Comparision of airway assessment by Mallampati classification and cormack and lehane grading in Indian population

Ramapati Sanyal[1], Subrata Ray[2,*], Prithviraj Chakraverty[3], Mukul Kanti Bhattacharya[4]

[1]Associate Professor, [2]Assistant Professor, [3,4]Junior Resident, Dept. of Anaesthesiology, KPC Medical College and Hospitals, Kolkata, India

***Corresponding Author: Subrata Ray**
Email: raysubrata62@gmail.com

Received: 24th September, 2018 **Accepted:** 12th November, 2018

Abstract

Introduction: This prospective cross-sectional observational study was undertaken to compare preanaesthetic predictive value of Modified Mallampati classification in relation to Cormac Lehane grades in Indian population.

Materials and Methods: One hundred patients of either sex, who have underwent general anaesthesia were includes in the study. Inclusion criteria were aged between 18 to 60 years, ASA grades I and II, weighing between 45- 80 kg. The parameters observed were, Mallampati class (MMT) during pre anaesthetic assessment and their percentages, Cormack and Lehane grades (CL) at intubation and their percentages and correlation of Cormack and Lehane grading and Mallampati classification.

Results: Out of 100 patients, men women ratio was 1: 2.1(32: 68), mean age of the patients were 43.15± 12.96yrs, mean BMI of the patients were 23.34 ± 1.34 kg/m². The corrected chi square test showed a value of 76.8 with a P value of < 0.001.The Spearman correlation co-efficient between Mallampati and Cormac Lehane classification is 0.8 and one tailed value is significant at 5% level. The sensitivity, specificity, positive predictive value and negative predictive value of the Mallampati classification were 42.86%, 82.56%, 28.57% and 89.87% respectively.

Conclusion: To increase predictive value of preassessment of difficult airway, Mallampati test should be supplemented by other airway assessment tools.

Keywords: Mallampati test, Predictive value, Difficult intubation.

Introduction

Pre-assessment of airway before anaesthesia is very vital. Assessment tools with repeatability and reliability are therefore important. Mallapati Classification is one such assessment tool which is extensively used by Anaesthesiologists. Developed by Mallampati,[1,2] it was successively modified by Samsoon[3] in 1987. Cormack Lehane (CL) grading[4] is another such assessment of airway at laryngoscopy. It is a gold standard for evaluation of difficulty of intubation as airway is assessed under direct vision. Over the years different airway assessments tools are evaluated against CL classification. The purpose of the present study was to assess the Mallampati classification with the help of CL classification in Indian population without obvious factors predicting difficult intubation, like decreased mouth opening, decreased range of motion of the neck, mass within oropharynx etc.

Aims and Objectives

1. To evaluate the predictive value of Mallampati classification with Cormack and Lehane grading for tracheal intubation.
2. To assess their correlation between the two at direct laryngoscopy.

Materials and Methods

After obtaining clearance from institutional ethics committee, the trial was registered with Clinical Trial Registry of India (No. CTRI/2017/12/010921). The study was on patients undergoing surgery under general anaesthesia, in a city medical college hospital, from November 2017 to April 2018, for a period of six months. The study was prospective, cross sectional and observational in nature.

After obtaining informed consent, 110 patients of either sex were chosen for the study. The sample size was calculated with an estimated sensitivity of 45% from a previous study, and an effect size of 10 per cent, which was equal to a sample size of 99.

All patients between the age of 18 to 60 years and ASA physical status I and II were included in the study. The airway of the patients were assessed by Modified Mallampati (MMT) classes in the following way. Patients were made to sit up straight with their head in neutral position. They were told to open their mouth wide as maximum, with the tongue protruded out. Modified Mallampati classes were assigned as following.

Class I: Soft palate, fauces, uvula, pillars visible.
Class II: Soft palate, fauces, uvula visible.
Class III: Soft palate, base of uvula visible.
Class IV: Soft palate not visible at all.
Class I and II correspond to easy intubation and class III and IV denote difficult intubation.

In operation room monitors were attached to the patients to regularly monitor ECG, blood pressure, heart rate, oxygen saturation and $EtCO_2$. Anaesthesia was induced with glycopyrolate 0.01 mg/kg, midazolam 0.05 mg/ kg, fentanyl 2mcg/kg and propofol 1 to 2 mg/kg slowly until the loss of verbal communication achieved. To ensure maximal relaxation, 1.5 mg/kg of succinylcholine were administered

and laryngoscopy was done after 60-90 seconds using appropriate Mcintosh blade.

Laryngoscopy was done by an anaesthesiologist who has done at least 50 laryngoscopies successfully. Assessment of laryngeal inlet was done according to the Cormack Lehane classification (CL) as follows:

Class I: All or almost all of larynx visible.

Class II: Posterior part of vocal cord and/or arytenoids cartilage visible.

Class III: Only epiglottis visible.

Class IV: Neither glottis nor epiglottis visible.

Class I and II correspond to easy intubation and Class III and IV denote difficult intubation. Assessment of the airway was agreed upon by a second consultant at the time of assessment.

Inclusion Criteria: Healthy patients of either sex, weighing 45-80 kgs, aged between 18-60 years were included in this study.

Exclusion Criteria: Emergency surgical procedures, pregnant patients, patients with unstable cervical spine, patients with tumour of larynx, patients with head and neck anomaly, edentulous or loss of a part of denture and unwilling patients were excluded from the study.

Parameters: The parameters that were observed:

1. Mallampati class (MMT) during pre anaesthetic assessment and their pecentages.
2. Cormack and Lehane grades (CL) at intubation and their percentages.
3. Correlation of Cormack and Lehane Grading and Mallampati Classification.
4. Statistical Analysis: Data obtained was tabulated and analysed by using SPSS17 version software.

