ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 07 | July - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

# "A COMPARATIVE STUDY OF HEMODYNAMIC RESPONSE FOLLOWING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION: DIRECT VERSUS VIDEO LARYNGOSCOPY"

Anaesthesiology

**Dr Ankit Shrivastava** MBBS, DNB Durgapur Steel Plant Hospital.

**Dr. Devashri Chilke*** M.D. Anaesthesiology , Durgapur Steel Plant Hospital, Durgapur , West Bengal 713205. *Corresponding Author

**Dr Nishant Kumar** MS (ENT) , Consultant The Mission Hospital, Durgapur.

**Dr. Debarshi Jana** Young Scientist (DST) Department Of Gynecology and Obstetrics Institute Of Post-Graduate Medical Education And Research, A.J.C. Bose Road, Kolkata-700020, West Bengal, India

## ABSTRACT

**Introduction:** Laryngoscopy and endotracheal intubation are the two essential procedures when general anaesthesia is administered to a patient. Adverse responses in the cardiovascular, respiratory, and other physiological systems can be provoked due to the noxious stimuli produced by laryngoscopy and intubation.1 During general anaesthesia maintenance of airway and ventilation can be done in various ways.
**Aims & Objectives:** To assess the superiority of video laryngoscopy over direct laryngoscopy using baseline parameters like heart rate, systolic blood pressure, diastolic blood pressure and mean blood pressure.
**Materials And Methods:** Interventional, Randomized study. Operation theatre of Durgapur Steel Plant Hospital, Durgapur, West Bengal. Adult males and females, ASA physical Grade 1 and 2 patients, scheduled for elective surgeries, under General Anesthesia, requiring or tracheal intubation. 1 year. From February 2018 to February 2019.
**Result And Analysis:**In Group-A (MDL), 28(56.0%) patients had MPG 1 and 22(44.0%) patients had MPG 2. In Group-B (KVVL), 29(58.0%) patients had MPG 1 and 21(42.0%) patients had MPG 2. Association of MPG vs. group was not statistically significant (p=0.8399). In Group-A (MDL), the mean time taken for intubation (mean±s.d.) of patients was 34.5600 ± 2.3661. In Group-B (KVVL), the mean time taken for intubation (mean±s.d.) of patients was 20.4000 ± 1.7728. Distribution of mean time taken for intubation vs. group was statistically significant (p<0.0001).
**Conclusion:** Also, Kingvision video laryngoscope offered less intubation time and reduced hemodynamic responses in patients with ASA grade 1and 2 as compared to Macintosh laryngoscope.
So further study can be done on patients with difficult airways (III-IV) and with different co morbidities (ASA 3,4, E) to evaluate whether using Kingvision video laryngoscope can be advantageous in reducing intubation time and obtunding hemodynamic responses to laryngoscopy and intubation.

## KEYWORDS

Hemodynamic Response, Laryngoscopy, Endotracheal Intubation, Video Laryngoscopy

## INTRODUCTION

Laryngoscopy and endotracheal intubation are the two essential procedures when general anaesthesia is administered to a patient. Adverse responses in the cardiovascular, respiratory, and other physiological systems can be provoked due to the noxious stimuli produced by laryngoscopy and intubation.[1] During general anaesthesia maintenance of airway and ventilation can be done in various ways. However intubating the trachea is the gold standard in airway management because it is the safest method of protecting the airway and delivering anaesthetic gases. There are many methods of intubating the trachea. Among them direct laryngoscopy and endotracheal intubation is done mostly. The Macintosh laryngoscope has been the gold standard device for direct laryngoscopy and endotracheal intubation since its invention.

The King Vision TM video laryngoscope is a relatively newer device which is somewhat similar to the guide channel video laryngoscopes like Airtraq and Pentax Airway Scope.

While using Macintosh laryngoscope, a relatively high forward and upward force is applied on the handle to visualize glottis through aligning oral, pharyngeal and laryngeal axes. Endotracheal intubation performed by intubating devices using indirect (video) laryngoscopy need comparatively less degree of manipulation of the airway [2], thus at least in theory we expect less hemodynamic stress response by using such devices.

