Assessment of predictors for difficult intubation in adult patients: A prospective study of 100 patients

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I. Introduction

• Expertise in airway management is essential in every medical specialty. Maintaining a patent airway is essential for adequate oxygenation & ventilation & failure to do so, even for a brief period of time, can be life threatening.

• Difficult airway is potentially catastrophic incident as it may result in airway or oesophageal injury, aspiration & severe hypoxemia with consequent brain damage / or death.

• Although oxygenation / ventilation – via various devices – is always the primary goal in management of a difficult airway, tracheal intubation remains the gold standard in securing the airway; it ensures optimal ventilation & oxygenation while protecting the respiratory tract from aspiration.

• Several predictors like Mallampati classification, Inter incisor gap, ThyroMental Distance (TMD), SternoThyroMental Distance (STMD) & Neck mobility have been used in clinical practice for predicting difficult laryngoscopy / intubation. Even though they are quite simple, most of them require patient’s cooperation in order to performed properly & thus assessed correctly.

II. Aim of the study

• To evaluate certain predictors of difficult intubation that can be measured pre-operatively during pre–anaesthetic check up & To assess their diagnostic value together in difficult direct laryngoscopy & difficult intubation.

III. Materials & Methods

• Inclusion criteria: 100 adult patients (> 18 years of age) of ASA Grade I & II, without known airway pathology scheduled for surgical procedure under general anaesthesia were included in this prospective study.

• Exclusion criteria: Obvious airway malformations, need for rapid sequence intubation, mallampati Grade IV, Inter incisor gap < 1 cm, cervical spine pathology, severe obese patients were excluded from the study.

• Pre operative assessment: An airway examination was performed in all patients during the preoperative visit. Clinical predictive factors: Mallampati classification, Inter incisor gap, ThyroMental Distance (TMD), SternoThyroMental Distance (STMD) & Neck mobility were performed in all patients by same investigator.

• Anaesthetic Management: In operative room, after general anaesthesia, in “sniffing position” direct laryngoscopy was performed with Macintosh Blade by a senior anaesthesiologist (> 5 years of experience) who was not involved in pre op assessment.

IV. Statistical Analysis & Results

• Data from 100 patients were analyzed. The cut off values for each predictors were decided.

• The predictive value of Mallampati classification, Inter incisor gap, ThyroMental Distance (TMD), SternoThyroMental Distance (STMD) & neck mobility for difficult laryngoscopy / intubation were assessed.

• Statistical analysis was performed using the myEpiTable PRO application.

• The sensitivity, specificity, Positive Predictive Value (PPV) & Negative Predictive Value (NPV) calculated for each variables.

• The laryngoscopy / intubation was assessed difficult in 22% of the studied patients. There were no failed tracheal intubation.
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<table>
<thead>
<tr>
<th>Predictive factors</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>PPV</th>
<th>NPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mallampatti classification (Grade 1-3)</td>
<td>65.12</td>
<td>70.18</td>
<td>62.22</td>
<td>72.73</td>
</tr>
<tr>
<td>Inter incisor gap (1-3 cm)</td>
<td>59.52</td>
<td>67.24</td>
<td>56.82</td>
<td>69.64</td>
</tr>
<tr>
<td>TMD &lt; 6.5cm</td>
<td>57.50</td>
<td>70.00</td>
<td>56.10</td>
<td>71.19</td>
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<tr>
<td>STMD &lt; 12cm</td>
<td>60.98</td>
<td>67.80</td>
<td>56.82</td>
<td>71.43</td>
</tr>
<tr>
<td>Neck mobility &lt; 90degree</td>
<td>56.41</td>
<td>68.83</td>
<td>53.66</td>
<td>71.19</td>
</tr>
</tbody>
</table>

V. Discussion

- We found that a study of predictors including Mallampati classification, Inter incisor gap, ThyroMental Distance (TMD), SternoThyroMental Distance (STMD) & Neck mobility altogether in each patient had a significant predictive accuracy for difficult laryngoscopy.
- Theoretically a perfect predictor is characterized by high sensitivity & high specificity, thus a high diagnostic accuracy, in order to identify every patient at high risk with minimal false positive predictions.
- In clinical practice, anaesthesiologists are mostly concerned for the unanticipated difficult airway (false negative predictions), which may find them unprepared.
- On the other hand, false positive predictions, although disturbing, distressing & inconvenient, have no life threatening sequel.
- Consequently, the most significant clinical problem is the false negative predictions, thus intubations predicted to be easy, proved to be difficult.

VI. Conclusion

- No single predictor can provide a high index of sensitivity & specificity for prediction of difficult intubation. Therefore it has to be a combination of all predictors together.
- So finally a study including assessment of all five predictors together for difficult intubation exhibited a statistically significant predictive accuracy & it will help to reduce number of adverse outcomes & improve safety of airway management.

References

[1]. The difficult airway. Ed George, MD, PhD, Kenneth L. Haspel, MD
[3]. Predictive signs of difficult intubation Pierre Diemunsch, Thierry Pottecher
[4]. The simplified predictive intubation difficulty score: a new weighted score for difficult airway assessment: Joel L’Hermite, Emmanuel Nouvellon.