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COMPARISON OF DIRECT AND VIDEO LARYNGOSCOPY FOR NASOTRACHEAL INTUBATION IN HEAD AND NECK ONCOSURGICAL CASES-AN OBSERVATIONAL STUDY

Anaesthesiology

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ABSTRACT

BACKGROUND AND AIMS: The video laryngoscope (VL) is well established as a difficult airway gadget. Nasotracheal intubation (NTI) is required for oral and maxillofacial surgeries. A superior laryngoscopy does not guarantee successful intubation. External manipulation of the larynx, use of Magill forceps, change in head position or partial inflation of cuff is often required The success of a VL assisted intubation depends on blade design, quality of the image on the monitor, as well as the experience of the intubator. The primary objective of this study was to assess the ease of intubation using C-MAC video laryngoscope compared with Macintosh laryngoscope. **METHODS:** This was an observational study among 70 patients with ASA Physical status I & II patients between 18 to 70 years with BMI <35kg/m2 scheduled to undergo elective head and neck surgery under general anaesthesia.. Study compared the duration of tracheal intubation. Visualization of laryngeal inlet was graded according to Cormack and Lehane classification. Additional optimizing manoeuvres required for intubation, hemodynamic responses, lowest saturation and presence of trauma, were also recorded. **RESULTS:** Average time taken for intubation was 37.5 seconds in video laryngoscopy compared to 38.1 seconds in direct laryngoscopy. Visualisation of laryngeal inlet was better with video laryngoscopy which was statistically significant (p value 0.0001).Additional optimizing manoeuvres required, incidence of oral trauma, lowest saturation and haemodynamic responses were comparable. **CONCLUSION:** Though the patients in Video laryngoscopy group had a significantly better view of the laryngeal inlet, there was no significant difference in ease of intubation or stress response compared to conventional laryngoscopy.

KEYWORDS

General Anaesthesia; Airway; Nasotracheal Intubation, Anaesthetic Techniques; Video Laryngoscope, Macintosh

INTRODUCTION: The primary responsibility of an anaesthesiologist is to establish a patent airway in order to ensure adequate oxygenation and ventilation for the safe conduct of General Anaesthesia. .Different types of supraglottic airway devices and video laryngoscopes available have made the airway management stress free for the anaesthesiologist since last three decades. Video laryngoscope is a suggested airway management device on a portable difficult airway cart [1, 2] and included in the guidelines of difficult airway management put forward by ASA (American Society of Anaesthesiology), DAS (Difficult Airway Society) and AIDAA (All India Difficult Airway Association). Studies support the view that video laryngoscopy resulted in better rate of first-attempt intubation success as compared to direct laryngoscopy [3, 4]. However, a recent randomised clinical trial in an intensive care unit (ICU) setting found that video laryngoscopy did not yield higher first-attempt tracheal intubation success rate than direct laryngoscopy [4,5]. In our institute, head and neck surgeries form a major part of surgical procedures and they need nasotracheal intubation (NTI) for better surgical access. Hence, we decided to conduct the study to assess the intubating conditions, using the conventional Macintosh laryngoscope and the Storz C-MAC Video laryngoscope during Nasotracheal intubation in patients posted for head and neck surgeries.

Aims and Objectives: Aim of the study was to compare the ease of nasotracheal intubation using direct conventional laryngoscopy and video laryngoscopy in patients for head and neck surgery under general anaesthesia ,to assess and compare the Cormack- Lehane(C-L) grading of the laryngoscopic view during intubation, whether intubation required use of any manoeuvre and if so what type of manoeuvre was used, haemodynamic changes during laryngoscopy and intubation, lowest recorded SpO2 during or immediately after intubation attempt and trauma if any. Sequence of additional manoeuvres used in the study were

1) M0- Intubation without manoeuvres
2) Ml- Use of external manipulations such as tube rotation, head flexion, BURP manoeuvre
3) M2 -Use of ETT cuff inflation alone
4) M3 -Use of ETT cuff inflation with external manipulation (Ml + M2)
5) M4 -Use of Magill's forceps alone
6) M5 -Use of Magill's forceps with external manipulation (Ml + M4)

