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# COMPARISON OF GLIDESCOPE VIDEO LARYNGOSCOPE WITH MACINTOSH LARYNGOSCOPE FOR TRACHEAL INTUBATION: A RANDOMIZED TRIAL

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**ABSTRACT** **Background:** Securing the airway is still one of the most important skill in Anaesthesia. Direct laryngoscopy has been universally used for tracheal intubation. To overcome the difficulty in securing the airway, various devices like video laryngoscopes have been developed. We, aim to compare GlideScope video laryngoscope and Macintosh laryngoscope for tracheal intubation.
**Methods:** This prospective study was conducted in 60 patients for various surgical procedures. Patients were divided into 2 groups of 30 each Group GL (GlideScope), Group ML (Macintosh).
**Results:** Time taken for intubation was significantly higher in group GL (42.76 +/- 7.2) than group ML (29.96 +/- 5.14) with a significant P value of 0.0001. GlideScope provided better Cormack-Lehane view (P value 0.006 grade 1) without significant change in the hemodynamic response.
**Conclusion:** Use of GlideScope for tracheal intubation improves the Cormack-Lehane grading, but takes more time than Macintosh laryngoscope without significant change in haemodynamic response.

**KEYWORDS :** GlideScope video Laryngoscope, Macintosh Laryngoscope, Cormack-Lehane grading.

## INTRODUCTION

Unsuccessful direct laryngoscopy for orotracheal intubation occurs with an incidence reported to be as high as 0.3% to 0.43% in two large studies [1,2]. Various alternatives to standard direct laryngoscopy are often deployed when a potential "Difficult Airway" is identified [3] or when conventional laryngoscopy fails. Over the past several years, video laryngoscopic devices like the GlideScope have come to the forefront as an alteration to direct laryngoscopy. These devices do not require a "line of sight" visualization of the larynx; instead, video chip/camera technology projects a view of the patient's larynx onto a video screen. The latest report from the American Society of Anaesthesiologists Task Force on the management of the difficult airway [4] even includes the consideration of video laryngoscope devices as an initial approach to intubation.

Several studies have addressed the aspects of video laryngoscope use. Aziz et al. reported retrospective data of a very large number of intubations (71,570) demonstrating the GlideScope's high success rates as a primary device and a rescue device, and providing insight into the incidence of major complications with the device (0.3%) [5]. Simulation-based studies describe greater intubation success rates using video laryngoscopy when compared to direct laryngoscopy [6,7], although the applicability of these to real-world practice could be questioned. Prospective studies that describe video laryngoscope use in patients have shown a better Cormack-Lehane view than direct laryngoscopy in certain scenarios [8,9]; however, video laryngoscope intubations appear to take longer to perform [10].

This study seeks to contribute to the literature by addressing video laryngoscope use in routine airway management and anaesthesiology practice within an active teaching hospital via prospective investigation. We hypothesized that the Cormack-Lehane grading would be better with Glide Scope than conventional laryngoscope.

## MATERIALS & METHODS

The institutional ethical committee approved the protocol and written informed consent was obtained from each patient preoperatively.

60 ASA I and II patients undergoing various procedures under general anaesthesia were randomly allocated into 2 groups using sealed envelope technique. Patients with raised intracranial pressure, known airway pathology, cervical spine injury were excluded.

Patient characteristics and airway measurements were recorded preoperatively. The same operator recorded Mallampati (MP) score as modified by Samsoon and Young with the patient sitting with mouth open and tongue protruded. The patients were randomized into two groups and intubated with either GlideScope or Macintosh laryngoscope.

All the patients were connected to standard monitoring devices and they received intravenous induction agents including midazolam 0.01–0.04 mg/kg, fentanyl 1-3mcg/kg and propofol 1–2 mg/kg. Neuromuscular blockade was achieved using vecuronium 0.1 mg/kg. No antisialagogues were used. The patients were placed in the 'sniffing' position with their head on a pillow. After approximately 3 min all patients in group GL underwent tracheal intubation using the GlideScope and Cormack-Lehane grading was noted. The patients in ML group were intubated with Macintosh laryngoscope, after ventilating for 3min. Cormack-Lehane grading was noted.