Previously, although several studies were conducted comparing the hemodynamic responses to tracheal intubation by different models of video-laryngoscopes and conventional laryngoscopes with conflicting results, very few studies are available with the King Vision™ video laryngoscope. The study is designed with the objective to assess the hemodynamic changes that occur during and after endotracheal intubation with video laryngoscope and comparing those changes with conventional laryngoscopy.[3]

## AIM

To assess the superiority of video laryngoscopy over direct laryngoscopy using baseline parameters like heart rate, systolic blood pressure, diastolic blood pressure and mean blood pressure.

## OBJECTIVE

To compare the hemodynamic stress responses during laryngoscope and end tracheal intubation using King Vision TM laryngoscope as compared to Macintosh laryngoscope amongst American Society of Anesthesiologists physical status (ASA) class 1 and class 2 adult individuals receiving general anesthesia for elective surgeries.

## MATERIALS AND METHODS

**Study Design:**
Interventional, Randomized study.

**Study Setting:**
Operation theatre of Durgapur Steel Plant Hospital, Durgapur, West Bengal.

**Study Population:**
Adult males and females, ASA physical Grade 1 and 2 patients, scheduled for elective surgeries, under General Anesthesia, requiring or tracheal intubation.

**Study Duration:**
1 year. From February 2018 to February 2019.

**Inclusion Criteria:**
i. Adult males and females, of age group 35-50 years.
ii. Airway ASA grade 1 and 2.
iii. Patients posted for elective surgery.

**Exclusion Criteria:**
i. Age group less than 35 years or more than 50 years.

ii. Airway ASA grade 3 and 4.
iii. Those with BMI >30
iv. Short thyromental distance (< 6 cm)
v. Restriction in neck extension
vi. Protruding front teeth
vii. Mallampati score ≥ III

## RESULT AND ANALYSIS

We found in Group-A (MDL), the mean age (mean±s.d.) of patients was 40.1200 ± 5.0735 years. In Group-B (KVVL), the mean age (mean±s.d.) of patients was 39.8000 ± 4.4263 years. Distribution of mean age vs. group was not statistically significant (p=0.7375). In Group-A (MDL), 32(64.0%) patients had female and 18(36.0%) patients had male. In Group- B (KVVL), 31(62.0%) patients had female and 19(38.0%) patients had male. Association of sex vs. group was not statistically significant (p=0.8359). In Group-A (MDL), the mean height (mean±s.d.) of patients was 155.8400 ± 8.4693 cm. In Group-B (KVVL), the mean height (mean±s.d.) of patients was 157.1200 ± 7.9505 cm. Distribution of mean height vs. group was not statistically significant (p=0.4378). In Group-A (MDL), the mean weight (mean±s.d.) of patients was 57.2800 ± 6.4872 kg. In Group-B (KVVL), the mean weight (mean±s.d.) of patients was 55.8400 ± 7.4925 kg. Distribution of mean weight vs. group was not statistically significant (p=0.3068).

Our study showed that in Group-A (MDL), the mean BMI (mean±s.d.) of patients was 23.6492 ± 2.6094 Kg/m2. In Group-B (KVVL), the mean BMI (mean±s.d.) of patients was 22.6420 ± 2.8293 Kg/m2. Distribution of mean BMI vs. group was not statistically significant (p=0.0673). In Group-A (MDL), 36(72.0%) patients had ASA status 1 and 14(28.0%) patients had ASA status 2. In Group-B (KVVL), 38(76.0%) patients had ASA status 1 and 12(24.0%) patients had ASA status 2. Association of ASA status vs. group was not statistically significant (p=0.6484). In Group-A (MDL), 28(56.0%) patients had MPG 1 and 22(44.0%) patients had MPG 2. In Group-B (KVVL), 29(58.0%) patients had MPG 1 and 21(42.0%) patients had MPG 2. Association of MPG vs. group was not statistically significant (p=0.8399). In Group-A (MDL), the mean time taken for intubation (mean±s.d.) of patients was 34.5600 ± 2.3661. In Group-B (KVVL), the mean time taken for intubation (mean±s.d.) of patients was 20.4000 ± 1.7728. Distribution of mean time taken for intubation vs. group was statistically significant (p<0.0001).\

## DISCUSSION

The total sample size was taken as 100. After a thorough pre-anesthetic check-up, patients fulfilling the inclusion criteria were taken up for surgery.

