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"COMPARISON BETWEEN MALLAMPATI CLASSIFICATION AND A NEW AIRWAY CLASSIFICATION (KAI) FOR PREDICTING DIFFICULT INTUBATION- A PILOT STUDY."

Anaesthesiology

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KEYWORDS

"ABC that is airway breathing circulation is the sequence you should see to save a pateint in emergency" is what doctors are always taught. Hence patent airway is very important for all doctors especially to the anaesthetist. Unanticipated difficult intubation with or without proper evaluation is a nightmare for anaesthetist even till date in this hi-tech world.

Significant anaesthetic related mortality and morbidity in various studies in UK, Australia and USA have been related to airway management.[1-5] A difficult or failed intubation contributed to 6 of 4034 deaths and has been mentioned in the Confidential Enquiry into Perioperative Deaths (CEPOD).[5] Over last few decades, various bedside tests and their combinations have been used to avoid this. Use of Thyromental distance by Patil Et all[6], visual examination of posterior wall of pharynx by Mallampati[7], combinations by Frerk[8] and New Airway Indexing by Smarajith Sur Roy[9] are amongst them.

However, Mallampati Examination has been used on a large scale. Some methods being cumbersome are avoided for daily use.

This small pilot study was done to introduce a new bed side test was based on the distance between midpoint of the two angle of mandible to thyroid notch. **This new classification will be termed as 'Khanvelkar Airway Indexing' or 'KAI' henceforth.**

AIMS & OBJECTIVES

AIMS

Comparison between New Airway Classification (KAI) and Mallampati classification for difficult intubation.

OBJECTIVES

- To predict difficult intubation based on Mallampati classification
- To predict difficult intubation based on New Airway Classification.
- To compare Mallampati Classification and Khanvelkar Airway Indexing for predicting difficult airway.

MATERIALS AND METHOD

A diagnostic observational, double blinded, pilot study was carried out after obtaining ethical committee clearance on 35 patients belonging to ASA (American Society Of Anaesthesiologists) grade I and II, aged between 18 to 60 years, including either gender and satisfying all inclusion and exclusion criteria scheduled for elective as well as emergency surgeries. Pre –Anaesthetic check-up was done for all patients and were graded under Mallampati classification. Routine intubation was carried out in such patients. Any difficulty encountered while intubating was graded based on diagrams of Cormack Lehane Classification and were followed up in the wards for distance measurement which were entered in a well designed proforma.

The measurements were done in a normally extended neck which was comfortable to the patient. A mid point was marked on the line joining the two angles of mandible. The distance between this midoint and throid notch were measured using 1 finger breadths.The measurements were entered in the proforma as more than or less than 1 finger breadths(more than or less than 2 cm).

Data collected was entered in Microsoft Excel and analysis was done using SPSS (Statistical Package for Social Sciences) Software Win-Pepi. Categorical variable were expressed in terms of frequency and percentage and continuous variable in terms of mean and SD. Association between two categorical variables was analysed using Chi square test with $p < 0.05$ as statistically significant value at 95% confidence interval.

Inclusion Criteria

1. Age between 18-65 years of either sex.
2. ASA grade I and II
3. Elective surgery under general anaesthesia requiring endotracheal intubation.
4. Patients willing to be part of the study.
5. Haemodynamically stable patients with all routine investigations within normal limits.
6. Availability of written informed consent from concerned patient.
7. Lesion of oropharynx and larynx
8. Obese patients.
9. Patients with short neck.

Exclusion Criteria

1. Patient refusal
2. NBM status less than 8 hours
3. Haemodynamically unstable patients
4. Oro pharyngeal surgery
5. Known unstable cervical spine injury.
6. ASA grade > III ; MPC Grade IV.

Procedure

After recording the demographic data such as age, sex, weight, height, MPC grading and ASA physical status and base parameters and consent of the patient, pre medications were given via a secured intracth of 20 gauge alongside pre oxygenation with 100 percent oxygen for 3 to 5 minutes. A head ring of 10 cm height was placed under the head of the patient for the same. A videolaryngoscope was kept ready bedside.

After checking the feasibility of ventilation, muscle relaxant was administered and laryngoscopy with a Miller's Blade was carried out by an experienced senior anaesthesiologist in a classical intubating position.. The Cormack Lehane grading was recorded as per the anaesthesiologist and then patient was intubated with help of cricoid pressure as well as a bougie. The placement of Endotracheal tube was confirmed with help of capnography as well as by auscultation and visually. Upon the use of cricoid pressure, McCoy blades, C-Mac, Video laryngoscope for visualisation of cords, patients were followed up immediately post extubation for distance measurement for mid point of line joining angle of mandibles to the thyroid notch. Distance was measured by a standard measuring flexible tape and entered in performa in centimetre units.

RESULTS

A total of 35 admitted patients with ASA I and II undergoing elective surgery under general anesthesia requiring endotracheal intubation were included in this study. Most of the patients were 61 to 70 years of age (31.4%). The mean age of the patients was 62.54 ± 12.5 years. Out of 35 patients, 18 (51.4%) were males and 17(48.6%) were females. Majority of our participants had normal BMI (62.9%).

