

Evaluation of Modified Cormack-Lehane Scoring System in Indian Population.

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ABSTRACT

Background: The usefulness of modified Cormack-Lehane scoring system (MCLS) used for laryngoscopy was introduced and used extensively Western population. This study was undertaken for evaluation of modified Cormack-Lehane scoring system in Indian population. **Methods:** 198 patients of more than 18 years of age requiring tracheal intubation were evaluated with preoperative airway predictors, the modified Mallampati test and thyromental distance (TMD). **Result:** The larynx was difficult to visualize (Cormack and Lehane grades IIIB and IV) in 18 / 198 (9.09 %) patients. No failed tracheal intubations occurred in any of the 18 cases. **Conclusion:** The Mallampati classification was associated with good predictive value for 3B and 4 of modified Cormack-Lehane scoring system. The MCLS better delineates the difficulty experienced during laryngoscopy than the original Cormack-Lehane grading.

Keywords: Airway Assessment, Modified Cormack-Lehane Scoring.

INTRODUCTION

The use of a modified Cormack-Lehane scoring system (MCLS) of laryngoscopy as introduced in the Western population, and needs to be investigated extensively during laryngoscopy in Indian population. Failure to manage the airway is the most significant cause of morbidity and mortality.

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Higher Cormack-Lehane score is synonymous with difficult intubation in most patients. Visualization of the larynx is usually described using the Cormack and Lehane grades, with grades 3 and 4 indicating difficult visualization of the larynx (DVL).^[1] It is often been difficult question of determining which patient will present as a difficulty for intubation. Visualization of the larynx is also described using Modified Cormack-Lehane scoring system, with grades 1 and 2A is defined as easy visualization of the larynx 2B and 3A is defined as restricted visualization of the larynx and 3B and 4 defined as difficult visualization of the larynx.

The incidence of DVL is 1.5 - 8% in general surgical patients but higher in patients undergoing cervical spine surgery (20%)^[2] or laryngeal surgery (30%).^[3] This study has been undertaken with a purpose to evaluate different grades of modified Cormack-Lehane scoring system, the predictors and difficult laryngoscopy, and the association of these predictors with difficult intubation.

The regular preoperative airway predictors, the modified Mallampati test and thyromental distance (TMD).

MATERIALS AND METHODS

Ethics Committee approval was obtained prior to the study. Informed consent was obtained from all persons involved in the study. Patient selection: 198 patients of more than 18 years of age requiring tracheal intubation were evaluated. Exclusion criteria were: pregnant women, restricted mouth opening (less than 3cms), any neck swelling, any anatomical variation of head and neck, maxillofacial fracture, loose teeth. Each patient underwent airway assessment by an experienced doctor. The distance between anterior part of the mentum and thyroid notch were measured, was defined as the thyromental distance (TMD).

After preoxygenation, all patients were induced using sedative agent and paralysed using depolarising muscle relaxants (suxamethonium) to facilitate tracheal intubation (avoided in hyperkalemia). Laryngoscopy was done after complete relaxation. The head was placed in

intubating position over a head support, an appropriate sized Macintosh blade was used by a consultant doctor. Modified Cormack and Lehane classification without any manual manipulation was used for visualisation of the glottis.

External manual manipulation was permitted for intubation endotracheal tube after evaluation. In our study difficult visualization of the larynx was defined using modified Cormack and Lehane grades 3B and 4. The statistical sensitivity and specificity of each tests was calculated as per standard formula. Statistical analysis was done using students 't' test and chisquare test.

RESULTS

The Chi-square test was used for statistical analysis of variables. The study done on 198 patients included 102 male (51.51%) and 96 female (48.48%) patients. We observe that there is slight male preponderance in the study. The sensitivity of modified Mallampati test for predicting Difficult Laryngoscopy (DL) was 44.44% and specificity was 99.44%. The test has a positive predictive value of 88.89% and negative predictive value of 94.71%.

The sensitivity of HMD at the extreme of head extension for predicting DL was 11.11% and specificity was 95.56%. The test has a positive predictive value of 20% and negative predictive value of 91.49%.

Table: Demographic parameter

Demographic parameter	
Age (mean ±SD)	41.8±13.49
Sex n (%)	
Male	102 (51.51%)
Female	96 (48.48%)
Total	198

Table: Diagnostic Validity of Modified Mallampati for predicting Difficult Laryngoscopy.

Modified Mallampati		Difficult visualization of the larynx		Total
		Yes	No	
Modified Mallampati Class ≥3	Yes	8	1	9
	No	10	179	189
Grand Total		18	180	198

Table: Diagnostic Validity of TMD at the extreme of head extension for predicting Difficult Laryngoscopy.

TMD at the extreme of head extension		Difficult visualization of the larynx		Total
		Yes	No	
TMD at the extreme of head extension ≤6.2 cm	Yes	2	6	8
	No	16	174	190
Grand Total		18	180	198

Table: Diagnostic Validity of HMD at the extreme of head extension for predicting Difficult Laryngoscopy.

