Comparison of upper lip bite test and modified mallampati test in prediction of difficult endotracheal intubation

Babu Isaac[1][*], Sharma Monika[2]

{[1]Associate Professor, Department of Anaesthesiology}, {[2]Assistant Professor, Department of ENT, Head and Neck Surgery}
Sree Narayana Institute of Medical Sciences, N. Kuthiyathodu, Ernakulam, Kerala – 683594, Tamil Nadu, INDIA.
Email: isaac_babu@rediffmail.com, dr_msharma@rediffmail.com

Abstract   150 patients of either sex scheduled for elective surgery were included in the study. All patients were aged more than sixteen years and belonging to ASA PS- 1/ 2. All the patients were assessed preoperatively by modified mallampati test and upper lip bite test. Difficult tracheal intubation was graded on Cormack Lehane scale. The sensitivity, specificity, positive predictive value, negative predictive value and accuracy were calculated. Conclusion: Modified Mallampati test is a better test at predicting difficult endotracheal intubation when compared to upper lip bite test.
Keywords: difficult airway, difficult tracheal intubation, modified mallampati test, upper lip bite test.

[*]**Address for Correspondence:**
Dr. Babu Isaac, Associate Professor, Department of Anaesthesiology, Sree Narayana Institute of Medical Sciences, N. Kuthiyathodu, Ernakulam, Kerala – 683594, Tamil Nadu, INDIA.
Email: isaac_babu@rediffmail.com

Access this article online	
Quick Response Code:	Website: www.statperson.com
	Volume 5 Issue 2

INTRODUCTION

Unanticipated difficult laryngoscopic tracheal intubations accounts for a significant proportion of adverse anesthestic outcome in patients undergoing surgery. Many tests are available for predicting difficult tracheal intubation. The Modified Mallampatti Test (MMT) is an accepted test to evaluate airway for predicting difficult tracheal intubation. The Upper Lip Bite Test (ULBT) assesses the range of movement of the mandible as well as the architecture of the dentition, both of which affects the ease of performing direct laryngoscopy. Hence we compared MMT to ULBT in prediction of difficult endotracheal intubation. Difficulty in endotracheal intubation was assessed by the Cormack Lehane grading.

MATERIALS AND METHODS

We conducted a prospective blinded surgery involving one hundred and fifty patients of either sex scheduled to undergo elective surgery under general anaesthesia. Patients were aged more than sixteen years belonging to ASA PS-1. Preoperatively, the patients were evaluated with MMT and ULBT by two anaesthesiologists not involved in intubating the airways of the patient. MMT was evaluated as follows. Class 1 – soft palate, fauces, uvula and pillars seen. Class 2 – soft palate, fauces and uvula seen. Class 3- soft palate and base of uvula seen and Class 4 – soft palate not possible. The ULBT was performed according to the following criteria; Class 1 – lower incisors can bite upper lip above the vermilion line. Class 2 – lower incisors can bite upper lip below vermilion line and Class 3 – lower incisors cannot bite the upper lip. The laryngeal view obtained was graded according to Cormack Lehane as Grade 1 – full view of glottis, Grade 2 – glottis partly exposed, grade 3 – only epiglottis seen and grade 4 – epiglottis not seen. No external laryngeal pressure was applied while recording laryngeal view. A grade1 or 2 was considered to represent easy intubation and a grade 3 or 4 to represent difficult intubation. Patients with obvious external deformities of airway like edentulous, restricted mouth opening or

cervical motion were excluded from the study. Anaesthesia was induced in all patients with Injection thiopentone sodium IV 5mg/kg and vecuronium 0.15 mg / kg. Laryngoscopy was done after 3 minutes after injection vecuronium with a size 3 Macintosh blade with the patient in sniffing position. True positive, False positive, True negative, False negative, Sensitivity, Specificity, Positive predictive value, Negative predictive value, and Accuracy for MMC and ULBT were calculated. The completed data sheets were analyzed by Fishers exact test with two-tailed p values.

OBSERVATIONS AND RESULTS

A total of 150 patients were enrolled in the study. There were 87 males and 63 females. The grading of the laryngoscopic view of the patients evaluated by Modified Mallampati Test (MMT) and ULBT.

