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# A prospective observational study on predicting the risk of obstructive sleep apnea and difficult intubation in patients posted for elective surgery

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**Abstract**
**Introduction:** The present study compared video laryngoscope with Macintosh laryngoscope in terms of laryngoscopic time, total intubation time, Cormack and lehane scale and stress response while intubating.
**Materials and methods:** After a standardized technique of induction of anesthesia, Group MCL (53 cases) intubated with Macintosh laryngoscope and Group VVL (53cases) intubated with Vividtrac Video laryngoscope. We compared laryngoscopic time, total intubation time, Cormack and lehane scale and stress response while intubating in these two groups.
**Results:** The heart rate and blood pressure was above immediately after post intubation and started declining to reach post induction value at about three to five minutes in both groups (p values > 0.05).The mean tracheal intubation time was 11.05 seconds in MCL group and 18.05 seconds in VVL group (p-0.001). All cases in VVL group were intubated in first attempt, but one patient in MCL group required two attempts for success (p->0.05). Visualisation of glottis and non-alignment of the airway axis was better with VVL (p-0.001). There is no desaturation noted in all of the 106 cases.
**Conclusion:** Vivid trac Laryngoscope has a comparable similar safety profile with Macintosh laryngoscope with respect to deleterious haemodynamic response produced by rigid manipulation of airway. Vivid trac Video Laryngoscope, a rigid channeled indirect laryngoscope provides always the better view of the laryngeal inlet than the Macintosh direct laryngoscope. Intubation time in Vividtrac video laryngoscopy was more than conventional laryngoscopy.

**Keywords:** Vivid trac video laryngoscope, macintosh laryngoscope, hemodynamic response

## Introduction
Endotracheal intubation is necessary for most of the patients undergoing surgery under general anesthesia [1]. Laryngoscopy forms an important part of general anesthesia and endotracheal intubation. Laryngoscopes are used to view the larynx and adjacent structures. The aim of laryngoscopy is to obtain good visualisation of laryngeal inlet and vocal cords to facilitate smooth endotracheal intubation. The laryngoscope blade is used to compress and displace the tongue to obtain a direct line of sight to the laryngeal inlet. Direct laryngoscopy depends on extension of the head at the atlanto occipital joint and flexion of the lower cervical spine to align oral, pharyngeal and laryngeal axes [2].
Many factors have shown to influence laryngoscopic view of vocal cords. These include forward displacement of mandible, prominent or absent teeth, backward displacement of tongue. The proof of this can be easily obtained by the existence of many different types of laryngoscopic blades. General anaesthesia with endotracheal intubation leads to extremely strong nociceptive stimuli, which often produces unintended stimulation of sympathetic nerv/ous system and adverse effects in the physiological systems particularly the adverse effects on the cardiovascular system commonly manifested as hypertension, tachycardia or arrhythmia [3].
In 1943, Robert Macintosh developed a curved blade to lift the epiglottis indirectly, which potentially reduced the risk of trauma. Since its introduction Macintosh laryngoscope was popular and the most frequently used scope for intubation. The severity of the haemodynamic response during laryngoscopy is attributed to correlate with laryngoscopy time and the magnitude of manipulation to expose glottis.

A relatively high forward and upward force is applied on the Macintosh handle to visualize glottis through aligning oral, pharyngeal and laryngeal axes [4]. The present study was compared video laryngoscope with macintosh laryngoscope in terms of laryngoscopic time, total intubation time, Cormack and lehane scale and stress response while intubating.

## Materials and Methods

The present study was conducted among 106 cases patients of age group of 18 to 60 years posted for elective surgery requiring general anesthesia at MVJ Medical College and Research Hospital. Informed written consent was taken from the patient.

A pre anesthetic evaluation was done. Patient kept nil per oral for eight hours. Pre operative vitals parameters in the form of baseline pulse, blood pressure, blood saturation recorded. The patients were selected according to inclusion-exclusion criteria and randomly divided into two groups. Group MCL underwent conventional laryngoscopy using Macintosh direct laryngoscope for intubation and group VVL to undergo video laryngoscopy for intubation.

