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A study on incidence of difficult laryngoscopy and intubation using modified Mallampatti test during pre-operative assessment of patients

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Abstract

Various clinical techniques have been used to assess difficult laryngoscopy, some of which are not sensitive or specific to predict difficult intubation. Hence unidentified difficult intubation can be challenging to the anaesthesiologist. All patients were premedicated with Tab. Pantoprazole 40 mg given orally night before surgery. On the morning of surgery patient were shifted to the O.T, Non-Invasive Blood pressure, ECG, Spo2 monitors were connected and basal vitals were recorded. Patients were given Inj. Fentanyl 2µg/kg, Inj. Midazolam 25 µg/kg given IV and pre oxygenated for 3 mins. Mallampatti grade 3&4 were considered as predictors of difficult intubation. There were 29 cases out of 300 patients (9.7%) belong to Mallampatti Grade 3 & 4.

Keywords: Difficult laryngoscopy, modified mallampatti test, pre-operative assessment

Introduction

Intubation and maintenance of the patient's airway is one of the most important steps in anaesthesia practice and a fundamental responsibility of the anaesthesiologist. Difficult intubation has been associated with serious complications particularly when failed intubation results.

There is no universally accepted definition of difficult intubation. The American Society of Anesthesiologists (ASA) has defined difficult endotracheal intubation, as when proper placement of endotracheal tube with conventional laryngoscopy requires more than 3 attempts or more than 10mins. Similarly difficult airway is defined as a clinical situation in which a conventionally trained anaesthesiologist experiences difficulty with mask ventilation or difficulty tracheal intubation or both [1].

The ASA (American society of anaesthesiologist) closed claims database analysis of adverse respiratory events has found that vast majority of 85% airway related events involves brain damage or death, and as many as 1/3rd of deaths is attributed solely to anaesthesia due to inability to maintain patent airway [2].

Difficult intubation is second most frequent proclaimed damaging event leading to anaesthesia malpractice claims [3].

Most catastrophes have occurred when possible difficult airway was not recognized [4].

Occasionally with a patient who has difficult airway, the anaesthesiologist is faced with a situation where mask ventilation is proved difficult or impossible. This is the most critical emergency that might be faced in the practice of anaesthesia [5].

When subtle anatomical abnormalities are hidden against the normal air passage then identification is likely to be missed. In such patients prediction of difficult intubation may be helpful.

If the cases of difficult airway could be predicted confidently in the pre-operative period, the anaesthesiologist can plan the safest and most effective way of managing tracheal intubation by organizing special procedures like fibre optic intubation, etc.

During routine anaesthesia, the incidence of difficult intubation has been estimated in a recent study as 5.8% [6].

Various clinical techniques have been used to assess difficult laryngoscopy, some of which are not sensitive or specific to predict difficult intubation. Hence unidentified difficult intubation can be challenging to the anaesthesiologist.

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Numerous investigators have attempted to predict difficult intubation by simple bedside physical examination. Mallampatti *et al.* [7] introduced in 1985 a currently well-known screening test that classified visibility of oropharyngeal structures. The distance from thyroid notch to mentum (thyromental distance), the distance from upper border of manubrium sterni to mentum (Sternomental distance) and simple summation of risk factors (Wilson risk sum score) are widely recognized as tools for difficult intubation [8, 9]. Nevertheless the diagnostic accuracy of these screening tests has varied from trial to trial. Probably because of difference in the incidence of difficult intubation, inadequate statistical power, different test thresholds, or difference in patient characteristics, questions remain as to whether a combination of tests may improve predictive accuracy.

Therefore there is a need for a test that is quick and easy to perform at the bedside, that is sensitive (so that the majority of difficult cases can be identified) and is also highly specific (so that false positive rate will be low when test is used routinely).

Methodology

All patients were premedicated with Tab. Pantoprazole 40 mg given orally night before surgery. On the morning of surgery patient were shifted to the O.T, Non- Invasive Blood pressure, ECG, Spo2 monitors were connected and basal vitals were recorded. Patients were given Inj. Fentanyl 2µg/kg, Inj. Midazolam 25 µg/kg given IV and pre oxygenated for 3 mins. Induction done with Inj. Thiopentone 5mg/kg IV and relaxation done with inj Vecuronium 0.1 mg/kg IV. Patients were ventilated with 50% Nitrous oxide and 1% Halothane in oxygen. After 3

mins laryngoscopy was done in sniffing position by using McIntosh blade no 3. Cormack & Lehane grading was done accordingly by a senior anaesthesiologist with more than two years' experience post qualification. Subsequently the patients were intubated. The following is the Cormack and Lehane grading:

Grade 1: Visualization of entire laryngeal aperture.

Grade 2: Visualization of only posterior commissure of laryngeal aperture.

Grade 3: Visualization of only epiglottis.

Grade 4: Visualization of only soft palate.

Grade 3 and 4 predict difficult intubation

The patients were intubated with appropriate sized endotracheal tube which were secured and anaesthesia was maintained.

