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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.

Predictive factors	Sensitivity	Specificity	PPV	NPV
Mallampatti classification (Grade 1-3)	65.12	70.18	62.22	72.73
Inter incissor gap (1-3 cm)	59.52	67.24	56.82	69.64
TMD < 6.5cm	57.50	70.00	56.10	71.19
STMD < 12cm	60.98	67.80	56.82	71.43
Neck mobilty < 90degree	56.41	68.83	53.66	71.19

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.

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