Table 1: Socio-demographic parameters

Variables	Frequency (%)
Mean age	62.54 ± 12.5 years
Mean Height	164.2 ± 7.3 cms.

Mean Weight	66.46 ± 7.44 kgs.	
Age group	<40 years	2 (5.7%)
	41-50 years	3 (8.6%)
	51-60 years	9 (25.7%)
	61-70 years	11 (31.4%)
	>70 years	10 (28.6%)
Gender	Males	18 (51.4%)
	Females	17 (48.6%)
BMI	18.5-24.9 Kg/m² (Normal)	22 (62.9%)
	25.0-29.9 Kg/m² (Overweight)	13 (37.1%)

According to Mallampati test 9 (25.7%), 15 (42.9%) and 11 (31.4%) had score I, II and III respectively. During procedure, difficulty in intubation was observed in 30 (85.7%) of cases and 5 (14.3%) was not difficult.

In Table 2 Mallampati grade III were observed in 11 (31.4%) cases that showed difficult tracheal intubations in which 11 (TP) were confirmed difficult tracheal intubations and none were confirmed easy tracheal intubations by C-L criteria. Similarly, Mallampati grade I and II were observed in 24 (68.6%) patients that were showing easy intubations in which none were confirmed easy and 24 (FN) were confirmed difficult tracheal intubation during procedure. The sensitivity, specificity, PPV and NPV of Mallampati grade were 30%, 60%, 81.8% and 12.5% respectively (Table 2).

Table 2: Mallampati score predicting difficult tracheal intubations

Mallampati classification	On procedure		Total
	Difficult	Not difficult	
Grade III: difficult	9	2	11
Grade I and II: Not difficult	21	3	24
Total	30	5	35

*Sensitivity=9/30*100=30%*
*Specificity=3/5*100=60%*
*PPV=9/11*100=81.8%*
*NPV=3/24*100=12.5%*

Table 4: Midpoint to cricoid notch distance predicting difficult tracheal intubations

Midpoint to cricoid notch distance	On procedure		Total
	Difficult	Not difficult	
<2 cms.	30	1	35
>2 cms.	0	4	0
Total	30	5	35

*Sensitivity=30/30*100=100%*
*Specificity=4/5*100=80%*
*PPV=30/35*100=85.7%*
*NPV=4/0*100=0%*

Table 5: Sensitivity, specificity, positive and NPV of airway predictors

Predictors	Sensitivity	Specificity	PPV	NPV
Mallampati score	30%	60%	81.8%	12.5%
Cormack Lehane Classification	100%	0	85.7%	0
Midpoint to cricoid notch distance	100%	80%	85.7%	0%

DISCUSSION

The ABC form the base of anaesthetist's practice. 'A' that is airway has been one of the most important parameter and has also proved to be the fundamental responsibility of an anaesthetist. A difficult airway has proved to be a nightmare atleast once. Inspite of having various predictors of difficult intubation and instruments like fibreoptic or videolaryngoscopy available , intubation has been a nightmare when it could not be predicted. Most of the airway catastrophes have occurred when difficulty with airway was not recognized.[10]

Over the last few decades various predictors of difficult intubation were introduced. The Mallampati Classification has been used and accepted widely. The Mallampati classification was first described in 1985 [11]and modified to include four categories in 1987 [12] and mainly includes Class I: Soft palate, fauces, pillars, and uvula are visible Class II: Soft palate, fauces, and uvula are visible Class III: Soft palate and base of uvula are visible Class IV: Soft palate is not visible at all. Hence it can safely be said that MPC I and II can be predicted as easy intubation. However, it can be observed that inspite of having Class I and Class II MPC, difficult intubation can be encountered. while actively doing laryngoscopy and hence known as unanticipated difficult intubation.

In 1997, Smarajith Sur Roy of India introduced a new airway index to predict difficult intubation which was proved to be a highly predictable one. It followed the ratio between length of mandible and thyromental distance[9]. However the cumbersome nature of measuring the distance and making it into a ratio form made it a bit difficult to use especially at the last monent. Hence the following study to introduce a new modern airway index system was carried out.

Our study was based on the curiosity to design a predictor of difficult intubation using simple technique that too immediately prior to intubation. It can also be used after administering relaxant and immediately prior to laryngoscopy. Being a pilot study, the sample size was assumed at 35. Out of 35, 5 patients were categorized under easy intubation and remaining were categorized as difficult intubation at time of laryngoscopy itself based on Cormack Lehane Grading.

Demographically it was seen that the mean age of participants was 62.54 ± 12.5 years. Similarly the participants displayed a mean height of 164.2 ± 7.3 cms., mean weight of 66.46 ± 7.44 kgs. The BMI was recorded as normal in majority of the population that is 22 in 62.9 % individuals and overweight in 13 that is 37.1 % population. The gender bias was not seen significant as 18 were males and 17 were females. .