Comparison of time to intubate (TTIs) between the two groups and airway measurements were the outcome measures. The time taken for intubation (TTI) was noted. This was from time the instrument entered the patient's mouth until end-tidal carbon dioxide was detected. If more than one attempt was required, the patient received bag-and-mask oxygenation between attempts. Drugs given and hemodynamic parameters were recorded for each patient. Failure to intubate was defined as a failure after three attempts.

## STATISTICAL ANALYSIS

Basic descriptive statistics have been used to study the central tendency and the variability among the variables. Results are expressed as the means and standard deviation or numbers and percentages. A two-sample t-test of the difference between two means was used to analyse the differences between various parameters that were used in the cases and controls. P value <0.05 was considered to be significant.

## RESULTS

A total of 60 patients were included in the study. The study population was divided into 2 groups GL and group ML with 30 patients in each group. Both the groups had comparable demographic variables [Table 1]. 17 patients in GL group and 18 patients in ML group had Mallampati class 1 airway score. 13 in GL group and 12 patients in ML group had Mallampati class 2 airway score [Table 1].

**Table 1: Demographic Data**

| Variable | Group GL | Group ML | P value |
|---|---|---|---|
| Age(years) | 45.6+/-12.34 | 43.63+/-11.63 | 0.5271 |
| ASA(I/II) | 16/14 | 19/11 | 0.43(ASA I) |
| Mallampati(I/II) | 17/13 | 18/12 | 0.79(Class I) |

The time taken for intubation (TTI) was significantly less in group ML (29.96 ± 5.14s) when compared to group GL (42.76 ± 7.2s) with a P value 0.0001 [Table 2]. Significantly more patients in group GL had grade 1 Cormack Lehanne laryngoscopic view (25 patients) as compared to group ML (14 patients) P value 0.0061. 3 patients from GL group and 12 patients from ML group had grade 2 CL glottic view. 2 patients from GL group had grade 3, CL glottic view against 4 patients in ML group [Table 2].

**Table 2: time taken for intubation (TTI) and Cormack Lehanne grading**

| Variable | Group GL | Group ML | P value |
|---|---|---|---|
| Time taken for intubation (TTI) | 42.76+/-7.2 | 29.96+/-5.14 | 0.0001 |
| Cormack Lehanne grading (1:2:3) | 25:3:2 | 14:12:4 | 0.0061 (grade 1) |

No patient from either group required more than 90 s for laryngoscopy nor had a drop-in oxygen saturation below 90% requiring mask ventilation. There is no significant variation in the haemodynamic response among both the groups [Table 3].

**Table 3: Hemodynamic variables**

| variable | Group GL | Group ML | P value |
|---|---|---|---|
| HR (baseline) | 83.6+/-12.44 | 90.167+/-13.34 | 0.0534 |
| HR (post intubation) | 97+/-16.15 | 97.1+/-15.34 | 0.9805 |
| HR (after 3 min) | 88.6+/-10.88 | 89+/-11.27 | 0.8893 |
| MAP (baseline) | 90.33+/-13.04 | 88.13+/-8.72 | 0.4455 |
| MAP (postintubation) | 101.43+/-14.13 | 96.16+/-14.08 | 0.1533 |
| MAP (after 3 min) | 86.86+/-9.40 | 84.23+/-12.38 | 0.3579 |

