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Research Paper

Laryngoscopic View And Cardiovascular Response to Intubation With Truview Laryngoscope in Comparison with Macintosh Laryngoscope.

Medical Science

KEYWORDS : TruViewEVO2laryngoscope, Macintosh laryngoscope, Laryngoscopy, Intubation

Dr S Amita	DEPARTMENT OF ANAESTHESIOLOGY, JSS MEDICAL COLLEGE,JSS UNIVERSITY MYSURU
Dr .Hemalatha S	MD. D.A, PROFESSOR, DEPARTMENT OF ANAESTHESIOLOGY, JSS MEDICAL COLLEGE MYSURU
Dr. NaliniKotekar	MD. D.A, PROFESSOR AND HOD, DEPARTMENT OF ANAESTHESIOLOGY, JSS MEDICAL COLLEGE, MYSURU

ABSTRACT

BACKGROUND AND OBJECTIVE: Macintosh laryngoscope is one of the gold standard instrument used for tracheal intubation TruViewEVO2 blade incorporates a non-magnifying optic port with an anterior fraction of 42º which enable a better field for intubation. The purpose of this study was to evaluate the TruView laryngoscope in comparison to Macintosh laryngoscope with regard to cardiovascular response and laryngoscopic view.

MATERIALS AND METHODS: 200 Adult patients(20-60yrs) with American Society of Anaesthesiologistsgrade I and II, Mallampati grade I and II posted for surgery under general anaesthesia at JSS Hospital, Mysore divided into two groups of 100 each. Laryngoscopic view and Hemodynamic response were assessed with statistical analysis.

RESULTS In group T, 65 (65%) patients had Cormack and LehanegradingI, 33 (33%) patients had Cormack and Lehane grading II and 2 (2%) patients had Cormack and Lehane grading III. In group M, 42 (42%) patients had Cormack and Lehane grading I and 57 (57%) patients had Cormack and Lehane grading II and 1(1%) patient had Cormack and Lehane grading III The differences in the Cormack and Lehane between the two groups were statistically highly significant (p = 0.003).Group T mean heart rate increased from 85.540±14.67866 beats per minute prior to intubation to 94.5200±15.08259 beats per minute after intubation and mean arterial pressure increased from 92.7850±12.39260 mmHg prior to intubation to 101.2550±13.19825 mmHg after intubation. In Group M, mean heart rate increased from 84.7900±7.99153 bpm prior to intubation to 103.6100±9.30721 bpm after intubation and mean arterial pressure increased from 91.7070±8.08478mmHg prior to intubation to 97.1410±7.71946 mmHg after intubation(p=0.000).

CONCLUSION TruView laryngoscope provides a better exposure of the glottis when compared to Macintosh laryngoscope while triggering minimum haemodynamic response to endotracheal intubation.

INTRODUCTION

Securing and maintainance of airway is one of the major responsibilities of an anaesthesiologist. The curved laryngoscope blade described by Macintosh in 1943 is the most popular device used to facilitate orotracheal intubation and constitutes a gold standard.[2] Most of tracheal intubations performed daily are effortless. However, difficult tracheal intubation, which occurs in 1.5–13% of general anaesthetics can be associated with severe morbidity [1]. In a case of difficult intubation, either the larynx cannot be visualised using conventional direct laryngoscopy, or the larynx is visualised but it is difficult to pass the tube into the trachea, wherin using macintosh may not be useful to visualize the glottis always, leading to invention of newer devices like Airtraq, Video assisted laryngoscope such as TruViewEVO2, King Vision laryngoscope and others.

The process of laryngoscopy is known to have profound cardiovascular effects. This includes pressor response and tachycardia along with an increase in catecholamine concentration, mainly norepinephrine. The major cause of this response is believed to arise from stimulation of supraglottic region by laryngoscopic blade with tracheal tube placement and cuff inflation contributing little additional stimulation.[3, 4]

Transitory hypertension and tachycardia are probably of no consequences in healthy individuals, but they may be hazardous to those with hypertension, myocardial insufficiency or cerebrovascular diseases. Complications of pressor response following laryngoscopy include myocardial ischemia, cardiac failure, intracranial haemorrhage and increase in intracranial pressure.[5,6]

In 2006, the TruphatekTruViewEVO2 system (Truphatek International Limited, Netanya, Israel) was introduced for adult airway management and in 2009..The blade of the laryngoscope has a magnified optic side port that provides a wide, magnified laryngeal view at a 46˚ anterior refracted angle, allowing a view of the glottis via the prismatic lens without having to align the oral, pharyngeal, and tracheal axes The tool has a narrower blade tip than does the Macintosh blade and an integrated oxygen jet-cleaning system (flow 10 l/min-1) to prevent fogging and provide apneic oxygenation.[7]

The purpose of this study is to evaluate the effectiveness of a Truview laryngoscope in comparison to an English blade Macintosh laryngoscope while performing a tracheal intubation with regard to cardiovascular response and laryngoscopic view.

