



COMPARATIVE STUDY OF HEMODYNAMIC RESPONSE TO ENDOTRACHEAL INTUBATION-BY DIRECT VERSUS VIDEO LARYNGOSCOPY IN HYPERTENSIVE PATIENTS

Anaesthesiology

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ABSTRACT

INTRODUCTION: Laryngoscopy and endotracheal intubation is an integral part of general anaesthesia. The magnitude of the hemodynamic response is directly related to the force and duration of laryngoscopy. Video laryngoscope has fiberoptic bundle incorporated in it, can reduce the amount of stretch on airways and gives good view in the LCD display. Tracheal intubation performed by video laryngoscopy need comparatively less degree of airway manipulation as it does not require alignment of the oral, pharyngeal and laryngeal axis to view the glottis because of the design of the blades, thus less hemodynamic response.

OBJECTIVES: The objectives of the study are laryngoscopic view, ease of intubation, intubation time, hemodynamic parameters and complications.

MATERIALS AND METHODS: The study was done in 60 adult ASA II/III patients, aged 30 to 60 years of either sex, scheduled for elective surgery under General Anesthesia in controlled hypertensive patients. Patients having blood pressure < 160/100 mmHg were included in study. Patients were randomly divided into two equal groups (n=30): Group D-Direct laryngoscopy and Group V-Video laryngoscopy.

RESULT: Laryngoscopic view was better in Group V than Group D. The intubation time was longer in Group V than Group D. Ease of intubation was better in Group V than Group D. In group D, 23.33 % patients required assistance compared to only 6.67% patients in Group V. Changes in mean pulse rate immediately after intubation was significantly less in Group V than with Group D. Increase in MAP was less in Group V compare to Group D. It remains elevated for only 3 minutes in Group V compared to 8 minutes in Group D. It was statistically highly significant. Postoperative complication were mild.

CONCLUSION: Video laryngoscope is more advantageous compare to Macintosh laryngoscope in terms of hemodynamic response and is better choice in hypertensive patients.

KEYWORDS

Hemodynamic response, Hypertensive patients, Macintosh laryngoscope, Video laryngoscope

INTRODUCTION:

Laryngoscopy and endotracheal intubation is an integral part of general anaesthesia. Laryngoscopy provoke untoward response in cardiovascular, respiratory and other physiological systems. Laryngoscopic stimulation of Oro-pharyngo-laryngeal structure is an important factor in hemodynamic response associated with tracheal intubation.⁽¹⁾⁽²⁾ The magnitude of the hemodynamic response is directly related to the force and duration of laryngoscopy.⁽³⁾

Video laryngoscope is a new airway tool, which by virtue of the fiberoptic bundle incorporated in it, can reduce the amount of stretch on airways and gives good view in the LCD display. Tracheal intubation performed by video laryngoscopy need comparatively less degree of manipulation of the airway as it does not require alignment of the oral, pharyngeal and laryngeal axes to view the glottis because of the design of the blades⁽⁴⁾, thus less hemodynamic response by using such devices. According to the manufacturer's data, due to its design, less upward lifting force (0.5 to 1.5 kg) is required compare to direct laryngoscopy (4.0 to 5.0 kg) on the base of tongue.

This study was undertaken to compare the hemodynamic changes that occur during endotracheal intubation with either direct laryngoscopy or a video laryngoscopy in hypertensive patients.

MATERIALS AND METHODS:

Following approval by IRB, this prospective observational study was carried out. The study was done in 60 adult ASA II/III patients, aged 30 to 60 years of either sex, scheduled for elective surgery under general Anesthesia in controlled hypertensive patients. Patients having blood pressure < 160/100 mmHg were included in study. Patients were randomly divided into two groups.

Group D (n=30): Direct laryngoscope- Macintosh blade.

Group V (n=30): Video laryngoscope-TrueView PCD.

The patients with difficult airway and cervical immobilizations were excluded from study.

The aim and objective of the study was to compare - (1)Laryngoscopic view as per Cormack- Lehane Grading (2)Ease of intubation (3)Intubation time (4)Laryngoscopic view (5) hemodynamic parameters and (6)airway complications.