The 100 patients were divided into two groups, of 50 each, based on random number generated by computer software.

| Group | Method of intubation used | Number of patients |
|---|---|---|
| A | Macintosh direct laryngoscope | N=50 |
| B | Kingvision video laryngoscope | N=50 |

We found that in Group-A (MDL), the mean age (mean± s.d.) of patients was 37.2600 ± 9.0030 years. In Group-B (KVVL), the mean age (mean± s.d.) of patients was 35.3000 ± 8.3648 years. Distribution of mean age vs. group was not statistically significant (p=0.2622).It was found that in Group-A (MDL), 32(64.0%) patients had female and 18(36.0%) patients had male. In Group- B (KVVL), 31(62.0%) patients had female and 19(38.0%) patients had male. Association of sex vs. group was not statistically significant (p=0.8359).Distribution of mean height and weight with group was not statistically significant (p=0.4378).

We found that in Group-A (MDL), the mean BMI (mean± s.d.) of patients was 23.6492 ± 2.6094 Kg/m2. In Group-B (KVVL), the mean BMI (mean± s.d.) of patients was 22.6420 ± 2.8293 Kg/m2. Distribution of mean BMI vs. group was not statistically significant (p=0.0673).

Savoldelli GL et al [4] (2008) found that the most difficult scenario (tongue oedema), the Macintosh blade was associated with a high rate of failure and prolonged intubation times whereas indirect laryngoscopes improved intubation time and rarely failed. Indirect laryngoscopes were judged easier to use than the Macintosh.

Enomoto Y et al [5] (2008) found that time taken for intubation was similar between the Macintosh laryngoscope [51 (27) s] and the Pentax-AWS [54 (14) s] (95% CI for difference: 29 to 3 s). The Pentax-AWS provided a better view of the glottis compared with the conventional Macintosh laryngoscope.

Sarkılar G et al [6] (2015) found that Cormack-Lehane, percentage of glottic opening), intubation time. Hemodynamic parameters were similar between the groups at all time points of measurement. The C-MAC video laryngoscope group had better laryngoscopic view as assessed by Cormack-Lehane and a longer intubation time. Endotracheal intubation performed with direct Macintosh laryngoscope or indirect Macintosh C-MAC video laryngoscope causes similar and stable hemodynamic responses.

It was showed that in Group-A (MDL), 36(72.0%) patients had ASA status 1 and 14(28.0%) patients had ASA status 2. In Group-B (KVVL), 38(76.0%) patients had ASA status 1 and 12(24.0%) patients had ASA status 2. Association of ASA status vs. group was not statistically significant (p=0.6484).

Our study found that in Group-A (MDL), 28(56.0%) patients had MPG 1 and 22(44.0%) patients had MPG 2. In Group-B (KVVL), 29(58.0%) patients had MPG 1 and 21(42.0%) patients had MPG 2. Association of MPG vs. group was not statistically significant (p=0.8399).

Kanchi M et al [7] (2011) found that the duration of laryngoscopy and intubation was significantly longer in group B (video laryngoscopy) when compared to group A patients.

However, haemodynamic changes were no different between the groups. Laryngoscopy did not provide any benefit in terms of haemodynamic response to laryngoscopy and intubation in patients undergoing primary CABG with a Mallampatti grade of <2.

İnangil G et al [8] (2018) found that the intubation time was similar in both groups (14.1±4.0 sec vs. 13.2±4.2 sec; p=0.22). Hemodynamic values including heart rate, systolic, diastolic and mean arterial pressure and rate pressure product were similar at all-time points. The laryngoscopy time was also similar between groups. The GlideScope video laryngoscope did not show any advantage on hemodynamic response in patients undergoing cardiovascular surgery when compared to Macintosh laryngoscope.

Tempe DK et al [9] (2016) found that duration of laryngoscopy and intubation was significantly less in MC (36.68 ± 16.15 s) as compared with MG (75.25 ± 30.94 s) and TV (60.47 ± 27.45 s) groups (P = 0.000 and 0.003, respectively). Video laryngoscopes did not demonstrate any advantage in terms of hemodynamic response in patients with normal airway undergoing CABG.

We found that in Group-A (MDL), the mean time taken for intubation (mean± s.d.) of patients was 34.5600 ± 2.3661. In Group-B (KVVL), the mean time taken for intubation (mean± s.d.) of patients was 20.4000 ± 1.7728. Distribution of mean time taken for intubation vs. group was statistically significant (p<0.0001).