HMD at the extreme of head extension		Difficult visualization of the larynx		Total
		Yes	No	
HMD at the extreme of head extension ≤5.3 cm	Yes	2	8	10
	No	16	172	188
Grand Total		18	180	198

The sensitivity of TMD at the extreme of head extension for predicting DL was 11.11% and specificity was 96.67%. The test has a positive predictive value of 25% and negative predictive value of 91.58%. In our study, overall sensitivity of the diagnostic predictors was relatively less. The highest sensitivity of 44.44% (8/18) was observed in predicting DVL with modified Mallampati followed by HMDR 27.78 % (5/18), TMD 11.11 % (2/18) and HMD at the extreme of Head (11.11 % (2/18)). In contrast, the specificity in our study was relatively high. The highest specificity of 99.44 % (179/180) was observed in predicting DVL with modified Mallampati followed by HMDR 98.89 % (178/180), HMD at the neutral position 98.89 % (178/180), TMD 96.67 % (174/180) and HMD at the extreme of head extension at 95.56 % (172/180).

DISCUSSION

Difficult laryngoscopy is one of the most common causes of difficult intubation in many patients. Therefore, identification of majority of the patients at risk of difficult laryngoscopy is important in forming safer alternative strategies for the induction of anesthesia and intubation. Though, various studies investigated diagnostic utility of many airway predicting parameters, no study has quantified its diagnostic validity for predicting difficult laryngoscopy. Therefore, this study has been undertaken with a purpose to evaluate the usefulness of the Modified Cormack-Lehane scoring system in Indian population. The airway predictors; the modified Mallampati test, Hyomental Distance (HMD) and thyromental distance (TMD) were examined.

Incidence:

In our study, the larynx was difficult to visualize (Cormack and Lehane grades IIIB and IV) in 18/198 (9.09 %) patients. No failed tracheal intubations occurred in any of the 18 cases. The incidence of 9.09% is almost consistent with the incidence reported in literature.

In one meta-analysis in 14,438 patients, a DVL incidence of 6% -27% was seen.^[4] Huh et al reported 12.2% incidence of Difficult laryngoscopy in 213 apparently normal patients undergoing general anesthesia with tracheal intubation.^[5] The wide variations in

the incidence of Difficult laryngoscopy may be related to many of the factors such as age and ethnic differences in patients^[6,7] or types of laryngoscope blade used.^[8] Sensitivity and specificity of HMDR: The ideal test for Difficult laryngoscopy prediction should have 100% sensitivity and 100% specificity; however, sensitivity and specificity are usually inversely proportional to each other. Optimal cut offs used in our study used to calculate the sensitivity and specificity in our study were HMD at the extreme of head extension ≤ 5.3 cm; TMD at the extreme of head extension ≤ 6.2 cm; Modified Mallampati Class ≥ 3 .

In our study, overall sensitivity of diagnostic predictors was relatively less. The highest sensitivity of 44.44% (8/18) was observed in predicting Difficult laryngoscopy with modified Mallampati followed by TMD (11.11 % (2/18) and HMD (11.11 % (2/18). In contrast, the specificity in our study was relatively high. The highest specificity of 99.44 % (179/180) was observed in predicting difficult laryngoscopy with modified Mallampati followed by HMDR 98.89% (178/180), TMD 96.67 % (174/180) and HMD 95.56 % (172/180).

These findings are in contrast to the observations by Huh who reported that greater diagnostic validity profile sensitivity and specificity of diagnostic predictor were HMD at the extreme of head extension ≤ 5.3 cm (46% & 81 %); TMD at the extreme of head extension ≤ 6.2 cm (31% & 92%); and Modified Mallampati Class ≥ 3 (12 % & 94 %).^[5] Various studies that assessed the sensitivity, specificity and predictive values of different diagnostic predictors have shown variable findings and this was mainly due to the different diagnostic criteria adopted by the different investigators.

Mathew et al demonstrated that patients with TMD of < 6 cm and horizontal length of mandible < 9 cm showed good correlation with MMT grade III and IV and had a higher probability of difficult intubation. Intrarater variability can be possible, because a single investigator performed almost all the of the measurements at once in a test.

Although Poor glottic visualization is synonymous with difficult intubation in most patients.^[9] In this study, we defined the modified C-L Grade 3B or 4 as an indicator of Difficult laryngoscopy. In many clinical situations, however, the application of external manual laryngeal pressure to facilitates laryngoscopic view and intubation can be performed without difficulty in these patients.

CONCLUSION

The modified Mallampati classification was associated with good predictive value for difficult laryngoscopy. We recommend modified Mallampati classification test should be used because of its greater diagnostic accuracy than any other tests in this study. We also recommend to seeking an

optimal combination of tests that includes the all the other predictors and performing the tests in combination for further good prediction. The modified Cormack-Lehane scoring system better delineates the difficulty experienced during laryngoscopy than the original Cormack-Lehane grading.

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