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# A Comparison of Glide Scope Video Laryngoscopy to Direct Laryngoscopy for Nasotracheal Intubation

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## ABSTRACT

***Objective:*** To compare the ease of intubation using glide scope video laryngoscope versus direct laryngoscopy for nasotracheal intubation.

***Study Design:*** Quasi experimental study.

***Place and Duration of Study:*** Combined Military Hospital, Rawalpindi Pakistan, Aug 2022 to Feb 2023.

***Methodology:*** Patients of either gender with age greater than 18 years with American Society of Anesthesiologists (ASA) Grade I or Grade II planned for elective dental or maxillofacial procedures requiring nasotracheal intubation were included. A total of 60 patients were included, with 30 patients in each group. Recorded variables were time to intubate, glottic grade, use of Magill forceps, first attempt success, failure to intubate and postoperative sore throat.

***Results:*** With 60 patients after randomised allocation, 30 were allocated to Group-DL (Direct laryngoscopy) and Group-VL (Video laryngoscopy). The success rate in the first attempt was 27(90%) in Group-DL vs 30 (100%) in Group-VL, and the number of patients who could not be intubated was 1(3.3%) vs 0(0%) in both groups. The glottic grade recorded by the operator under vision, time to intubation, use of Magill forceps and post-operative sore throat in both groups was significant with a *p*-value of <0.05.

***Conclusion:*** Glide scope video laryngoscopy provides a better view of the vocal cords with less time to intubation, greater chances of successful intubation, and fewer post-operative chances of sore throat than direct laryngoscopy.

**Keywords:** Glottic grade, Nasotracheal intubation, Laryngoscope,

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## INTRODUCTION

Intubation of the airway is a crucial component in managing patients, which can be employed inside or out of the hospital in planned or emergencies. This technique is life-saving and a basis for maintaining a patient's patent airway.[1,2] Indications for intubation can be a decreased score on a Glasgow comma scale, any respiratory, musculoskeletal pathology or any other pathological condition in which the patient cannot adequately breathe or protect the airway to maintain a constant supply of oxygen to the body organs.[3]

Every physician should have ample knowledge and skill to perform endotracheal intubation. Failure to maintain a patent airway and a continuous supply of oxygen can lead to hypoxia, which is fatal.[4] To perform successful intubation of the airway wherever required, several approaches are employed, including direct laryngoscopy, video laryngoscopy, fiberoptic intubation, intubation via intubating laryngeal mask airway and others.[5]

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The most common complications seen during intubation are hypertension, tachycardia, increased intracranial pressure, and increased intraocular pressure, with a wide range of systemic complications if not addressed promptly.[6] To decrease the incidence of such complications, several instruments have been used to obtain a better vision of the trachea, decrease the time to intubation, reduce the requirement of instrumentation for intubation with a better success rate and reduce the risk of failure.[7,8]

Diagnostic and therapeutic elective procedures and airway emergencies have been dealt with by performing direct laryngoscopy using a Macintosh or McCoy laryngoscope, video laryngoscope, fiberoptic video equipment or others. Recent advances promote the use of video devices, which can decrease the intubation time with a greater success rate and reduce the failure rate.[9] This study aims to compare nasotracheal intubation techniques using video laryngoscopy versus direct laryngoscopy in patients who are planned for elective procedures.

## METHODOLOGY

The quasi-experimental study was performed at Operation Theater Complex, CMH Rawalpindi, Pakistan from August 2022 to February 2023 after

approval by the Ethical Review Committee (ERC # 302). Sample size was calculated taking statistics of video laryngoscopy versus direct laryngoscopy (0% of the patients required Magill forceps to perform intubation compared to 49% when direct laryngoscopy using a Macintosh laryngoscope was used),[10] using a WHO sample size calculator.

**Inclusion Criteria:** Patients of either gender, age greater than 18 years with American Society of Anesthesiologists (ASA) Grade I or Grade II planned for elective dental or maxillofacial procedures requiring nasotracheal intubation were included.

**Exclusion Criteria:** Participants were excluded if they had a difficult airway on the paranesthesia exam, had contraindications of video laryngoscopy or required rapid sequence induction.

A total of 60 patients were included, with 30 patients in each group. Group-DL patients underwent direct laryngoscopy, while Group-VL patients underwent video laryngoscopy for nasotracheal intubation. All the patients underwent pre-anesthesia assessment examination based on their history, physical examination and laboratory investigations. After obtaining fitness from the pre-anaesthesia clinic, patients were admitted and prepared as per institutional protocol for surgical procedures after randomization using lottery method (Figure).