METHODOLOGY: After approval of our Institutional Review Board, ASA Physical status I & II patients in the age group of 18 to 70 years with BMI <35kg/m^2 scheduled to undergo elective head and neck surgery under general anaesthesia were selected for the study. Airway assessment using Modified Mallampati score was performed during the preoperative evaluation and patients with MPC 1 and 2 were recruited to either of the two groups (conventional direct laryngoscopy-DL or video laryngoscopy-VL group).Patients with significant systemic disease of cardiac and nervous system, ASA Grade III and IV, patients with contraindications for nasotracheal intubation were excluded from the study. Study population was 35 patients in each group. Sample size was estimated based on previous studies.A thorough pre-anaesthetic evaluation was conducted including airway assessment and nasal patency using spatula test.Patients received the routine premedication with Alprazolam 0.5mg on the night prior to surgery and Pantoprazole on the morning of surgery. In the recovery area, nasal decongestants were applied to both the nostrils. Once the patient reached the OT, after attaching the routine preinduction monitors, IV line was secured and an IV fluid was started. After preoxygenation and intravenous (IV) premedication in the OT, general anaesthesia was induced with IV Propofol 2-2.5mg/kg body

weight, Xylocard 1.5mg/kg and Succinyl choline 2mg/kg following prior precurarisation. Patients underwent either conventional laryngoscopy using Macintosh direct laryngoscope or video laryngoscopy using KarlStorz C-MAC Video laryngoscope (VL) for nasal intubation. The investigators performing the intubation in this study had already performed more than 100 Nasotracheal intubations using Karl Storz C-MAC VL and the conventional technique. Time to intubate was calculated from the beginning of introduction of the endotracheal tube in the nostril till appearance of end-tidal carbon dioxide waveform. C-L grading, time required for intubation, intubation without any maneuver (MO), need for the manoeuvres, and type of manoeuvre (Ml-M5) used, haemodynamic changes, lowest recorded Sp02 during or immediately after intubation attempt, trauma if any was observed.

RESULTS: A sample of 70 patients (35 in each group) undergoing elective head and neck surgery under general anaesthesia over a period of one year were included in the study. The mean and standard deviation of quantitative data were described. Qualitative data were described by frequency distribution. To compare between two groups, qualitative variables were assessed and analysed by chi square test and quantitative variables by student's t test. A pvalue of 0.05 was regarded statistically important. The two groups were comparable based on age distribution. The demographic data (age, sex and BMI) are given in table 1. Mean age was 52.6 and 55yrs in direct laryngoscopy(DLS) and videolarygoscopy(VLS) group respectively which was comparable (and the p value was 0.409). The mean value for male population was 48.6% and 54.3% in DLS and VLS group respectively. The mean value for female population was 51.4% and 45.7% in DLS and VLS group respectively. Mean BMI for DLS and VLS group were 22.7+/-3.2 and 23.6+/-3.7 respectively. The mean time required for tracheal intubation with direct laryngoscope was 38.1 seconds while with video laryngoscope time required was about 37.5 seconds which were analysed by student t test. The p value was 0.929. Distribution of Cormack Lehane classification grades is shown in table 2. Here, p value was 0.001, which was highly significant (Using Chi square test).Oral trauma occurred in 2 patients of each group. The systolic blood pressure was found to be comparable between the two groups. The diastolic blood pressure after 1 minute of laryngoscopy was found to be significantly higher for video laryngoscopy as compared to direct laryngoscopy with a significant p value. The mean arterial pressure was found to be comparable between the two groups .The need for different airway manoeuvres was comparable between the two groups(Graph2).None of the patients had desaturation during intubation with direct or video laryngoscope. Since our patients had either MPC 1 or 2 and the anaesthesiologist performing the intubation was a senior consultant, none of the patients required multiple attempts at intubation. None of our patients required more than 120sec for NTI had a fall in saturation below 90%, and hence none of the patients were excluded from the study.

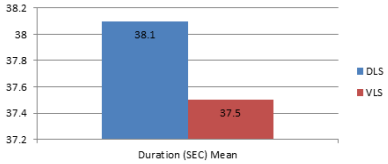
TABLES AND GRAPHS

Table 1: Demography

	DLS	VLS
MALES (%)	48.6	54.3
FEMALES (%)	51.4	45.7
MEAN /SD OF AGE(YRS)	52.6+/-12.7	55+/-11.7
BMI Mean (SD)	22.7(3.2)	23.6 (3.7)