## DISCUSSION

Our study demonstrated that a longer time was required for endotracheal intubation using a GlideScope video laryngoscope when compared to Macintosh laryngoscope which could be due to the time required to negotiate the endotracheal tube through the vocal cords, even though the GlideScope video laryngoscope provided a better glottic view. The GlideScope is designed to offer the advantage of being able to 'look around the corner', allowing a view of the glottis via the camera without having to align oral, pharyngeal and tracheal axes. Therefore, the Cormack Lehane grading should be improved. The GlideScope avoids potential problems associated with a 'blind' technique and external manipulation by allowing a view of the larynx and visualization of tracheal tube placement. This has been demonstrated in our study. Improved glottic view with GlideScope does not necessarily translate to shorter intubation time, in contrast to a Direct laryngoscopy, which could be due to the time required to negotiate the endotracheal tube through the vocal cords. The average TTI was 13s more in the GlideScope laryngoscopy group because of the technique required to manipulate the stylet and endotracheal tube through the vocal cords. The TTI was used as an outcome measure as it is a variable that can be measured and is not subjective. If there is no harm to the patient, the advantage of visualizing the tracheal tube passing through the cords would compensate for the slightly longer time required. Some practice/training is required to manipulate the tracheal tube through the vocal cords. Indirect video laryngoscopes like GlideScope place the 'virtual eyeball' close to the glottis, theoretically obtaining an easy view of the glottis. This does not necessarily mean that passing the tracheal tube through the vocal cords will be as easy. Often, careful manipulation may be required to approximate the tip of the tube and the glottic opening. The GlideScope may facilitate tracheal intubation in patients with abnormal upper airways not only by improving the laryngoscopic view, but by virtue of its indirect (videoscopic) nature. In patients with a small mouth, retrognathia or micrognathia direct laryngoscopy may reveal an adequate view of the vocal cords. However, insertion of a tracheal tube into the oropharynx may then obliterate that view, making intubation difficult. In contrast, laryngoscopy using the GlideScope may allow for an improved continuous view even as the tracheal tube is inserted in the mouth. This mechanism accounts for the improved view often afforded by video laryngoscopes such as the GlideScope [11]. Our study results were comparable to results of previous studies that reported improved glottic visualization and better Cormack-Lehane view with GlideScope laryngoscope when compared to Macintosh laryngoscope [10,12]. Various studies by experienced and novice users, in patients with normal and difficult airways, in adult and paediatric patients have compared GlideScope laryngoscope with Direct laryngoscopy [13,14,15]. Because of a short learning curve and enhanced user satisfaction and in minimally trained interns and paramedics, who do not routinely perform endotracheal intubations, GlideScope is supposed to be useful in medical and paramedical training in emergency departments [15,16].

Sun et al conducted a study and showed that in GlideScope (GS) group, laryngoscopy grade was improved in the majority (28/41) of patients with Cormack-Lehane (C&L) grade >1 and in all but one patient who was grade 3 (P<0.001). The overall mean time to intubate was 30 (95% CI 28–33) seconds in the direct laryngoscopy (DL) group and 46 (95% CI 43–49) s in the GS group. Time to intubate for C&L grade 3 were similar in both groups, being 47sfor the DL group and 50 s for the GS group respectively [10].

James W Ibinson compared GlideScope and Direct laryngoscopy. Direct laryngoscopy was successful in 80.8% on the first-pass intubation attempt, while the GlideScope was successful in 93.6% (p <0.001; risk difference of 0.128 with a 95% CI of 0.0771 – 0.181). A greater first-attempt success rate was found when using the GlideScope versus direct laryngoscopy. In addition, the GlideScope was found to be 99% successful for intubation after the initial failure of direct laryngoscopy, helping to reduce the incidence of failed intubation [17].

## CONCLUSION

Use of GlideScope for tracheal intubation improves the Cormack-Lehane grading, but takes more time for intubation than conventional Macintosh laryngoscope. There was no significant difference in hemodynamic parameters during intubation using either of the two laryngoscopic techniques. Further studies in a larger subset of patients with variable degrees of anticipated intubation difficulty comparing GlideScope with other intubation devices are required to demonstrate the clinical utility of GlideScope.

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