After obtaining written informed consent from each patient, overnight fasting for eight hours before the procedure was adopted, and patients were shifted to the operation theatre on the procedure day. All the non-invasive monitoring, including pulse oximetry probe, non-invasive blood pressure cuff, temperature probe and electrocardiography leads, were attached to the patient for recording baseline hemodynamic variables. Participants received premedication of intravenous crystalloids, intravenous metoclopramide 10mg, intravenous Nalbuphine @ 0.1mg/kg and intravenous Dexamethasone @ 0.08 mg/kg via a peripheral intravenous cannula already placed on the upper limb before the commencement of the procedure. Patients were then given supplemental oxygen for 03 minutes to perform Denitrogenation followed by administration of induction drugs. Intravenous Propofol @ 2mg/kg was given, and bag-mask ventilation was assessed. After the confirmation of successful bag-mask ventilation, patients were administered a muscle relaxant intravenous atracurium @ 0.5 ml/kg, and ventilation was performed for another 03 minutes till the adequate depth of anaesthesia was achieved. Nasotracheal intubation was performed after this using a right-angle endotracheal tube (RAE) tube. Direct laryngoscopy was performed in patients from Group DL, while nasotracheal intubation was done via a video laryngoscope in Group VL. After the placement of the tube in the trachea, the circuit was attached to the endotracheal tube, and successful intubation was confirmed using end-tidal $CO_2$ concentration on the monitor and auscultation of the chest. The time to intubation was recorded from the period of insertion of a Video laryngoscope or a direct laryngoscope in the oral cavity till the confirmation of successful placement of the tube in the trachea as confirmed by end-tidal $CO_2$ concentration on the monitor. From the visibility of the vocal cords under direct laryngoscopy or a video laryngoscope, the glottic grade was recorded as per the Cormack and Lehane scoring.[11] In case of poor visibility, Magill forceps were used and recorded. Other variables recorded in the intraoperative period were first attempt success or a failed intubation if the total time was greater than 150 seconds. In the case of failed intubation, another modality was used to intubate the trachea.

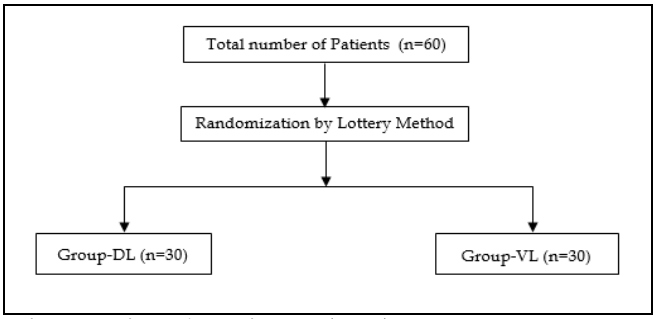


**Figure: Patient Flow Diagram (n=60)**

Maintenance of anaesthesia was done using Isoflurane @ 1-2 Minimum alveolar concentration with supplemental administration of analgesia and intravenous fluids as per the requirement of the patient and our institutional protocol. At the end of surgical procedures, patients were administered Neostigmine with Glycopyrrolate @0.05 and 0.01 mg/kg. Extubation was done when adequate muscle power had returned, as indicated by the patient performing purposeful body movements or obeying verbal commands. Postoperatively, patients were followed and asked about the presence of sore throat. Any presence of a cough or patient complaining of sore throat was documented.

Statistical Package for Social Sciences (SPSS) version 23.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD

and qualitative variables were expressed as frequency and percentages. Chi-square test and Independent sample t-test were applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

## RESULTS

With a total number of 60 patients, after randomised allocation, 30 patients were allocated to Group-DL and Group-VL. 23(76.7%) patients in Group DL and 19(63.3%) patients from Group VL had ASA Grade I, while 07(23.3%) and 11( 36.7%) patients had ASA Grade II from each group, respectively. The mean age of the patients from Group DL was 39.17±7.01 years, while the mean age from Group VL was 41.13±7.89 years, as shown in Table-I. The success rate in the first attempt was 27(90%) in Group DL vs 30 (100%) in Group VL, and the number of patients who could not be intubated was 01(3.3%) vs 0 (0%) in both the groups are shown in Table-II. The glottic grade recorded by the operator under vision, time to intubation, use of Magill forceps and post-operative sore throat in both the groups were comparable with a *p*-value of <0.05, as shown in Table-III.