According to Mallampati test, 9 (25.7%), 15 (42.9%) and 11 (31.4%) had score I, II and III respectively.

Dr AswiniB, Dr Madhusoodanan, Et all conducted an observational study to predict difficult intubation in patients undergoing general anaesthesia using Moddified Mallampati test, Sternomental Distance and Thyromental Distance and concluded that the prediction is best when all three parameters are used together.[13] Our study can be compared with their in the following table:

Predictors	Sensitivity	Specificity	PPV	NPV
MMT	40.7%	92.4%	34.4%	94.1%
SMD	81.5%	93.9%	56.4%	98.1%
TMD	88.9%	80.9%	31.2%	98.7%
MMT+SMD	100.0%	86.7%	42.2%	100.0
MMT+TMD	96.3%	75.2%	27.4 %	77.0%
SMD+TMD	92.6%	78.4%	29.4%	99.1%
MMT+SMD+TMD	100.0%	72.7%	26.2%	100%
Mallampati Classification	30%	60%	81.8%	12.5%
KAI	100%	80%	85.7%	0%

Ushakumary Raghunathan ,Radha Korumbil Raghavan and Bindu Mele Veetil compared the new airway indexing by Smarajith Sur Roy against modified Mallampati classification and concluded that new airway indexing by Smarajith Sur Roy has almost 100 % success rate in anticipating difficult airway and has more predictive value than modified Mallampati classification.[14] Similarly, our study also points out to having higher sensitivity and success rate as compared to Mallampati classification.

CONCLUSION

This study of new airway indexing introduced by authors and contributors confirms a higher success rate in predicting difficult intubation. Although a high success rate has been obtained , it still needs to be confirmed on on a larger scale with large sample size and involving various Tertiary Care Hospitals and hence an observational study will be done soon.. A study will also be done in near future to compare this against the airway indexing by Smarajith Sur Roy. This will enable us to add it into everyday use while assessing patients during pre anaesthetic check up. This new airway indexing shall now be known as “Khanvelkar Airway Indexing “ or “KAI” from now on and for future refrences.

REFERENCES:

1. American society of anaesthesiologists, Committee on professional liability. Preliminary study of closed claims. ASA newsletter 1988;4(52):8-10.
2. Caplan RA, Ward RJ, Posner K, et al. Unexpected cardiac arrest during spinal anaesthesia: closed claims analysis of predisposing factors. Anaesthesiology 1988;68(1):5-11.
3. Caplan RA, Posner K, Ward RJ, et al. Adverse respiratory events in anaesthesia: a closed claim analysis. Anaesthesiology 1990;72(5):828-33.
4. Holland R. Anaesthesia related mortality in Australia. In:PierceEC, Cooper JB, eds.

Instructional anaesthesia clinics. Boston: Little, Brown 1984:61-71.
5. Department of health and social security. Report on confidential enquiries into maternal deaths in England and Wales, 1979-1981. Report on health and social security subjects, 29. London:HMSO 1986.
6. Patil VU, Stehling LC, Zaunder HL. Fibreoptic endoscopy in anaesthesia. Chicago: Yearbook Medical 1983.
7. Mallampati SR, Gatt SP, Gugino LD, et al. A clinical sign to predict difficult tracheal intubation: a prospective study. Canadian Anaesthetists' Society Journal 1985; 32(4):429-34.
8. Frerk CM. Predicting difficult intubation. Anaesthesia 1991;46(12):1005-8.
9. Smarajith Sur Roy. New airway index to predict difficult intubation. Indian Journal of Anaesthesia 1997;41:17-21.
10. D. L. Oates, A. D. Macleod, P. D. Oates, F. J. Pearsall, J. C. Howie and G. D. Murray. Comparison of two methods for predicting difficult intubation. Br J Anaesth. 1991;66(3):305.
11. Mallampati SR, Gatt SP, Gugino LD, Desai SP, Waraksa B, Freiberger D, Liu PL. A clinical sign to predict difficult tracheal intubation: a prospective study. Can Anaesth Soc J. 1985;32:429–434. doi: 10.1007/BF03011357. [PubMed] [CrossRef][GoogleScholar]
12. Samsoon GL, Young JR. Difficult tracheal intubation: a retrospective study. Anaesthesia. 1987;42:487–490. doi: 10.1111/j.1365-2044.1987.tb04039.x. [PubMed] [CrossRef] [Google Scholar]
13. Modified Mallampati Test, Sternomental Distance, and Thyromental Distance for Prediction of Difficult Intubation in Patients Undergoing General Anaesthesia Authors: Dr Aswini B, Dr Madhusoodanan Pillai .C, Dr Rajani Gandha. DOI: https://dx.doi.org/10.18535/jmscr/v5i10.169
14. Ushakumary Reghunathan , Radha Korumbil Raghavan , Bindu Mele Veetil Airway assessment for anticipation of difficult intubation: A double blind comparitive study. J. Evolution Med. Dent. Sci./eISSN- 2278-4802, pISSN- 2278-4748/ Vol. 5/ Issue 40/ May 19, 2016