Table 1: Modified Mallampatti Test

MMT	Number	Percentage
I	85	56.67
II	34	22.67
III	26	17.33
IV	5	3.33
Total	**150**	**100**

The number of patients in Class I and II (predicted easy intubation) was 119 (79.33 %). The number of patients in Class III and IV (predicted difficult intubation) was 31 (20.67 %).

Table 2: Upper Lip Bite Test

ULBT	Number	Percentage
I	114	76
II	29	19.33
III	7	4.67
Total	**150**	**100**

The number of patients in Class I and II (predicted easy intubation) was 143 (95.33 %). The number of patients in Class III (predicted difficult intubation) was 7 (4.67 %).

Table 3: Cormack Lehane Grading of glottic exposure

Grading	Number	Percentage
I	133	88.67
II	10	6.67
III	5	3.33
IV	2	1.33
Total	**150**	

The number of patients with Cormack lehane grade I and II was 143. (95.33 %). These patients were easy to intubate. Those with grade III or IV were grouped as difficult to intubate and amounted to only 7 (4.67 %). External laryngeal pressure was applied in grades III and IV to improve glottis visualization. There were no incidences of inability to intubate the trachea in our study.

Table 4: Modified Mallampati Classification Vs Cormack and Lehane's Classification of glottic exposure

	Easy	Difficult	Total
Predicted Easy Class 1, 2	True Negative a = 116	False Negative b = 3	a + b
Predicted Difficult Class 3, 4	False Positive c = 26	True Positive d = 5	c + d
Total	a + c	b + d	

This table shows that out of the 119 patients predicted to be easy intubation by Modified Mallampatti test, 3 were actually difficult intubation. Out of the 31 patients predicted to be difficult intubation, only 5 were actually difficult and the rest were easy intubations.

Table 5: Upper Lip Bite Test Vs Cormack and Lehane's Classification of glottic exposure

	Easy	Difficult	Total
Predicted Easy Class 1, 2	True Negative a = 138	False Negative b = 5	a + b
Predicted Difficult Class 3	False Positive c = 4	True Positive d = 3	c + d
Total	a + c	b + d	

This table shows that out of the 143 patients predicted to be easy intubation by Upper lip bite test, 5 were actually difficult intubation. Out of the 7 patients predicted to be difficult intubation, only 3 were actually difficult and the rest were easy intubations.

Table 6

	MMT	ULBT
Sensitivity	62.5 %	37.5 %
Specificity	81.69 %	97.18 %
Positive predictive value	16.13 %	42.86 %
Negative predictive value	97.48 %	96.5 %
Accuracy	80.67 %	94 %

DISCUSSION

The failure of anaesthesiologist to maintain a patent airway after the induction of general anaesthesia is one of the most common causes of anaesthesia-related morbidity and mortality[1]. The incidence of difficult intubation has been variously quoted as 1.3 %, 1.5 %, 1.8 %, 3.5 %, 4 %, 4.5 %, 4.9 %, 7 %, 8 % and 13 % depending on the criteria used to define it[2,3,6,7,11-15]. The incidence of failure to intubate the trachea is 0.05 % - 0.35 %[5]. We found a 4.67 % incidence of difficult intubation in this study and there were no failures to intubate the trachea. Although some authors blame different anthropomorphic features among populations as the cause of the discrepancies in the incidence of difficult intubations in different studies, such differences maybe attributed to the fact that sometimes the cases in which pressure was applied to the larynx were excluded from the " difficult intubation " group[16]. Wilson et al described five risk factors that are important in predicting difficult intubation, including weight, head and neck movement, jaw movement, receeding mandible and buck teeth. The ULBT assesses a combination of jaw subluxation and the presence of buck teeth simultaneously, supposedly enhancing its predictive value and reliability. The three classes of the ULBT are clearly demarcated and delineated, making interobserver variations highly unlikely when using this test (in contrast to considerable interobserver variations found with the MMT which has been controversial[10,12]). MMT, in assessing oropharyngeal view has had poor reliability, which has been attributed to the technicalities involved in the demonstration, and inter-observer variations. We found the specificity and positive predictive value of the ULBT to be better than MMT, but the sensitivity of the ULBT was a dismal 37.5 % as compared to the 62.5 % of the MMT. Negative predictive values of both tests were comparable. With regard to the MMT, a wide range of specialities have been observed in different studies (61-84 %)[6,12,15]. The difference between the reported specificity results suggests an incorrect evaluation; moreover, many patients involuntarily phonate during the test, which may significantly alter the Mallampati classification. Zahid Hussain et al[1] found a higher specificity for ULBT (88.7 %) than the MMT (66.8 %), as was observed in our study also. However they recorded a very high sensitivity for the ULBT (76.5 %). The sensitivity for MMT was 82.5 % whereas in our study it was 62.5 %. The difference in sensitivity could be attributed to the fact that the incidence of the new clinical predictor (Class III ULBT) in our study population was only 4.6 %, whereas in their study it was 15 %. Bhat et al concluded that a combination of upper lip bite test and modified Mallampati test in parallel is more sensitive, specific and has a higher discriminative power which is clinically relevant than Modified Mallampati Test or ULBT alone[17]. Difficult intubation is a rare phenomenon. Therefore, only those tests whose specificity approach 100 % will correctly predict difficult intubation. The presently available tests do at least perform well at predicting easy intubations. Upper Lip Bite Test and Modified Mallampati Test alone, in parallel and series are good predictors of possible easy intubation rather than difficult intubation[17]. In our study 8 patients had grade III or IV laryngoscopic view. External laryngeal pressure improved the view in all the patients. Though the sample size is small, it appears to be a useful maneuver in improving glottic visualization.