Materials and Methods

At the start of this study TruViewEVO2 was a novel device hence we wanted to assess its usage in visualization of glottis in patients with apparently normal airway charecteristics. 200 patients of either sex in the age group of 20-60 years undergoing elective surgery under general anaesthesia at JSS Hospital attached to JSS Medical College,Mysore from September 2013 to March 2015 were included in the study.

In this study, evaluation and comparison of the differences in observations made using TruViewEVO2 laryngoscope and Macintosh laryngoscope in terms of Cormack and Lehane grading of laryngeal view, haemodynamic response and complications were studied.

After Institutional Ethical Committee approval and written informed consent, patients posted for various elective surgeries requiring general anaesthesia were selected. All the patients were explained in their colloquial language about the procedure.

Two hundred (200) patients of either sex scheduled for different elective surgeries under general anaesthesia requiring endotracheal intubation were randomly allocated to one of the two groups of 100 patients each group.

Volume : 5 | Issue : 2 | February 2016 • ISSN No 2277 - 8179

Group T - Patients intubated with TruViewEVO2 laryngoscope (n-100)

Group M - Patients intubated with Macintosh laryngoscope (n-100)

Inclusion criteria are ASA grade I and II, Age group 20-60 years,Mallampati class I and II.

Exclusion criteria are ASA grade III and IV,Mallampati III and IV.

All patients were examined a day prior to surgery. A systemic examination was done to rule out any of the above mentioned exclusion criteria. The cardiovascular parameters were noted.

Airway assessment was done using various methods. Movements of neck, ruleof 1-2-3(temporomandibular joint, mouth opening and thyromental distance), teeth and Samsoon and Young's modification of Mallampati grading were assessed in each patient. They were premedicated with alprazolam 0.25 mg and ranitidine 150mg orally the night before surgery and on the morning of surgery.

Basic haemotological investigations (haemoglobin%, platelete count and international normalized ratio), biochemical investigations(blood urea, serum creatinine, random blood sugar, serum electrolytes) chest X-ray and Electrocardiogram(ECG) were done.

In this study, TruViewEVO2 laryngoscope Adult size and Macintosh size 3 and 4 blades were used.

On arrival into the operation theater, intravenous line was startedand psychological assurance was given to the patient.

Pulse oximeter, Non invasive blood pressure monitor, ECG monitor, end tidal carbon dioxide(EtCO2) were connected.

Preinduction parameters: Heart rate(HR), systolic blood pressure(SBP), diastolic blood pressure(DBP),mean arterial pressure(MAP) , oxygen saturation (SPO2), ETCO2 and ECG were noted.

Patients were premedicated with Inj. ondansetron 0.08mg/kg, Inj. Glycopyrrolate0.01mg/kg Inj. Lignocaine 1.5 mg/kg and Inj. Midazolam 0.01mg/kg, Inj.Morphine 0.1mg/kg Preoxygenation with 100% oxygen was done for 3 minutes Anaesthesia was induced with Inj. propofol 2mg/kg, mask ventilation was confirmed. Inj.Succinylcholine 1.5mg/kg was used for facilitation of intubation. Mask ventilation was done for 1min after injection of Succinylcholine with Bain's system/closed circuit.

The HR,SBP, DBP, MAP, ETCO2, ECG and SPO2 were noted just prior to laryngoscopy.

Patients in group M laryngoscopy was attempted in "sniffing position".

Patients in group T were put in neutral position. TruViewEVO2 adult size was selected.

Intubation was carried on with TruView laryngoscope.The laryngoscopic view obtained was compared according to Cormack and Lehane grading as follows.

Grade 1 – most of the glottis is visible
Grade 2 – only posterior extremity of glottis visible
Grade 3 – no part of glottis visible only epiglottis visible
3a – epiglottis can be lifted from the posterior pharyngeal wall
3b – epiglottis cannot be lifted.

Grade 4 – not even epiglottis visible

The ETT was connected to breathing circuit. Position of the tube was confirmed by EtCO2 and five point auscultation. The endotracheal tube was secured and controlled ventilation was instituted.