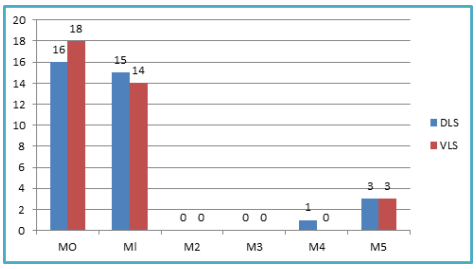
Table 2: Comparison of sample based on Cormack Lehane Grading [CL Grade]

CL Grading	DLS		VLS		p VALUE
	Number	Percent	Number	Percentage	
Grade 1	14	40.0	30	85.7	0.001*
Grade 2	18	51.4	4	11.4	
Grade 3	3	8.6	1	2.9	
Grade 4	0	0	0	0	



Graph 1:Comparison of sample based on duration of laryngoscopy

The mean time required for tracheal intubation for direct laryngoscopy was 38.1 seconds while in video laryngoscopy time required was about 37.5 seconds which were analyzed by student t test. The p value was 0.929.



Graph 2: Comparison of optimizing man oeuvres required

DISCUSSION: Nasotracheal intubation provides better access to the surgeon for intraoral surgeries. Though conventional laryngoscopy is the gold standard for intubation, the video laryngoscopes have considerably reduced airway related morbidities in the perioperative period. Head and neck malignancies pose specific challenges to the anaesthesiologist-due to disease as well as due to radiotherapy used for treatment of oral malignancy. Following Commando's procedure airway oedema can occur in the postoperative period and hence we leave the patient intubated in the postoperative period for one day (institutional protocol) as it leads to lesser need for emergency tracheostomy. NTI is preferred for better tube tolerance.

Many clinical reports have evaluated the efficiency of airway devices by using first-attempt intubation success rate as a parameter [1,2] Ono et al[6] reported that using Pentax AWS for NTI was 100% successful with an 86.4% success rate at first attempt. However, 10 patients were categorized into moderate difficulty scale and 37 patients needed cuff inflation technique to assist tube placement respectively. Large tongue and higher Cormack Grade may impede a smooth nasotracheal intubation.

In our study, the ease of intubation as assessed by the duration of intubation was found to be similar for the groups, 38.1seconds and 37.5 seconds for DLS and VLS group respectively with no significant difference (p value of 0.929). This was in contrast to the findings of the study done by Patil et al where duration of intubation was significantly lower for video laryngoscopy group[7]

Visualisation of laryngeal inlet, in our study population was found to be significantly better for video laryngoscopy group (p value of 0.001) which was similar to the results of study by Baek et al[3] and Lascarrou et al [4]. The video laryngoscope allows the operator to visualize adjacent structures near glottis that may not be seen with the direct line-of-sight view available to the naked eye during direct laryngoscopy using Macintosh blade. During laryngoscopy the endotracheal tube introduced nasally will slide more posteriorly in line with the larynx. This is augmented by the lifting of epiglottis by the laryngoscope blade. So external laryngeal manipulations were needed in both these groups but this was not statistically significant. M2 and M3 manoeuvres were not useful. The use of Magill's forceps (M4 and M5) was needed in both groups again with no significant difference statistically. It was observed that once Magill's forceps was used, BURP (Backward, Upward, and Downward Pressure) was required in video laryngoscopy group. This may be because of the innate curvature of the video laryngoscopy blade. This was contrary to the study by Patil et al where more manipulations were needed in direct laryngoscopy view[7].There was a positive co-relation between the duration of laryngoscopy and manoeuvres applied in both direct laryngoscopy (r=0.44) and video laryngoscopy(r=0.43) .

In adult patients requiring nasotracheal intubation, video laryngoscopes have frequently been reported to display significant advantages over the Macintosh laryngoscope. Video laryngoscopes have been shown to provide improved glottic exposure and non-line-of-sight view, thereby allowing quick visualization of the glottic inlet and easy navigation of the tracheal tube through a less distorted anterior airway. Thus, many reports have concluded these scopes as superior tools with regard to success rates and/or intubation time. In studies using Magill forceps as a navigation method, the incidence of the use of Magill forceps with Macintosh laryngoscopes ranged

between 34% and 49%, while with video laryngoscopes, the incidence ranged between 0% and 6%. In patients aged 8–18 years, the cuff inflation method and Magill forceps were used in 6.7% to 60% of patients when using the Macintosh laryngoscope and in 6.7% to 17% of patients using the C-MAC video laryngoscope [7]. Therefore, most existing evidence suggests that compared to Macintosh laryngoscope, video laryngoscope require less use of Magill forceps and are associated with reduced intubation times. The cuff inflation method takes time to inflate the cuff and lift the tracheal tube from the posterior pharyngeal wall, as well as requiring manipulation of the tracheal tube tip into the glottic inlet, and deflating of the ballooned cuff. In a previous study, the intubation time in patients requiring the cuff inflation method was reported to be 7.2 s longer on average than that in patients where inflation was not used.