After attaching the appropriate monitors, all patients were premedicated with Glycopyrrolate IV (0.01mg/kg), Fentanyl IV (2mcg/kg). Preoxygenation done and induction by using IV Propofol (2 mg/ kg) followed by motor paralysis using IV succinylcholine (2mg/kg) and patient is being put on oxygen, nitrous oxide, isoflurane (0.5%) and positive pressure ventilation. After giving succinylcholine, ensuring adequate muscle relaxation, Macintosh laryngoscope inserted for Group MCL and video laryngoscope inserted for Group VVL and laryngeal opening was assessed. Lubricated cuffed endotracheal tube of appropriate size inserted. Initially attempt is made to pass the endotracheal tube through the vocal cords. If difficulty is encountered, external manipulation performed. Correct placement of endotracheal tube is confirmed by auscultation and end tidal carbon dioxide (ET CO2) values. After endotracheal intubation, subsequent anesthetic management continued as per the need of the case. Time taken for intubation is noted for each case. Blood pressure, oxygen saturation recorded before intubation, during intubating and after 1 minute, 5 minutes and 10 minutes. Results were statistically analyzed. P value less than 0.05 was considered significant.

## Results

**Table 1:** Comparison of ages between group MCL and group VVL

| Age Group (Years) | Group MCL | | Group VVL | |
|---|---|---|---|---|
| | No. of patients | % | No. of patients | % |
| 18-25 | 2 | 3.8% | 1 | 1.9% |
| 26-30 | 3 | 5.7% | 2 | 3.8% |
| 31-35 | 9 | 17.0% | 8 | 15.1% |
| 36-40 | 11 | 20.7% | 16 | 30.2% |
| 41-45 | 13 | 24.5% | 9 | 17.0% |
| 46-50 | 7 | 13.2% | 10 | 18.8% |
| 51-55 | 6 | 11.3% | 4 | 7.5% |
| 56-60 | 2 | 3.8% | 3 | 5.7% |
| Total | 53 | 100.00% | 53 | 100.00% |
| Mean age in years | 41.45±8.12 | | 42.01±7.70 | |
| t value | .178 | | | |
| p value | .848 | | | |

Table 1 shows age distribution of patients in both groups. The maximum age of the patient involved in study in groups MCL and VVL were 55 years and 57 years and the minimum age were 22 years and 23 years respectively. The mean age in group MCL and VVL were 41.45±8.12 and 42.01±7.70 respectively. There was no statistical significant difference in age of patients between Group MCL & Group VVL (P>0.05).

**Table 2:** Comparison of Mallampati grading between two groups

| Mallampati grade | MCL(n=53) | | VVL (n=53) | | Mean | p-value | t-value |
|---|---|---|---|---|---|---|---|
| | No | % | No | % | | | |
| 1 | 26 | 49.1% | 27 | 50.9% | 0.019 | 0.846 | 0.192 |
| 2 | 27 | 50.9% | 26 | 49.1% | | | |
| Total | 53 | 100% | 53 | 100% | | | |

Table 2 shows that there was no statistically significant difference with regard to Mallampati grade between 2 groups.

**Table 3:** Comparison of mean heart rate values in both groups

| HR | Group MCL (Mean±SD) | Group VVL (Mean±SD) | t value | p value |
|---|---|---|---|---|
| T0 | 79.64 ±11.68 | 82.00±9.15 | -1.157 | 0.250 |
| T1 | 78.75±11.68 | 80.71±8.94 | -0.971 | 0.334 |
| T2 | 71.05±11.13 | 72.37±8.38 | -0.690 | 0.492 |
| T3 | 88.71±11.65 | 90.39±8.66 | -.842 | 0.402 |
| T4 | 84.41±11.46 | 88.49±8.23 | -2.102 | 0.038 |
| T5 | 80.32±11.20 | 81.15±7.97 | -0.439 | 0.661 |
| T6 | 78.79±11.51 | 80.15±17.11 | -0.479 | 0.633 |

Table 3 shows that mean HR in group MCL varied from baseline 79.64±11.68 to highest 88.71±11.65 Mean HR in group VVL varied from 82.00±9.15 to 90.39±8.66. Baseline values (T0) were comparable in both groups. T1 and T2 values (before intubation) were comparable. No statistically significant difference between two groups. After intubation values from T3 to T6 were comparable and not statistically significant difference between two groups.