Anaesthesia was maintained using 66% N2O in O2 and 0.5% halothane uniformly. Respiratory rate was adjusted to maintain EtCO2 between 35 – 40 mm of Hg. For muscle relaxation Inj.Vecuronium bromide 0.08 mg kg-1 was given as loading dose and one fourth of loading dose was used for maintenance.

The HR,SBP, DBP, MAP, ETCO2, ECG and SPO2 were noted one minute and ten minutes after intubation.

Once the surgery was completed neuromuscular blockade was reversed with Inj.Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.01mg/kgboth IV after ensuring adequate recovery from neuromuscular blockade. Postoperatively, the patient was evaluated for the symptoms of sore throat, broken teeth, soft tissue edema, bleeding from gums or lips, stridor or hoarseness and any other complication.The collected data was analysed with descriptive statistics, independent/paired samples t test, contingency co-efficient test, Repeated measure ANOVA,using SPSS for windows.

RESULTS

ASA physical status, mean age, weight, height and sex ratio distribution of patients were nearly identical in both the groups ($P > 0.05$)

The differences in the MP grading between the two groups were statistically insignificant (p = 0. .883).

In group T, all 65 (65%) patients had Cormack and Lehane grading(CLG) I, 33 (33%)patients had CLG II and 2 (2%) patients had CLG III. In group M, 42 (42%) patients had CLG I and 57 (57%) patients had Cormack and Lehane grading II and 1(1%) patient had Cormack and Lehane grading III The differences in the CLG between the two groups werestatistically highly significant (p = 0.003).

This implies that the efficacy of laryngoscopy was better with TruViewEVO2 laryngoscope compared to Macintosh laryngoscope.

In Group T, mean heart rate increased from 85.5400 ± 14.67866 bpm prior to intubation to 94.5200± 15.08259 bpm after intubation.

In Group M, mean heart rate increased from 81.1900 ± 7.80403bpm prior to intubation to 103.30 ± 9.30721 bpm after intubation.

This implies that the increase in mean heart rate after intubation was more with Macintosh laryngoscope compared to TruViewEVO2 laryngoscope.

In both the groups the heart rates settled down to preintubation levels by ten minutes.

This implies that the increase in mean heart rate after intubation between the two groups was statistically highly significant (p = 0.000).

In Group T, mean arterial pressure increased from 92.7850± 12.39260mmHg prior to intubation to 101.2550± 13.19825 mmHg

after intubation.In Group M, mean arterial pressure increased from 91.7070 ± 8.08478 mmHg prior tointubation to 111.9270± 7.69486 mmHg after intubation.In both the groups the mean arterial pressure settled down to preintubation levels by ten minutes.The increase in mean arterial pressure after intubation between the two groups was satistically highly significant (p=0.000).The increase in mean arterial pressure after intubation was more with Macintoshlaryngoscope compared to TruView-EVO2 laryngoscope

There was no significant difference in end tidal carbon dioxide, oxygen saturation, ECG changes and complications.

There were two cases requiring second attempt in Macintosh group and two cases requiring second attempt in TruView group. There were two cases which could not be intubated with TruView laryngoscope. They were intubated using Macintosh blade with bougie.

There were eight cases with bleeding, one case of postoperative sore throat in Macintosh group. There were four cases of bleeding in TruView group. the difference between the two groups was statistically insignificant (p=0.291).

DISCUSSION

AyseCigdemTutuncu et al. compared the quality of the laryngoscopic exposures produced by the TruViewEVO2 with that of Macintosh blades, which have traditionally been used for laryngoscopy. The CLG were significantly better for the TruViewEVO2 laryngoscopy than for the Macintosh blade However, there was no improvement or intubation failure in 38 (20.5%) patients, including the 4 (2.2%) patients who could not be successfully intubated with the TruViewEVO2 laryngoscope.[8]

J. B. Li et al comparedTruViewEVO2 laryngoscope with the traditional Macintosh laryngoscope in 200 patients who required tracheal intubation for elective surgery The view of the larynx was better with the TruViewEVO2 laryngoscope than Macintosh laryngoscope in patients with a CLG greater than 1 ($p < 0.01$). The mean time to intubate was significantly shorter with the Macintosh laryngoscope (34 s) than with the TruView laryngoscope (51 s) ($p < 0.01$).[9]

A comparative study was done by **Sourav Kr Bag,et al.** between TruView PCD laryngoscope and Macintosh laryngoscope in viewing glottic opening and ease of .Better visualization with lesser CLG was found with TruView laryngoscope but it took longer time for intubation than Macintosh laryngoscope. The hemodynamic response to intubation was significantly less with the use of.[10]

The results were similar to our study, The mean age and mean weight of the patients in both groups were statistically insignificant.The differences in the CLG between the two groups were statistically highly significant ($p = 0.003$).

the visualization of larynx according to CLG was better with TruViewEVO2 laryngoscope compared withMacintosh laryngoscope which was statistically significant.