CONCLUSION

Modified Mallampatti test is a better test at predicting difficult endotracheal intubation when compared to upper lip bite test in our population.

REFERENCES

1. Zahid Hussain et al. a comparison of the upper lip bite test with modified mallampati classification in predicting difficulty in endotracheal intubation. Anaesthesia and Analgesia 2003; 96:595-599.
2. William H Rosenblatt. Clinical Anaesthesia. IVth Ed; 614-615.
3. S. R. Mallampati. A clinical sign to predict difficult tracheal intubation: A prospective study. Canadian anaesthetic Society Journal 1985; 32: 429-434.
4. H. E. Wilson. Predicting difficult intubation. Br J Anaesth 1988; 61: 211-216.
5. Jimson C Tse. Predicting difficult endotracheal intubation in surgical patients scheduled for general anaesthesia. A prospective blind study. Anaesthesia and Analgesia 1995; 81: 254-258.
6. C. M. Frek. Predicting difficult intubation. Anaesthesia 1991; 46: 1005-1008.
7. R. S. Cormack, J Lehane. Difficult endotracheal intubation in obstetrics. Anaesthesia 1984; 39: 1105-1111.
8. Lloyd F, Redick. The temperomandibular joint and tracheal intubation. Anaesthesia and Analgesia 1987; 66: 675-676
9. Abdel Raouf et al. preoperative airway assessment. Predictive value of a multivariate risk index. Anaesthesia and Analgesia 1996; 82: 1197-1204
10. Keyvan Karkouti et al. Interobserver reliability of the tests used for predicting difficult intubation. Can Jof Anaesth 1996; 43: 554-559
11. Al Ramadhani. Sternomental distance as the sole predictor of difficult laryngoscopy in obstetric anaesthesia . Br J Anaesth 1996; 77: 312-316
12. Oates J D. comparison of two methods for predicting difficult intubation. Br J Anaesth 1991; 66: 305-309
13. Yamamoto, Tsubokawa. Predicting difficult intubation with indirect laryngoscopy. Anaesthesiology 1997; 86: 316-321

14. Arne J, Descoins. Preoperative assessment for difficult intubation in general and ENT surgery: predictive value of a clinical multivariate risk index. Br J Anaesth 1998; 80: 140-146
15. Savva D. Prediction of difficult intubation. Br J Anaesth 1994; 73: 149-153
16. Bilgin H. screening testd for predicting difficult intubation: a clinical assessment in Turkish patients. Anaesth Intensive Care 1998; 26: 382-386
17. R Bhat, S Mishra, A Badhe. R Bhat. Comparison of upper lip bite test and modified mallampati classification in predicting difficult intubation. The Internet Journal of Anaesthesiology 2013; Vol 19: Number 1

Source of Support: None Declared
Conflict of Interest: None Declared