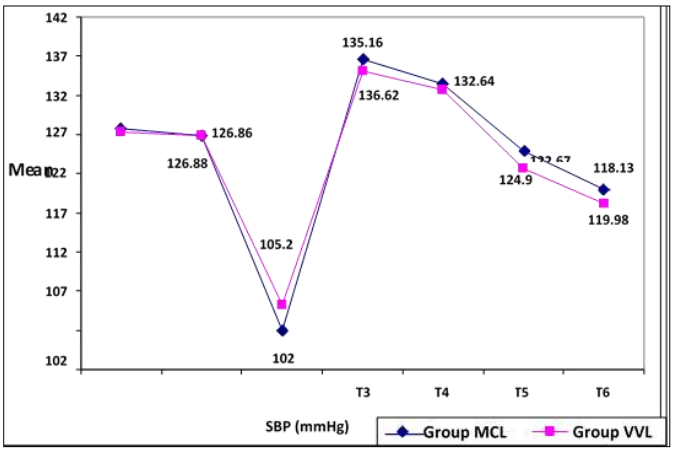


**Fig 1:** Comparison of mean SBP (mmHg) in both groups

Figure 1 shows that mean SBP in group MCL varied from baseline 127.81±8.51 to highest 136.62±9.97. Mean in group VVL varied from 127.35±7.77 to 135.16±7.63 Baseline values (T0) were comparable in both groups. T1 and T2 values (before intubation) were comparable. No statistically significant difference between two groups. After intubation values from T3 to T6 were comparable and not statistically significant difference between two groups.

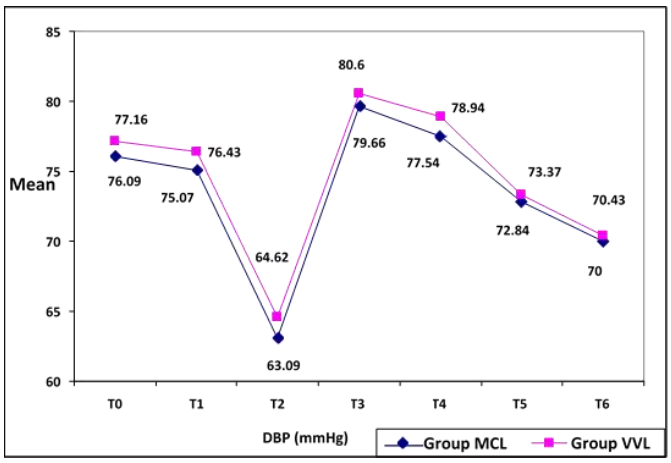


**Fig 2:** Comparison of mean DBP (mmHg) in both groups

Figure 2 shows that mean DBP in group MCL varied from baseline 76.09±5.66 to highest 79.66±7.15. Mean in group VVL varied from 77.16±5.84 to 80.60±5.28 Baseline values (T0) were comparable in both groups. T1 and T2 values (before intubation) were comparable. No statistically significant difference between two groups. After intubation values from T3 to T6 were comparable and not statistically significant difference between two groups.

**Table 4:** Cormack-Lehane grading

| Cormack-Lehane grade | Group MCL (n=53) | | Group VVL (n=53) | |
|---|---|---|---|---|
| | No | % | No | % |
| 1 | 43 | 81.1% | 53 | 100% |
| 2 | 10 | 18.9% | 0 | 0% |
| Total | 53 | 100% | 53 | 100% |
| Mean | 1.18 | | 1.00 | |
| t-value | 3.478 | | | |
| p-value | 0.001 | | | |

Table 4 shows that VVL has better laryngeal view than traditional MCL (P< 0.05).

**Table 5:** Comparison of number of desaturation

| SPO2 | Group MCL (n=53) | | Group KVL (n=53) | |
|---|---|---|---|---|
| | No. | % | No. | % |
| 100% | 53 | 100% | 53 | 100% |
| </=96% | 0 | 0.0% | 0 | 0.0% |
| Total | 53 | 100% | 53 | 100% |

Table 5 shows that there is no difference in the desaturation results in both the groups (0 cases in both MCL and VVL group).

## Discussion

Laryngoscopy forms an important part of general anaesthesia and endotracheal intubation. For almost 60 years, direct laryngoscopy was the sole method used by anaesthesiologists to insert a tracheal tube into the trachea. The search for a bigger and better angle of view during difficult intubations led to the development of devices using video assistance [5].

Macintosh laryngoscope is used as standard for intubation technique. Developments in digital technology has led to birth of many portable video laryngoscopes and Vivid trac Video Laryngoscope is one among them. Vivid Trac has an integrated ET tube channel providing easy means for the preloaded ET tube advancement into the oral cavity and trachea, under continuous visualization, and without the need of a separate Stylet [6]. This study is designed to evaluate Macintosh and Vivid trac video laryngoscopes in terms of intubation time, Cormack lehane grading, hemodynamic response and safety for intubation of

A total number of 106 patients of age group of 18 to 60 years posted for elective surgery requiring general anesthesia were included in the study. The study population was divided into 2 groups with 53 patients in each group. Emergency surgeries, Mallampatti grade III and IV, patients at risk of gastric aspiration, significant systemic diseases, pregnancy were excluded. The mean age in group Macintosh video laryngoscope (MCL) and Vivid trac video laryngoscope (VVL) were 41.45±8.12 and 42.01±7.70 respectively. There was no statistical significant difference in age of patients between Group MCL & Group VVL. Rendeki S *et al.* [7] compared Vivid Trac video laryngoscope, Air traq video laryngoscope, King Vision video laryngoscope, Macintosh Laryngoscope and a Custom-Made Video-laryngoscope for difficult and normal airways in mannequins by novices. According to the study intubation-related times, the view of the glottis and operator

satisfaction were significantly better throughout the study with the commercial video-laryngoscopes.

