Comparative study of Truview Evo-2 laryngoscope versus Macintosh laryngoscope for hemodynamic response & POGO Scoring

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Abstract: Life begins with breath. The primary responsibility of the anesthesiologists as a clinician is to safeguard the airway i.e. to preserve and protect it during induction, maintenance and recovery from the state of anesthesia. Failure to maintain a patent airway for more than a few minutes’ results in hypoxia, hypercarbia, metabolic alterations, brain damage or death. 90 patients with age ranging from 18-65 years. There was rise in heart rate in both the group but significant rise was seen in patient in Macintosh –group. There was rise in systolic blood pressure in both the group but significant rise was seen in patient in Macintosh -group as compared to patient in Truview evo-2 - group. Hemodynamic response: There was lesser rise in hemodynamic parameters such as heart rate, systolic blood pressure and rate pressure product as the lifting force required was less in T-group. Laryngoscopic view: Truview laryngoscope provides better glottic view as expressed by Cormack and Lehane grade and Percentage of glottic opening score and makes intubation easier.

Keywords: Laryngoscope, Heart rate, Blood pressure

INTRODUCTION:
Life begins with breath. The primary responsibility of the anesthesiologists as a clinician is to safeguard the airway i.e. to preserve and protect it during induction, maintenance and recovery from the state of anesthesia. Failure to maintain a patent airway for more than a few minutes’ results in hypoxia, hypercarbia, metabolic alterations, brain damage or death [1]. More than 85% of all respiratory related closed malpractice claims [2, 3] involve a brain damaged or dead patient.

Direct rigid laryngoscopy, tube placement and inflation of cuff induces arterial hypertension, tachycardia due to increased catecholamine concentration secondary to proprioceptor stimulation by stretch exerted on supraglottic structure [4]. Laryngoscopy also produces a balanced stimulation of cardiac accelerator fibre and produces less vagal stimulation [4]. Truview EVO2® laryngoscope (Truphatek - Israel) has been claimed to be associated with a lesser rise in heart rate & blood pressure, a better glottic view expressed as POGO Score( Percentage of Glottic Opening Score), Cormack and Lehane grade and reduced intubation time [5]. In theory, blind nasal intubation may cause less of pressor response as laryngoscopy is avoided [5, 6].

Laryngoscopy in addition to pressor response could cause arrhythmias which are mostly sinus arrhythmias. Others were ventricular premature beats, nodal rhythm, sinus bradycardia, ventricular tachycardia and fibrillation [7]. These changes can be detrimental in patients with high risk and elderly patients [7]. So in order to prevent these untoward hemodynamic changes at the time of induction, there are various drugs such as anaesthetic agents, adjuvants and analgesics which have been employed to blunt the stress response during laryngoscopy and intubation [6, 8]. Various attempt have been made such as changing the type of blade, smaller number endotracheal tube, minimum inflation of cuff to blunt the stress response during laryngoscopy and intubation [9, 10]. Our study was conducted to compare Macintosh laryngoscope and Truview evo 2
AIMS & OBJECTIVES
To compare effectiveness of Truview Evo-2 laryngoscope versus Macintosh laryngoscopy with respect to
1. Hemodynamic changes like
   a) Heart rate
   b) Blood pressure
2. Visibility of glottic aperture
   a) Cormack and Lehane grading of laryngoscopic view
   b) POGO Scoring

MATERIAL AND METHODS:
A randomized controlled clinical trial of 90 cases was carried out to compare effectiveness of Truview Evo-2 laryngoscope (T-group) n= 45, & Macintosh laryngoscope M-group n=45 to perform endotracheal intubation in patient undergoing elective surgical procedure under general anaesthesia after taking written informed consent from the patients in a period of 2 years.

Inclusion criteria:-
- Patient belonging ASA I & ASA II grade
- Patients between 18 yrs to 65 yrs of age.
- Patient undergoing any procedure under general anaesthesia with endotracheal intubation.
- Mallampatti Classification Grade I & II.

