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MODIFIED MALLAMPATTI TEST VS THYROMENTAL DISTANCE; PREDICTORS OF DIFFICULT INTUBATION

Medical Science

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ABSTRACT

Airway management is the fundamental responsibility of every anaesthesiologist. Difficult intubation is a major cause of morbidity and mortality related to Anesthesia. This study is designed to predict difficult intubation in patients, by comparing Modified Mallampati test, Thyromental distance and their combination. Study was conducted on 300 patients posted for elective surgery according to the inclusion and exclusion criteria. Mallampati grade and thyromental distance noted and Cormack lehane grading seen on intubation. It was observed that there was a statistical significance seen when using Mallampati as an assessment of airway, proving that it can be used as significant measure in assessment of easy intubation (p value 0.002) and similar with thyromental distance (p value <0.001) . No significant co relation (kappa0.108) between mallampati and Cormack lehane but fair co relation (kappa 0.232) between thyomental and Cormack & lehane. This study has shown that the combination of Modified Mallampati and thyromental distance is better and adds some incremental diagnostic value when compared to value of each predictor used alone.

KEYWORDS

Modified Mallampati, Cormack And Lehane, Thyromental Distance, Difficult Intubation

Airway management is the fundamental responsibility of every anaesthesiologist.

Difficulty intubation is a major cause of morbidity and mortality related to anesthesia. Caplan R (1990)[1]

The American society of anaesthesiologists (ASA) has defined difficult airway as the clinical situation in which the conventionally trained anaesthesiologist experiences difficulty with face mask ventilation of the upper airway, difficulty with tracheal intubation, or both.

Difficult laryngoscopy is defined as when it is not possible to visualize any portion of the vocal cord after multiple attempts at conventional laryngoscopy.

Difficult tracheal intubation is defined as intubation requiring multiple attempts, in the presence or absence of tracheal pathology.

Most of the airway catastrophes have occurred when difficulty with the airway was not recognized. Jonathan L (1991)[2]

Predicting the occurrence of difficult intubation reduces the number of unanticipated difficult tracheal intubations.

Airway assessment is an integral part of preanaesthetic evaluation.

Most of the predicted cases of difficult intubation are found after clinical examination and application of simple clinical tests. Cobley M, Vaughan R.S(1992)[3]

A range of bedside screening tests are available to predict a 'difficult airway'. These include Modified Mallampati test, thyromental distance, Wilson's risk sum etc.

A test to predict difficult intubation should have high sensitivity and also a high positive predictive value.

This study is designed to predict difficult intubation in patients, by comparing Modified Mallampati test, Thyromental distance and their combination.

Materials and methods

After obtaining institutional ethical committee clearance this study was conducted on 300 patients posted for elective surgeries.

Inclusion criteria
- ASA class I or II
- Either sex
- 20 to 60 years of age posted for elective surgeries under general anaesthesia

Exclusion criteria
- Patient refusal
- Emergency surgeries
- ASA grade 3 and 4
- Pregnant patients
- Patients with known abnormalities or obvious malformations of the airway, with head or neck trauma, edentulous patients

Preanaesthetic check-up was done on the previous day of the surgery and routine investigations carried out and informed consent taken.

Airway was assessed by Modified Mallampati test, done by instructing the patient , to sit with head in neutral position and told to open their mouth as wide as possible and protrude their tongue, while the observer looking from the patient's eye level inspected the pharyngeal structure with a pen torch, without the patient phonating and oropharyngeal view were graded. Class 3 and 4 are classified as difficult intubation.

Thyromental distance was recorded by using a measuring tape to measure the distance between the mentum of the mandible to the thyroid notch in the midline with neck in full extension. It was measured twice and average of the values is taken for the sake of accuracy. A measurement of less than 6cm was considered to be a predictor of difficult intubation.

Premedications given the night before surgery and nil per oral kept.

In ot baseline values of non-invasive blood pressure, heart rate, ECG, oxygen saturation were recorded.

Premedicated with Fentanyl (1mcg/kg body weight), followed by preoxygenation for 3 mins. Induced with Thiopentone (5mg/kg body weight) given over 20 seconds, after confirming adequate ventilation and sedation, Vecuroinum (0.1mg/kg body weight) given.

MacIntosh blade was used for intubation and laryngeal view assessed using Cormack and Lehane grading. Grade 3 and 4 predict difficult intubation.

Patients was intubated with appropriate sized cuffed oral endotracheal tube, secured after confirming bilateral equal air entry and anaesthesia maintained.

RESULTS Demographic characteristics; the mean for age, weight, height and BMI is shown in table 1

Table 1 Distribution of combination of mallampati grade and thyromental distance in the study population is given in table 2

	MEAN	STANDARD DEVIATION
AGE	42.4	11.8
WEIGHT (kg)	67.19	9
HEIGHT (cm)	164.4	9.55
BMI	27.7	6.66

Table 2 Distribution of Cormack and lehane grade in study population. (table 3)

MP+TMD	NO OF PATIENTS	PERCENTAGE
EASY INTUBATION	261	87
DIFFICULT INTUBATION	39	13
TOTAL	300	100

Distribution of Cormack and lehane grade in study population.(table 3)

Table 4

C&L GRADE	NO OF PATIENTS	PERCENTAGE	C&L CATEGORY	NO OF PATIENTS	PERCENTAGE
I	165	55	EASY INTUBATION	278	92.7
II	113	37.7			
III	11	3.7	DIFFICULT INTUBATION	22	7.3
IV	11	3.7			
TOTAL	300	100	TOTAL	300	100

It was observed that there was a statistical significance seen when using Mallampati as an assessment of airway, proving that it can be used as significant measure in assessment of easy intubation (p value 0.002) and similar with thyromental distance (p value <0.001) . No significant co relation (kappa0.108) between mallampati and Cormack lehane but fair co relation (kappa 0.232) between thyomental and Cormack & lehane.