Pre-operative assessment was done before the surgery. Detailed history was taken, General physical examination was done and detail of their antihypertensive medications and the duration of hypertension was noted. Vitals and investigations were also noted. Patients were checked for mouth opening and neck extension. Patients were kept NBM for minimum 6 hours and advised to take antihypertensive drug orally in the morning 6 am with sip of water, except for ARBs and ACE inhibitors. Patient was explained about the procedure and Informed written consent was taken.

Patient was premedicated with Inj. Ondansetron 4 mg, Inj. Glycopyrrolate 0.2 mg and Inj. Fentanyl 2µg/kg I.V.

All patients were preoxygenated for 3 minutes before induction. Induction was done with Inj. Thiopentone Sodium 5-7 mg/kg and Inj. Succinylcholine 2 mg/kg I.V.

Patient was intubated using direct/ video laryngoscopy with appropriate size cuffed ET tube as per selected group. In Group D, tracheal intubation was performed with Macintosh laryngoscope. If vocal cords were not seen, assistance was used to facilitate intubation like external laryngeal manipulation and/or bougie, and noted.

In Group V, tracheal intubation was done with ET tube preloaded with stylet using Video laryngoscope after visualization of vocal cords on camera screen.

The ease of intubation was graded on the basis of number of attempts and assistance required during intubation.

Easy – first attempt and no assistance required for intubation.
Intermediate – two attempts and assistance required in form of external laryngeal manipulation and/or bougie

Difficult – three attempts and both external laryngeal manipulation and bougie required for intubation

Intubation time was considered from introducing the laryngoscope into the mouth till ET tube inserted in vocal cords.

After confirmation of bilateral equal air entry, cuff was inflated and ET tube fixed. Anesthesia was maintained with oxygen and nitrous oxide (50:50%) and sevoflurane 2-3%. Once the spontaneous respiration achieved, Inj. Atracurium 25 mg I.V. given and repeated 5 mg I.V. as per requirement.

Pulse rate, SBP, DBP, SPO₂ and EtCO₂ were recorded at various intervals – baseline ,before and after induction ,immediately after intubation ,3,,5,8,10 minute after intubation.

After completion of surgery, reversal was done with Inj. Neostigmine 2.5 mg and Inj. Glycopyrrolate 0.4 mg. Thorough oral suction was done and patient extubated. Intraoperative complications like soft tissue injury, dental injury, desaturation, oesophageal intubation and post-operative complications like sore throat and hoarseness of voice was noted.

Study was conducted at Smt. SCL General hospital , Ahmedabad from October 2017 to September 2018.

STATISTICAL ANALYSIS:

Patients were randomly divided into two groups (n=30). Statistical analysis was done using unpaired t-Test. All the continuous variables were recorded as mean±SD. Data were analysed using graph pad software. P value ≤0.05 was considered statistically significant, whereas P value of <0.001 was taken as highly significant.

OBSERVATION AND RESULTS:

Demographic data was comparable in both groups.

The Laryngoscopic View was noted as per Cormac Lehane grading. Grade III was noted in 13.33% patients in Group D as compared to nil in Group V.

EASE OF INTUBATION:

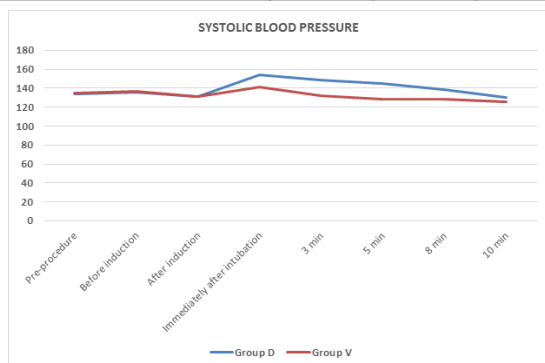
In 93.33% of patients, intubation was found easier in Group V compared to 76.67% in Group D. Only 6.67% intubation was intermediate grade and none was found as difficult in Group V while in Group D, 16.66% of intubation was intermediate grade and 6.67% intubation was difficult.