Exclusion criteria:-
- Patient less than 18yrs or greater 65yrs of age.
- Mallampatti Classification grade III & IV
- Risk for gastric aspiration
- Patient not willing for study
- Patient with h/o Hypertension and ischemic Heart Disease
- Patient of Laryngeal & thyroid surgery
- Patient belonging ASA III & ASA IV grade

Operational classification
Laryngoscopic view was graded according to Cormack and Lehane [11, 12] classifications.
Grade I: Full glottic exposure
Grade II: Only posterior portion of glottis seen
Grade III: Only epiglottis seen, no glottic exposure
Grade IV: Not even the epiglottis can be seen

POGO score (Percentage of glottic opening score) [13]

Data collection:
Premedication: On the morning of surgery, patient was given inj. Glycopyrrolate 4 mcg/kg im ½ hr prior to surgery. Pre induction monitor such as cardio scope lead II, pulse oximeter, Noninvasive Blood pressure monitor, manual Blood pressure monitor, Capnometer was attached. Baseline pulse rate, Blood pressure, Oxygen saturation & ECG rhythm was recorded. Intravenous access on forearm with appropriate Gauze intravenous cannula was secured and pre oxygenation was done with 100% Oxygen 6L/min for 3 min.

Sedation was given with inj. Midazolam 0.03 mg/kg and inj. Fentanyl 2 mcg/kg. After sedation patients was induced with inj. Propofol 2 mg/kg and confirming the mask ventilation muscle relaxant inj.vecuronium.0.1mg/kg was given. Trachea was intubated with appropriate no. endotracheal tube by an anesthetist with either of two blades & placement of endotracheal tube was confirmed by equal chest movement, 5 point auscultation & capnography. Patient was mechanically ventilated during procedure after confirmation of successful intubation. Anesthesia was maintained with intermittent positive pressure ventilation with Oxygen & Nitrous oxide, muscle relaxant inj. vecuronium 0.1 mg/kg & inhalational agent.

During laryngoscopy 6 liter of oxygen/min was administered via oxygen port of Truvview Evo 2 laryngoscope. Intubation time was noted from introduction to removal of laryngoscope blade from mouth. POGO score & Cormack Lehane grading was done. Hemodynamic changes were recorded from baseline value to 10 min post intubation interval. No other medication was administered or procedure done affecting the above parameter during 10 min data collection period after tracheal intubation. This was considered as end point. Rescue technique was applied in cases of difficult intubation in the form of external pressure, bougie or both.

Statistical analysis was done by using SPSS16 software. ‘t’ test was used for quantitative data and chi square test was used for qualitative type of data for analysis. The p value <0.05 was considered significant.
OBSERVATION AND RESULTS

In our study, 90 patients with age ranging from 18-65 years posted for elective surgery under general anaesthesia with endotracheal intubation were studied in two years period.

Group M= Macintosh laryngoscope
Group T= Truview Evo-2 laryngoscope

Table 1: Age-wise distribution of patients

<table>
<thead>
<tr>
<th>Age in years</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group M</td>
<td>45</td>
<td>38.07</td>
<td>12.95</td>
</tr>
<tr>
<td>Group T</td>
<td>45</td>
<td>39.62</td>
<td>13.07</td>
</tr>
</tbody>
</table>

p value (t test)= 0.57, not significant.

Fig 1: Gender distribution among the study population

Applying Chi square test, p value=0.67 not significant.

Fig 2: Distribution as per ASA grading systems

Applying chi square test, p value=0.39, not significant.
Table 2: Comparison of heart rate/intergroup

<table>
<thead>
<tr>
<th>Heart rate</th>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base line</td>
<td>Group M</td>
<td>45</td>
<td>75.7</td>
<td>7.9</td>
<td>0.24</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>73.9</td>
<td>6.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At Laryngoscopy</td>
<td>Group M</td>
<td>45</td>
<td>82.4</td>
<td>8.8</td>
<td>0.01</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>78.0</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post intubation</td>
<td>Group M</td>
<td>45</td>
<td>99.4</td>
<td>9.2</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>1 min</td>
<td>Group T</td>
<td>45</td>
<td>92.5</td>
<td>5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group M</td>
<td>45</td>
<td>95.0</td>
<td>8.7</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>88.6</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3min</td>
<td>Group M</td>
<td>45</td>
<td>89.8</td>
<td>8.1</td>
<td>0.006</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>85.6</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 min</td>
<td>Group M</td>
<td>45</td>
<td>83.9</td>
<td>6.6</td>
<td>0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>75.5</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 min</td>
<td>Group M</td>
<td>45</td>
<td>74.2</td>
<td>8.8</td>
<td>0.78</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>74.6</td>
<td>4.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 shows that there was rise in heart rate in both the group but significant rise was seen in patient in M-group as compared to patient in T-group. Heart rate was maximally increased during one minute post intubation period with 31.5% in M-group and 25.1% in T-group. It was also noted that heart rate came down to baseline value around 5 min post intubation period in T-group and in M-group it took 10 min time for the same which is statistically significant with a P value of <0.05.