There was good co relation (kappa 0.331) between combination of mallampati and thyromental distance and cormack & lehane grading to assess difficulty in intubation as shown in table 4.

Table 4

			C & L		TOTAL
			EASY INTUBATION	DIFFICULT INTUBATION	
MP+TMD	EASY INTUBATION	COUNT	251	10	261
		% WITHIN MP+TMD	96.2%	3.8%	100%
		% WITHIN C&L	90.3%	45.5%	87.0%
	DIFFICULT INTUBATION	COUNT	27	12	39
		% WITHIN MP+TMD	69.2%	30.8%	100%
		% WITHIN C&L	9.7%	54.5%	13.0%
	TOTAL	COUNT	278	22	300
		% WITHIN MP+TMD	92.7%	7.3%	100%
		% WITHIN C&L	100%	100%	100%

Cormack and lehane grading was taken as the ideal standard for prediction of difficult airway. When comparing MP, TMD and its combination in assessing difficult airway, both MP and TMD individually show higher sensitivity in comparison to combination of both. But, the combination of MP and TMD has been shown to have higher specificity, higher positive predictive value and diagnostic accuracy when compared to both parameters individually. All the parameters offer similar negative predictive value.table 5

Table 5

PARAMETER	SENSITIVITY	SPECIFICITY	PPV	NPV	DIAG ACCURACY	GOLD STANDARD
MP	72.7%	61.2%	12.9%	96.6%	62.0%	C&L
TMD	72.7%	77.7%	20.5%	97.3%	77.3%	C&L
MP+TMD	54.5%	90.3%	30.8%	96.2%	87.6%	C&L

DISCUSSION

Airway management and Endotracheal intubation is of primary concern in the field of anaesthesia. Identifying the characteristics of difficult intubation and ventilation is first step in airway management. Pre operative prediction of a difficult airway is important to prevent anticipated difficult intubation, and allow sufficient time for formulation of a plan for difficult airway. Recent advances in supraglottic airway devices, fibre optic intubation have been included but they will never replace the traditional laryngoscopy. (Gupta AK et al2010[3]; Shailaja S et al 2014[4])

An ideal predictor test for difficult intubation should be characterized by high sensitivity , specificity and high predictor value; thus a high diagnostic accuracy in order to identify every person at risk with minimal false positive and false negative predictions. (Chara L et al 2014[6]; Bhadke VK et al 2014[7] ; Basunia SR et al 2013[8])

Based on this observation, our study was conducted using two simple bed side airway assessment test i.e. Modified Mallampati test and thyromental distance measurement. In this study modified mallampati grade 3 and grade 4 and thyromental distance of less than 6cm were used as predictor of difficult intubation.Then we compared the ability of each test when used individually and in combination , to successfully predict difficult airway by correlating each with Cormack and Lehane laryngoscopic grading obtained at the time of intubation.(Gupta AK et al 2010[9]; Munnur U et al 2005[10]

The incidence of difficult airway found in previous studies ranged from 1 to 18%[8,11]. In our study it was 7.3% similar to incidence reported by Prakash S, Kumar A, Bhandari S, Mullick P, Singh R, Gogia AR (2013)[12] which was 9.7% and Badhe et al (2014)[13] which were conducted in Indian population.

Mean value of age in difficult and easy intubation were 45[+]-14.78 yrs and 42.14[+]-11.63 yrs respectively. It demonstrated a statistically significant association between age and difficult intubation(p value .002) when Cormack and Lehane grade 3 0r 4 were used. Prakash et al[12] conducted a study and found that increasing age was associated with difficult intubation.

There was no significant difference in height , weight and BMI of the patients in two groups which was similar to study conducted by Savva (1994)[14]

In our study when mallampatti was used alone for predicting difficult airway, sensitivity of 72.70% and specificity of 61.20 %, positive predictive value was 12.90% and negative predictive value was 96.60%. diagnostic accuracy was 62.00%. modified mallampati showed a statistical co relation when used as a tool for difficult airway assessment (p value .002) but kappa value of .108 showed a poor co relation.

The thyromental distance was found to have sensitivity of 72.70% and specificity of 77.70%. the positive predictor value was 20.50% and negative predictive value was 97.30%. demonstrated a diagnostic accuracy of 77.33%.The thyromental distance showed a statistical significance when used as a tool for assessment of airway (p value <0.001) and kappa of .232 which implied a fair co relation with Cormack and Lehane.

When comparing between two test both had similar sensitivity and a negative predictive value, however thyromental distance showed a higher specificity , positive predictive value , diagnostic accuracy.

When used together in combination even though it showed lower sensitivity compared to test used individually, however showed a higher specificity, positive predictive value. It showed diagnostic accuracy of 87.67% which had a statistically significant p value of <0.001 and kappa value of .331 which shows fair correlation with Cormack and Lehane.

Shiga T, Wajima Z, Inoue T, Sakamoto A[15] conducted a meta analysis of bed side test and reported the combination of these two test had a low sensitivity of 36% and specificity of 87%, which was similar to this study.

In our study difficult airway determined by Cormack and Lehane were intubated by "BURP" maneuver or bougie. Total of 22 patients were intubated by above methods.

CONCLUSION

In our study the incidence of difficult intubation was found to be 7.3%. Current available test like Modified Mallampati test and thyromental distance have only poor to moderate discriminative power when used alone. This study has shown that the combination of Modified Mallampati and thyromental distance is better and adds some incremental diagnostic value when compared to value of each predictor used alone. However the clinical value of these bedsides screening test for predicting difficult intubation remains limited.

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