Siddiqui N et al [10] (2009) found that there was no significant difference in blood pressure and heart rate between the groups. Direct laryngoscopy intubation times were significantly lower than those of the other techniques (both P < 0.0001).

Dashti M et al [11] (2014) found that sixty patients who had uncontrolled hypertension and scheduled for elective surgery requiring tracheal intubation, were randomly assigned to receive intubated with either a GVL (n = 30) or a MDL (n = 30). Intubation time, heart rate, and mean arterial blood pressure (MAP), were compared between the two groups at; baseline, following induction of anaesthesia, after intubation, and at one minute intervals for 5 minutes. Intubation time was longer in the GVL group (9.80 ± 1.27 s) than in the MDL group (8.20 ± 1.17 s) (P < 0.05). MAP, pulse rate, were lower in the GVL than the MDL group after endotracheal intubation (P < 0.05). MAP, heart rate, returned to pre-intubation values at 3 and 4 minutes after intubation in the GVL and MDL groups, respectively. Hemodynamic fluctuations in patients with uncontrolled hypertension after endotracheal intubation were lower with the GVL than the MDL technique. In C-MAC group, the HR was significantly higher than the Macintosh group at 3 min after intubation, whereas SBP, DBP, and MAP were significantly higher at 1 min. McCoy group showed a similar response compared to Macintosh

group at all- time intervals. C-MAC video laryngoscope has a comparatively greater hemodynamic response than Macintosh laryngoscope. The time taken to perform endotracheal intubation and haemodynamic changes associated with intubation were noted in both the groups at different time points. The duration of laryngoscopy and intubation was significantly longer in group B (video laryngoscopy) when compared to group A patients. However, haemodynamic changes were no different between the groups. Video laryngoscopy did not provide any benefit in terms of haemodynamic response to laryngoscopy and intubation in patients undergoing primary CABG with a Mallampatti grade of <2.

Tempe DK et al [9] (2016) found that heart rate and diastolic arterial pressure increased at 0 and 1 min of intubation in all the three groups ($P < 0.05$) while mean arterial pressure increased at 0 min in the MG and TV groups and at 1 min in all three groups ($P < 0.05$). A significant increase in systolic arterial pressure was only observed in TV group at 1 min ($P < 0.05$). These hemodynamic parameters returned to baseline by 3 min of intubation in all the groups.

Ko DD et al [12] (2012) found that there were no significant differences in the SBP, MAP, DBP, HR, and the sore throat incidence between the two groups. Time for intubation was longer than with conventional laryngoscope. OptiscopeTM, when compared with conventional laryngoscope for intubation, does not modify the hemodynamic response, but it provides a better view of the vocal cords.

Sarkar J et al [13] (2015) found that the hemodynamic parameters, systemic blood pressure (systolic and diastolic) and heart rate were recorded before and after induction of anaesthesia and every minute up to 5 min after intubation. Patients of Group II recorded a minimal rise in peak systolic blood pressure (SBP) (1.8%) and diastolic blood pressure (10.6%). In comparison patients of Group I recorded a significant sustained rise in peak SBP (20.3%) and diastolic blood pressure (21.4%). However heart rate changes recorded in the two groups were of equal measure (peak rise of 22.9% in Group I vs. 22.4% in Group II). They conclude that intubation through C- Trach generates a lower pressor response to intubation in comparison to intubation using DL.

## CONCLUSION

We had compared Hemodynamic responses to endotracheal intubation using Macintosh laryngoscope and Kingvision video laryngoscope.

In patients that were presumed to have normal airways (MPG-Gr I and Gr II), KVVL showed special advantages over the Macintosh laryngoscope in terms of time taken for orotracheal intubation and hemodynamic responses following the same.

Therefore it was concluded that the time taken for intubation with video laryngoscope was shortened, this probably was the advantage over the Macintosh laryngoscope group in terms of decreased hemodynamic responses.

Also, Kingvision video laryngoscope offered less intubation time and reduced hemodynamic responses in patients with ASA grade 1and 2 as compared to Macintosh laryngoscope.

So further study can be done on patients with difficult airways (III-IV) and with different co morbidities (ASA 3,4, E) to evaluate whether using Kingvision video laryngoscope can be advantageous in reducing intubation time and obtunding hemodynamic responses to laryngoscopy and intubation.