Results

There were 110 patients eligible for the study, three of them had their operation cancelled, five patients were administered regional anaesthesia and two opted out of the study. Therefore, hundred patients entered the study.

The number of women patients were 68 and the number of men were 32, men women ratio was 1: 2.1.

The mean age of the patients were 43.15± 12.96 yrs.

The mean BMI of the patients were 23.34 ± 1.34 kg/m².

The percentage of different grades of Mallampati classification & Cormack Lehane are shown in table 1.

The distribution of the cases according to Mallampati class and Cormac Lehane grades are shown in table 2.

The corrected chi square test performed from the above table 2 with 9 degrees of freedom showed a value of 76.8 with a P value of < 0.001.

The Spearman correlation co-efficient between Mallampati and Cormac Lehane classification is 0.8 and one tailed value is significant at 5% level.

The sensitivity, specificity, positive predictive value and negative predictive value of the Mallampati classification are given in table 3.

Table1: Percentage of MMT and CL grades

Grades	Mallampati (MMT) %	Cormack Lehane (CL) %
1	30	44
2	49	42
3	19	11
4	2	3

Table 2: Distribution of cases according to MMT and CL grades

	CL	I	II	III	IV	Total
MMT		44	42	11	3	100
I	30	20	9	1	0	
II	49	19	23	7	0	
III	19	5	10	3	1	
IV	2	0	0	0	2	
Total	100					

Table 3: Sensitivity, specificity, predictive values of MMT classification

Statistic	Value	CI 95%
Sensitivity	42.86 %	17.66 % to 71.14 %
Specificity	82.56 %	72.87 % to 89.90 %
Positive Likelihood Ratio	2.46	1.15 to 5.25
Negative Likelihood Ratio	0.69	0.44 to1.10
Prevalence Ratio	14.0 %	7.87 % to 22.37 %
Positive Predictive Value	28.57 %	15.76 % to 46.10 %
Negative Predictive Value	89.87 %	84.80 % to 93.38 %
Accuracy	77.00 %	67.51 % to 84.83 %

Discussion

Securing the airway is one of the most important task of the anaesthesiologist. Prior assessment of the airway helps in planning for difficult airway. There are many bedside tests for assessment of airway apart from assessment by imaging. One of the common bedside test is modified

Mallampati classification first proposed by Mallampati. Cormack lehane classification assesses the laryngeal inlet and intubation difficulty at laryngoscopy. It is the gold test against which other bedside tests are assessed.

Our aim was to find out whether Mallampatti is a satisfactory test to predict difficult airway when all other obvious factors for difficult intubation have been eliminated.

One hundred patients were included in the study. All of them were ASA I or II grade patient.

The sex ratio shows predominance of females. Other studies have shown dominance of either sex. One of the causes of female dominance may be due to the fact that majority of the surgical cases were laporoscopic cholecystectomy, as cholecystitis is more common in women.

The mean age of the patients were 43 ± 12.96 yrs. This shows that none of the patients had extremes of age, which might increase presence of other factors of difficult intubation.

The BMI of the patients were within the acceptable limit. Thus the important factor of obesity is satisfactorily ruled out. This was similar to studies by Aswar SG et al.[5]

The association between Mallampati classification and Cormack Lehane grade were significant as shown by Chi square test ($p<0.001$) and Spearman correlation of 1 ($p<0.05$). Similar results were shown by Aswar et al.[5] and Nasir KK et al[6] Significant correlation was also shown by Cattano D et al.[7]

Sensitivity of Mallampati is its ability to detect difficult intubation. The sensitivity in our study is low (42.86%) with a wide confidence interval (95% CI 17.66% to 71.14%). Sensitivity vary widely from 25.52% (Nasir KK et. al.)[6] to 76% (Erzi et. al.)[8] In fact Lee et al[9] has shown that sensitivity can vary between 34% and 66%. Lundstrom[10] has recorded the variation of sensitivity between 0% and 100%. Our study records a sensitivity to that of Deepak et al. (44.44%).[11]

The specificity of our study is 82.56%. This is similar to specificity recorded by Nasir KK et al. (83.6%).[6] Even higher specificity were recorded by Aswar et al. (91.3%)[5] and Cattano D et al. (91%).[7]

Our results reflect a poor positive predictive value, i.e, only 28% of the patients predicted to have a difficult airway, have a really difficult airway. However once predicted a difficult intubation, patients are almost two and half times likely to have a difficult airway (positive likelihood ratio of 2.46). Studies by Adamus M et al[12] shows a lower predictive value (10.7%) and Aswar et al. registered a more favourable value (42.86%).[5]

However, the incidence of difficult intubation in itself is low as shown by the study, to be only 14%. The results are similar to studies by Huh et al.(12.2%),[13] Aswar et al (6%)[5] and Adamus M et al. (2%) observed even lower values.[12] This may be due to the larger sample on which they based their study.

Accuracy of a test is one of the fundamental statistic on which the overall utility of test can be assessed. It is the percentage of correct results (both true positive and true negative) as a proportion of all intubations. In our study, the accuracy of the test was 77% (95% CI 67.51 % to 84.83 %). Similar Results were observed by Adamus M et al. (81.9%).[12] Higher values were observed by Aswar et. al. (90%)[5] and Mallampati et. al. (92.9%).[2]

Conclusion

To increase predictive value of preassessment of difficult airway, Mallampati test should be supplemented by other airway assessment tools.

Conflict of Interest: None.

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How to cite this article: Sanyal R, Ray S, Chakraverty P, Bhattacharya MK. Comparision of airway assessment by Mallampati classification and cormack and lehane grading in Indian population. *Indian J Clin Anaesth* 2019;6(1):140-142.