anaesth. 2022 Jul-Sep;16(3):314-321. PMID: 35898526 DOI: 10.4103/sja.sja_90_22


 