INTUBATION TIME:

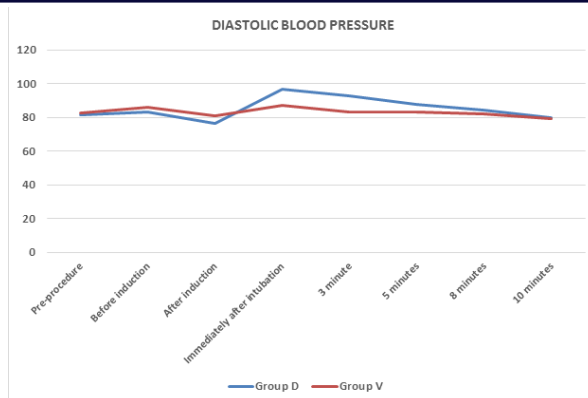
Total time taken for intubation was longer for Group V (15.56±2.93s) than Group D (11.56±2.09s)(p<0.05).

Table I-analysis Mean Pulse Rate (per Minute)

Time	Group D	Group V	P value
Pre-procedure	84.43±6.87	85.9±7.27	0.4241
Before induction	84.03±4.55	84.73±6.04	0.6141
After induction	77.66±4.74	79.06±6.54	0.3473
Immediately after intubation	97.8±4.82	94.63±7.15	0.0487
3 minute	94.73±4.90	86.16±6.68	0.0001
5 minutes	91.33±5.27	84.83±5.61	0.0001
8 minutes	89.23±6.0	83.63±5.32	0.0003
10 minutes	83.1±5.22	82.03±5.37	0.4371



Graph I: Analysis Of Systolic Blood Pressure



Graph II: analysis Of Diastolic Blood Pressure

Table II : Analysis Of Mean Arterial Pressure

Time	Group D	Group V	P value
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8 minutes	89.23±6.0	83.63±5.32	0.0003
10 minutes	83.1±5.22	82.03±5.37	0.4371

Postoperative complications were mild. Soft tissue injury was seen only in 2 patients in Group D compare to nil in Group V. Sore throat was seen in 2 patients in both groups.

DISCUSSION:

Hypertensive patients have an exaggerated hemodynamic stress response due to increased catecholamine levels and increased sensitivity of peripheral vessels to catecholamine because of long-term persistent vascular hyperreactivity.

Laryngoscopy and intubation using Macintosh laryngoscope requires elevation of the epiglottis and exposure of the glottis, obtained by forward and upward lifting force to straighten the angle between mouth and the glottic opening on laryngoscope blade. This causes stretching of the oropharyngeal tissues and trigger a hemodynamic stress response which is of little consequence in healthy people but it may be hazardous, increasing risk of MI or stroke in hypertensive patients.

Video laryngoscope is recent novel device used to facilitate laryngoscopy and intubation. Unlike Macintosh laryngoscope, the TrueView laryngoscope does not require alignment of oropharyngeal laryngeal axis. Further it has specially designed blade with a 46° angled view which reduce upward lifting force to expose glottis. Due to these reasons, it might be associated with less hemodynamic stress responses.

This study was conducted to compare hemodynamic response to laryngoscopy and endotracheal intubation by current standard practice of direct laryngoscopy using Macintosh blade versus video laryngoscopy using TrueView laryngoscope in hypertensive patients.

Majid Dashti, Shahram amini, RasoulAzarfarin et al(2014)⁽⁵⁾ compared hemodynamic changes following endotracheal intubation with video laryngoscope (VL) and direct laryngoscope (DL) in 60 adult uncontrolled hypertensive patients. They concluded that intubation time was longer (9.80± 1.27s) in VL group than in DL group (8.20±1.17s) (p<0.05). MAP, pulse rate, Blood pressure were lower in the VL group than the DL group after intubation (p<0.05). However these changes returned to baseline value at 3 to 4 minutes after intubation in both groups. They concluded that hemodynamic response was lower in VL group than DL.

Kamlesh G, Smita L, Sushma S. (2016)⁽⁶⁾ compared stress response to laryngoscopy and ease of intubation in 100 patients with direct and video laryngoscope. They found that at 3 minutes pulse, systolic and diastolic blood pressure were significantly high with direct group than video laryngoscope group. They concluded that, less hemodynamic

changes was associated with use of video laryngoscope. Intubating condition were also better with video laryngoscope than direct laryngoscope.