**Table: Association of MPG vs. Group**

| GROUP | | | |
|---|---|---|---|
| **MPG** | **Group-A (MDL)** | **Group-B (KVVL)** | **TOTAL** |
| 1 | 28<br>49.1 | 29<br>50.9 | 57<br>100.0 |
| | 56.0 | 58.0 | 57.0 |
| 2 | 22<br>51.2 | 21<br>48.8 | 43<br>100.0 |
| | 44.0 | 42.0 | 43.0 |
| TOTAL | 50<br>50.0 | 50<br>50.0 | 100<br>100.0 |
| | 100.0 | 100.0 | 100.0 |

## REFERENCES


1. Reid LC, Brace DE. Irritation of respiratory tract and its reflex effect on heart Surgery.Gynaecology Obstetrics. 1940; 70:157-6
2. Pott LM, Murray WB. Review of video laryngoscopy and rigid fiberoptic laryngoscopy. C rrOpinAnaesthesiol. 2008;21(6):750–8.
3. Standring S, Gray H. Anatomy. Gray's anatomy. 41st ed. Edinburgh: Churchill Livingstone; 2016.
4. Savoldelli GL, Schiffer E, Abegg C, Baeriswyl V, Clergue F, Waeber JL. Comparison of the Glidescope®, the McGrath®, the Airtraq® and the Macintosh laryngoscopes in simulated difficult airways. Anaesthesia. 2008 Dec;63(12):1358-64.
5. Enomoto Y, Asai T, Arai T, Kamishima K, Okuda Y. Pentax-AWS, a new videolaryngoscope, is more effective than the Macintosh laryngoscope for tracheal intubation in patients with restricted neck movements: a randomized comparative study. British journal of anaesthesia. 2008 Jan 31;100(4):544-8.
6. Sarkılar G, Sargın M, Sarıtaş TB, Borazan H, Gök F, Kılıçaslan A, Otelcioğlu Ş. Hemodynamic responses to endotracheal intubation performed with video and direct laryngoscopy in patients scheduled for major cardiac surgery. International journal of clinical and experimental medicine. 2015;8(7):11477.
7. Kanchi M, Nair HC, Banakal S, Murthy K, Murugesan C. Haemodynamic response to endotracheal intubation in coronary artery disease: Direct versus video laryngoscopy. Indian journal of anaesthesia. 2011 May;55(3):260.
8. İnangil G. Comparison of hemodynamic responses to endotracheal intubation with the GlideScope video laryngoscope and Macintosh laryngoscope in patients undergoing cardiovascular surgery. Turkish Journal of Thoracic and Cardiovascular Surgery. 2018;26(3).
9. Tempe DK, Chaudhary K, Diwakar A, Datt V, Virmani S, Tomar AS, Mohandas A, Mohire VB. Comparison of hemodynamic responses to laryngoscopy and intubation with Truview PCD™, McGrath® and Macintosh laryngoscope in patients undergoing coronary artery bypass grafting: A randomized prospective study. Annals of cardiac anaesthesia. 2016 Jan;19(1):68.
10. Siddiqui N, Katznelson R, Friedman Z. Heart rate/blood pressure response and airway morbidity following tracheal intubation with direct laryngoscopy, GlideScope and Trachlight: a randomized control trial. European Journal of Anaesthesiology (EJA). 2009 Sep 1;26(9):740-5.
11. Dashti M, Amini S, Azarfarin R, Totonchi Z, Hatami M. Hemodynamic changes following endotracheal intubation with glidescope® video-laryngoscope in patients with untreated hypertension. Research in cardiovascular medicine. 2014 May;3(2).
12. Ko DD, Kang H, Yang SY, Shin HY, Baek CW, Jung YH, Woo YC, Kim JY, Koo GH, Kim SD. A comparison of hemodynamic changes after endotracheal intubation by the Optiscope™ and the conventional laryngoscope. Korean journal of anesthesiology. 2012 Aug;63(2):130.
13. Sarkar J, Anand T, Kamra SK. Hemodynamic response to endotracheal intubation using C-Trach assembly and direct laryngoscopy. Saudi journal of anaesthesia. 2015 Oct;9(4):343.