Table 3: Comparison of systolic blood pressure

<table>
<thead>
<tr>
<th>Systolic BP</th>
<th>Group</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
<th>P value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base line</td>
<td>Group M</td>
<td>45</td>
<td>112.0</td>
<td>6.2</td>
<td>0.14</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>114.6</td>
<td>10.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>At Laryngoscopy</td>
<td>Group M</td>
<td>45</td>
<td>121.8</td>
<td>6.1</td>
<td>0.40</td>
<td>Not significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>123.2</td>
<td>9.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post intubation</td>
<td>Group M</td>
<td>45</td>
<td>141.8</td>
<td>7.6</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td>1 min</td>
<td>Group T</td>
<td>45</td>
<td>134.2</td>
<td>11.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group M</td>
<td>45</td>
<td>130.3</td>
<td>8.1</td>
<td>0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>123.6</td>
<td>9.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3min</td>
<td>Group M</td>
<td>45</td>
<td>120.4</td>
<td>7.9</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>113.7</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 min</td>
<td>Group M</td>
<td>45</td>
<td>115.4</td>
<td>7.9</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>103.6</td>
<td>7.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 min</td>
<td>Group M</td>
<td>45</td>
<td>110.3</td>
<td>7.8</td>
<td>&lt;0.001</td>
<td>Significant</td>
</tr>
<tr>
<td></td>
<td>Group T</td>
<td>45</td>
<td>98.6</td>
<td>9.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows that there was rise in systolic blood pressure in both the group but significant rise was seen in patient in M-group as compared to patient in T-group. Systolic blood pressure was maximally increased during one minute post intubation period with 26.6% in M-group and 17% in T-group. It was also noted that systolic blood pressure came down to baseline value around 3 min post intubation period in T-group and in M-group it took 5 min for the same which is statistically significant with a P value of <0.05.
Figure 3 shows that the POGO Score was significantly lower in M-group as compared to in T-group which is statistically significant (P< 0.001).

Figure 4 shows that 44.4% cases of M-group as compared to 95.6% cases of T- Group belonged to Cormack and Lehane grade I, 37.8% cases of M-group as compared to 4.4% cases of T- Group belonged to Cormack and Lehane grade II. Only 17.8% cases of M-group belonged to Cormack and Lehane grade III. These values are statistically significant (P < 0.001).

**DISCUSSION**
Rashid M Khan et al.; [5] done a comparative study regarding Truview evo-2 vs macintosh laryngoscopy in 44 patients of either sex ranging from 20-50yrs and found that the ASA grading, mean age, weight and sex distribution was nearly equal in both groups(p>0.005). They also found that 44 patients’ heart rate and systolic blood pressure raised in both the
group but significant rise was found in patients intubated with macintosh laryngoscopy and also the glottic opening was inferior in macintosh laryngoscopy.

Mohammad Maroof et al.; [14] found that the maximum rise in heartrate and systolic blood following laryngeal intubation was significantly lesser [p<0.05] in patients intubated using Truview evo-2 laryngoscope. In our study we also found that there was lesser rise in haemodynamic parameters such as heart rate, systolic blood pressure, and rate pressure product belonging to T-group.

Ishwar Singh et al.; [15] performed a study comparing Macintosh laryngoscope and Truview laryngoscope in 100 patients with 1 or 2 predictors of difficult intubation. The Cormack and Lehane grading improved with Truview as also confirmed by other investigators mentioned above.

SUMMARY AND CONCLUSION

**Hemodynamic response:** There was lesser rise in hemodynamic parameters such as heart rate, systolic blood pressure and rate pressure product as the lifting force required was less in T-group.

**Laryngoscopic view:** Truview laryngoscope provides better glottic view as expressed by Cormack and Lehane grade and Percentage of glottic opening score and makes intubation easier.

**REFERENCES:**