Hypertensive patients have an exaggerated hemodynamic stress response due to increased catecholamine levels and increased sensitivity of peripheral vessels to catecholamine because of long term persistent vascular hyperreactivity.

In our study, Cormac Lehane grade was I/II in 80%/20% of patients in Group V while it was 56.67%/30% in Group D. Grade III was noted in 13.33% patients in Group D as compared to nil in Group V.

In 93.33% of patients, intubation was found easier in Group V compared to 76.67% in Group D. Only 6.67% intubation was intermediate grade and none was found as difficult in Group V while in Group D, 16.66% of intubation was intermediate grade and 6.67% intubation was difficult.

External laryngeal manipulation was required in 10% of patients in Group D compare to 6.67% in Group V. Bougie was needed in 6.67% patients in Group D compare to nil in Group V. Both assistance were required in 6.67% patients in Group D compare to nil in Group V. Our findings were similar with the study of Kamlesh G et al.

The success rate at first intubation attempt was greater for Group D(93.33%) compare to Group V (90%)($p=0.6505$). 10% patients required 2nd attempt in Group V compare to only 6.67% in Group D.

In both groups changes in Mean pulse rate was comparable up to induction. Immediately after intubation, there was more increase in the mean pulse rate (97.8 ± 4.82) in Group D than Group V (94.63 ± 7.15), which is statistically significant ($P < 0.05$). Mean pulse rate returns to baseline value after 10 minutes (83.1 ± 5.22) in Group D and at 5 minutes (84.83 ± 5.61) in Group V. Our finding were comparable with the study of Majid Dasthi et al⁽²⁵⁾.

Increase in MAP immediately after intubation was significantly higher in Group D(115.70 ± 6.80 mmHg) compared with Group V (104.97 ± 3.42 mmHg). This increase in Mean blood pressure is statistically significant ($P < 0.05$). Our finding were comparable with the study of Majid Dasthi et al⁽²⁵⁾.

Soft tissue injury was seen in 2 patients in Group D compare to nil in Group V. Post-operative sore throat was seen in 2 patients in both groups. The limitations of our study were that we did not use both the devices in the same patient and did not record the direct view of the glottis during Video laryngoscopy.

CONCLUSION:

Video laryngoscope because of specially designed angulated blade, it offers better laryngeal view, does not require alignment of oropharyngeal and laryngeal axis and lesser degree of force require to view glottic structure compared to Macintosh laryngoscope. It causes less stretching to oropharyngeal tissue which is important factor for hemodynamic changes. Time taken for intubation was longer but CL grading was better with Video laryngoscope. All these causes lesser hemodynamic responses in Group V compared to Group D.

To conclude with, Video laryngoscope is more advantageous compare to Macintosh laryngoscope in terms of hemodynamic response and is better choice in hypertensive patients.

REFERENCES

1. Shribman AJ, Smith G, Achola KJ. Cardiovascular and catecholamine responses to laryngoscopy with and without tracheal intubation. *Br J Anaesth* 1987;59:295-9.
2. Bucx MJ, Scheck PA, Van Geel RT, et al. Measurement of forces during laryngoscopy. *Anaesthesia* 1992;47:348-51.
3. Rose DK, Cohen MM. The airway, problems and predictions in 18,500 patients. *Can J Anaesth* 1994;41:372-83.
4. Koyama Y, Inagawa G, Miyashita T, et al. Comparison of the Airway Scope, gum elastic bougie and fiberoptic bronchoscope in simulated difficult tracheal intubation: a manikin study. *Anaesthesia* 2007;
5. Majid Dasthi, Shahram Amini, Rasoul Azarfarin, Zia Totonchi, Maryam Hatami. Hemodynamic changes following endotracheal intubation with Glidescope® Video laryngoscope in patient with untreated Hypertension. *Res Cardiovasc Med*. 2014;3 (2):e17598.
6. Kamlesh G, Smita L, Sushma S, stress response to laryngoscopy and ease of intubation: comparison between Macintosh and McCoy's type laryngoscope. *International Journal of Research in Medical Sciences* 2016 aug;4(8):3141-3145.