The process of laryngoscopy is known to have profound cardiovascular effects. This includes pressor response, tachycardia, an increase in catecholamine concentration, mainly norepinephrine. The major cause of the sympathoadrenal response is believed to arise from stimulation of supraglottic region by laryngoscopic blade ,tracheal tube placement and cuff inflation. The magnitude of response is greater with increasing force and duration of laryngoscopy.

In the present study TruViewEVO2 laryngoscope laryngoscope resulted in lesser alterations in the heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure when compared to Macintosh laryngoscope. This can be attributed to the fact that TruViewEVO2 provides a view of the glottis without the need to align the oral, pharyngeal and tracheal axes, and therefore requires less force to be applied during laryngoscopy. In standard intubations using the Macintosh blade, the anterior structures of the larynx are pulled forward while the teeth or gums are utilised as a pulley for maximal exposure of the peri-tracheal area to provide the best conditions to draw a direct line between the eyes of the operator and the tracheal aperture. The TruView blade is designed to enable indirect laryngoscopic view; thus, the anaesthetist applies less force on the anterior larynx, resulting in fewer patients with bleeding and soft tissue damage.

Although we hadn't considered time taken to intubate as a parameter in our study, subjectively itwas observed that intubation using the TruView took longer than using the Macintosh blade. This may be due to greater experience with Macintosh blade despite using TruView for pilot study .Also the use of the TruView blade requires intubation in an indirect manner, seeing the tube through the lensand does not see the tube at all at first. The tube needs to be advanced blindly until its tip enters the TruView visual field. Thereafter, the tube should be introduced through the vocal cords while looking through the lens. It requires good eye-hand co-ordination and some practice.

SUMMARY AND CONCLUSION

From the present study, it can be concluded that

1.TruViewEVO2 laryngoscope provides a better glottic exposure whencompared to Macintosh laryngoscope.
2. TruViewEVO2 laryngoscope triggers minimal haemodynamic response tolaryngoscopy and intubation when compared to Macintosh laryngoscope andthis can be attributed to the reduction in the lifting force necessary to obtain aclear view of the glottis.
3. Its use as a useful alternative to Macintosh laryngoscope in patients with anticipated (as a part of difficult airway cart) or unanticipated difficult airway management needs to be evaluated with further studies.
4. it can be a useful alternative laryngoscope in patients with hypertension, ischemic heart disease, hyperthyroidism etc. (lesser pressor response)
5. It can be a useful alternative in patients requiring cervical immobilization such as cervical spine fractures, spinal cord injuries etc, as intubation with TruView is carried out in neytral position.

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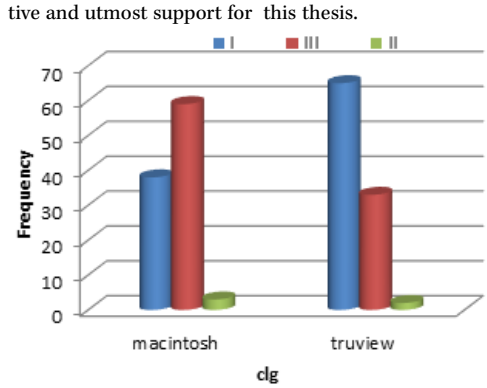

Figure 1 comparison of Cormacke Lehane gradingclg - Cormacke Lehane grading

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Table 1 – Comparison of haemodynamic parameters

Parameter	Group M		Group T		P Value
	Prior intubation	After intubation	Prior intubation	After intubation	
Mean Heart Rate	81.1900 ± 7.80403bpm	103.30 ± 9.30721 bpm.	12485.5400 ± 14.67866 bpm	94.5200± 15.08259 bpm	0.000
Systolic Blood Pressure	122.4200± 9.71324mm Hg	151.1600± 9.16154mmHg	122.5700± 15.31768mmHg	133.1000± 16.40553mmHg	0.000
Diastolic Blood Pressure	76.3900± 8.20063mm Hg	96.6800± 7.55703mmHg	77.9400± 11.76265 mmHg	85.3500± 12.38717 mmHg	0.000
Mean Blood Pressure	91.7070 ± 8.08478 mmHg	111.9270±7.694 mmHg	92.7850±12.392mmHg	101.2550± 13.19 mmHg	0.000

ABSTRACT

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