**Table–I: American Society of Anesthesiologists Grade (ASA) and Age distribution between Study Groups (n=60)**

| ASA Grade n(%) | | Group-DL (n = 30) | Group- VL (n = 30) | *p*-value |
|---|---|---|---|---|
| | ASA-I | 28(84.8%) | 26(78.8%) | 0.260 |
| | ASA-II | 05(15.2%) | 07(21.2%) | |
| Age in years Mean±SD | | 39.17±7.01 | 41.13±7.89 | 0.312 |

**Table–II: First Attempt Success Rate and Failed Intubations between Study Groups (n=60)**

| Variables | | Group-DL (n = 30) | Group- VL (n = 30) | *p*-value |
|---|---|---|---|---|
| First pass success rate n(%) | Yes | 27(90%) | 30(100%) | 0.076 |
| | No | 03(10%) | 0(0%) | |
| Failed intubations n(%) | Yes | 01(3.3%) | 0 (0%) | 0.313 |
| | No | 29(96.7%) | 30(100%) | |

## DISCUSSION

We compared the ease of intubation during elective maxillofacial or dental procedures for nasotracheal intubation. When glide scope video laryngoscope was compared to direct laryngoscopy the former technique was superior as the time taken to intubation was significantly decreased (71.67±7.7 seconds vs 46.63±7.54seconds) with a better view of the vocal cords 28(93.3%) vs 18(60%), fewer episodes of use of Magill forceps 05(16.7%) vs 17(56.7%) and with lesser chances of failure in the first attempt as compared to direct laryngoscopy. The follow-up of patients in the postoperative period revealed a significantly decreased number of cases of sore throat when video laryngoscopy was used compared to direct laryngoscopy.

Another research with similar results revealed that patients admitted in intensive care units, when intubated with video laryngoscope versus Macintosh laryngoscope, had a first-attempt success rate of 84% versus 57%, respectively. When video laryngoscopy was done, the glottic grade assessment based on Cormack and Lehane scoring the glottis visualisation was significantly easier with video laryngoscopes compared to direct laryngoscopy.[9]

**Table–III: Comparison of Clinical Variables between Study Groups (n=60)**

| Variables | Group-DL (n = 30) | | Group-VL (n = 30) | *p*-value |
|---|---|---|---|---|
| Use of Magil's forceps n(%) | Yes | 17(56.7%) | 05(16.7%) | 0.001 |
| | No | 13(43.3%) | 25(83.3%) | |
| Glottic grade n(%) | Grade-1 | 18(60%) | 28(93.3%) | 0.002 |
| | Grade ≥2 | 12(40%) | 02(6.7%) | |
| Post operative sore throat n(%) | Yes | 09(30%) | 02(6.7%) | 0.020 |
| | No | 21(70%) | 28(93.3%) | |
| Time to intubation in seconds Mean±S.D | 71.67±7.7 | | 46.63±7.54 | 0.001 |

Jones *et al*. in their research, found that the glottis visualisation with video laryngoscopy was grade 1 or easy in 94% compared to 66% of patients undergoing maxillofacial surgeries when nasotracheal intubation was performed. This superiority of the video-assisted technique was also revealed in our results, where 93.3% of the patients had Grade-I visibility of the glottis as compared to 60% in patients when direct laryngoscopy was employed.[10]

Multiple studies have evaluated the effectiveness of video-assisted airway devices versus non-video devices for airway management. These studies employed video devices like glide scope, king vision and MCGRATH video laryngoscopes. Compared to direct laryngoscopy, all the video-assisted devices performed better with higher success rates during first attempts, decreased time to intubation, lesser rates of failure and easy visibility of the glottis compared to direct laryngoscopy.[11-13]

In another study, when hemodynamic fluctuations were compared in three groups of patients where Macintosh, MCCOY and C-MAC video laryngoscopes

were used, the least hemodynamic fluctuation was found with the MCCOY laryngoscope. However, the visibility of the glottis was still superior with the C-MAC video laryngoscope compared to the other two groups, signifying the ease of intubation with a video-assisted device.[14]

A large number of patients presenting to the hospital setup land in an emergency, such as traumatic patients or any patients with other surgical or medical emergencies who require emergent intubation.[15] Studies reveal that the chances of intubation are higher with video-assisted devices, but patients who need emergency intubation might not benefit from a video laryngoscope compared to direct laryngoscopy.[16,17]

In another study conducted on patients with cervical spine injuries, were intubated in less time when video laryngoscope was used as compared to direct laryngoscopy. This leads to the conclusion that the employment of video-assisted devices decreases the manoeuvre required during difficult intubations with greater chances of success and better visibility of the glottis.[18,19] Various techniques are in practice and under research to decrease the failure rate and improve the first-attempt success rate during intubations.[20] Our study proves the beneficial and superior role of glide scope video laryngoscope during naso-tracheal intubation compared to direct laryngoscopy.

## CONCLUSION

Glide scope video laryngoscopy provides a better view of the vocal cords, less time to intubation, greater chances of successful intubations, and fewer post-operative chances of sore throat than direct laryngoscopy.

**Conflict of Interest:** None.

**Authors' Contribution**

Following authors have made substantial contributions to the manuscript as under:

TAK & SQAS: Conception, study design, drafting the manuscript, approval of the final version to be published.

MHB & OAM: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MHS & SRAH: Data acquisition, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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