MCL group included 27 male and 26 female patients and VVL group contained 25 males and 28 females. Gender of the subjects was comparable in both groups. Statistically there is no significant change in the gender wise distribution of patients in both the groups. Subjects in both groups belonged to ASA I or II category which are also comparable in both groups.

MCL group have 26 patients of class I, 27 patients of class II Mallampati airway and VVL group have 27 patients of class I, 26 patients of class II Mallampati airway. They also have adequate mouth opening, normal thyromental and sternomental distance. There is no significance between these two groups in terms of Mallampati grading.

The heart rate in both groups decreased from basal value after premedication and lowered further after induction. It was slightly above immediate post intubation in both groups and then started declining to reach post induction value at about three to five minutes in both groups. Both groups were comparable and found to be non- significant.

In group VVL and group MCL, mean HR values before intubation, immediately after intubation and 1 min after intubation (T1-T4) compared to baseline (T 0) show statistically significant difference and after 5 to 10 min (T5 T6) shows statistical insignificant.

Reena *et al.* [8] conducted study on comparison of King vision video laryngoscope with Macintosh laryngoscope for tracheal intubation using armored endotracheal tubes and found that there is no significant difference in heart rate between two groups similar to our study. Kumar M conducted a randomized control trial on intubation with King vision video-laryngoscope and Macintosh laryngoscope in cervical spine injury patients and observed that hemodynamic parameters of video laryngoscope remain the same as compared with Macintosh laryngoscope.

In both groups Systolic, diastolic and mean blood pressure decreased to lower value from basal to premedication and to post induction (lowest). After intubation they all increased to basal value from post induction value, then started declining to basal value by about 3-5 minutes after intubation. Both groups were comparable and none of the p value was significant.

Upadhyaya S [9] conducted a randomized comparative study on Hemodynamic changes during orotracheal intubation using Airtraq video laryngoscope and direct laryngoscope and found that Blood pressures were similar in both the groups at all times of intubation similar to our study.

As per our study there is no difference in haemodynamic parameters in both the groups. Hence irrespective of the laryngoscopy employed for intubation, there is a need for attenuation of airway reflexes in both the cases. The mean tracheal intubation time was 11.05 seconds in MCL group and 18.05 seconds in VVL group. MCL is faster than VVL by 6 seconds. In general the intubation time is longer with video laryngoscopes than direct Macintosh blade. Akihisa Y *et al.* [10] compared intubation by novice persons on mannequin using KVL and ML and found that the mean intubation time was faster with Macintosh group by 3.6 seconds similar to our study where Macintosh group faster than King Vision by 6 seconds.

There is no desaturation noted in all of the 106 cases including 53 cases with Macintosh laryngoscope and 53 cases with Vivid trac video laryngoscope. All cases maintained saturation of 100%. Even though one case using Macintosh laryngoscope required second attempt, the saturation maintained 100%. Erdivanli B *et al.* [11] conducted study on Comparison of King Vision video laryngoscope and Macintosh laryngoscope and found that none of the patients had peripheral oxygen desaturation below 94%. Experienced anesthesiologists may obtain similar rates of first pass intubation success and airway trauma with both laryngoscopes.

## Conclusion

Direct laryngoscope was the gold standard of airway management and video laryngoscope is comparatively a newer mode of airway visualizing device needs to be studied with the gold standard. This was a prospective comparative study conducted on 106 patients, dividing 53 patients in Macintosh laryngoscope and Vividtrac video laryngoscope each. It is observed that Vividtrac Video Laryngoscope has a comparable similar safety profile with Macintosh laryngoscope with respect to deleterious haemodynamic response produced by rigid manipulation of airway. Vividtrac Video Laryngoscope, a rigid channelled indirect laryngoscope provides always the better view of the laryngeal inlet than the Macintosh direct laryngoscope. Intubation time in Vividtrac video laryngoscopy was more than conventional laryngoscopy. There was no desaturation episodes noted among the two groups.

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