Studies also reports a delay in intubation with VL compared to ML [7,8]. A recent randomised clinical trial in an intensive care unit (ICU) setting found that video laryngoscopy did not yield higher first-attempt tracheal intubation success rate than direct laryngoscopy[4]

Another finding was that there was no difference between the incidences of oral trauma between the two groups. In a study by Kilicaslanet et al[8] VL was found to cause less trauma compared to DL. Van Zundert et al [9] in his study found that less force on maxillary incisors was required for C-MAC as compared to DL. In our study no difference was found regarding oral trauma may be because the patients included were of MPC 1 and 2 where airway was found to be adequate and so better views were obtained.

Haemodynamic responses during NTI using direct laryngoscopy and video laryngoscopy were also studied. In both the groups there was initial increase in blood pressure and heart rate after intubation which came back to baseline by about 5 minutes. There was no significant difference in the haemodynamic responses between the two groups with regard to systolic blood pressure and mean arterial pressure. However, an increase in heart rate was observed during third minute after intubation which was higher in video laryngoscopy group compared to direct laryngoscopy with a significant p value of 0.012. Similarly diastolic blood pressure was found to be more during the second minute of intubation in video laryngoscopy group as compared to direct laryngoscopy group. This could have been an incidental finding which requires further randomised control trials to explain the occurrence. In a study by Patil et al and that by Altun et al[10] there was no significant difference in haemodynamic responses between the groups. This was in contrast to the findings of Rajan et al where VLS showed less stress as compared to direct laryngoscopy [11]. Study by Buhari et al on the other hand showed that C MAC video laryngoscopes caused more stress during intubation than that for conventional laryngoscope [12].

In a previous study [13], it was found that using Glide Scope for nasotracheal intubation provided shorter mean total intubation time than in using the Macintosh laryngoscope. Using video laryngoscope for either Glide Scope or Pentax AWS virtually needed no BURP manoeuvre to view the glottis clearly as compared with traditional laryngoscope When navigating and aligning the tube from the oropharynx into the glottis inlet, the cuff inflation method was required in significantly fewer patients for the Macintosh group (11.1%) than for the McGrath (48.6%) and Pentax (51.4%) groups.NTIs with non-channelled King Vision and McGrath VLs in the setting of predicted difficult intubations was found to have shorter intubation time, higher first success rate, better qualities of glottis view, attenuated hemodynamic responses, and fewer incidences of side effect compared with Macintosh DL.[14]

Limitations of the study

1) We used only Mallampati grading for airway assessment during the preoperative period and this alone is not sufficient to assess difficult intubation. Since it is an easy bed side airway assessment test which we routinely follow in our preanaesthetic clinic we excluded patients with anticipated difficult airway on that basis. We should have included other bed side tests also to assess airway.
2) More confounding factors could have been taken into consideration. We excluded paediatric patients, morbid obesity and patients with significant systemic illness.
3) BIS could have been used to assess the depth of anaesthesia prior to intubation so that we could have assessed whether the hemodynamic responses was due to inadequate depth of anaesthesia.
4) Blinding was not possible in the anaesthesiologist using the device.
5) Post-operative sore throat as a complication of laryngoscopy could not be evaluated as the endotracheal tube was retained in the postoperative period.

CONCLUSION: Though the patients in the video laryngoscopy group had a significantly better view of the laryngeal inlet, there was no significant difference in ease of intubation and hemodynamic stress response as compared to conventional laryngoscopy in nasotracheal intubation among patients undergoing procedures for head and neck oncosurgery. Hence availability of newer gadgets, though relieves the stress in the anaesthesiologist may not decrease intubation times in the hands of an experienced anaesthesiologist if there is no difficult intubation situation. However it goes without saying that the video laryngoscope is lifesaving armamentarium in the difficult airway scenario-a true blessing available to the anaesthesiologist.

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