Results

Table 1: Distribution of mallampatti grade in the study population

Mallampatti Grade predictor	No. of patients	Percent
+ve (grade 3 & 4)	29	9.7
-ve (grade 1 and 2)	271	90.3
Total	300	100.0

Mallampatti grade 3 & 4 were considered as predictors of difficult intubation. There were 29 cases out of 300 patients (9.7%) belong to Mallampatti Grade 3 & 4.

Table 2: Distribution and correlation of mallampatti grade with Cormack & Lehane grade in prediction of difficult intubation.

Cormack and lehane grading	Mallampatti Grade predictor		Total
	+ve (Grade 3 & 4)	-ve (Grade 1 & 2)	
+ve (Grade 3 & 4)	20	1	21
	95.2%	4.8%	100.0%
	68.9%	0.4%	7.0%
-ve (Grade 1 & 2)	9	270	279
	3.6%	96.8%	100.0%
	34.5%	99.6%	93.0%
Total	29	271	300
	9.7%	90.3%	100.0%
	100.0%	100.0%	100.0%

Sensitivity: 68.9% Specificity: 99.6% Positive predictive Value: 95.3% Negative Predictive value: 96.8%. The

incidence of difficult intubation is found to be 7%.

Table 3: Distribution of mallampatti grade in various age groups

Age	Mallampatti Grade predictor		Total
	+ve (Grade 3 & 4)	-ve (Grade 1 & 2)	
21-30 yrs	8	96	104
	7.69%	92.31%	100.0%
31-40 yrs	6	69	75
	8%	92%	100.0%
41-50 yrs	3	53	56
	5.4%	94.6%	100.0%
51-60 yrs	12	53	65
	18.46%	81.54%	100.0%
Total	29	271	300
	100.0%	100.0%	100.0%

Table 4: Distribution of mallampatti grade in male and female groups

Gender	Mallampatti Grade predictor		Total
	+ve (Grade 3 & 4)	-ve (Grade 1 & 2)	
Male	16	134	150
	10.7%	89.3%	100.0%
Female	13	137	150
	8.7%	91.3%	100.0%
Total	29	271	300
	9.7%	90.3%	100.0%

Discussion

In earlier days anaesthesia was induced by anaesthetic vapours given through face mask. Due to inability to maintain a patent airway, adequate depth of anaesthesia for surgical procedures and its complication leading to morbidity and mortality led to development of safer anaesthetic practice by maintaining anaesthesia through endotracheal insufflation.

The endotracheal tube is one of the airway devices which can be introduced into the trachea either orally or nasally, to maintain a patent airway in both unconscious and anaesthetized patients.

The significance of difficult or failed tracheal intubation following induction is a well-recognized cause of morbidity and mortality in anaesthetic practice. Moreover the need to predict potentially difficult tracheal intubation has received wide attention but with meager success.

Many anatomical characteristics and pathological conditions (like Pierre Robin syndrome, Ludwig's angina) have been suggested to be useful in assessing anticipated difficult intubation by altering or distorting the regional anatomy of the airway. Unheralded difficult intubation is a risk to the patient's life and a challenge to the skill of the anaesthesiologist.

In the absence of pathological conditions, radiographic methods are time consuming and cannot be used routinely for prediction of the difficult intubation. But these factors have limitations because of observer variability, inadequate statistical power and difference in incidence of difficult intubation. Based on these observations and studies, our study was conducted to overcome a few of these limitations and hence we have used two simple bedside airway assessment tests i.e., Mallampatti test and measurement of thyromental distance to predict the incidence of difficult intubation. The study population consisted of 300 ASA grade 1 & 2 patients with apparently normal airway who underwent surgical procedures under general anaesthesia.

In our study the prediction of difficult intubation was done by combining Mallampatti test grade 3 & 4 and thyromental distance <6cm during the preoperative airway assessment and correlating it with the Cormack & Lehane laryngoscopic grading at intubation. Grade 3 & 4 of Cormack & Lehane was considered difficult intubation.

Butler. P.J *et al.* [10] conducted on 250 patients, who did the pre-operative airway assessment by Mallampatti test and thyromental distance. The incidence of difficult laryngoscopy in their study was 8.2%.

Ezri *et al.* [11] conducted a study on 1472 ASA grade 1 & 2 patients whose preoperative airway assessment was done by Mallampatti test and thyromental distance. The incidence of difficult intubation was found to be 10%.

Iohom *et al.* [12] conducted a study on 212 patients, where preoperative airway assessment was done by using Mallampatti test, thyromental distance or sternomental distance in patients aged >18yr. The incidence of difficult intubation in their study was found to be 9%.

The incidence of difficult intubation is 7%, in our study which correlates with the above mentioned studies.

Similar study conducted by Koh *et al.* [13] on 605 patients, a combined Mallampatti test grade 3 & 4 and thyromental distance <6cm was noted during preoperative airway assessment and correlated to Cormack & Lehane laryngoscopic grading during intubation. Grade 3 & 4 were considered difficult intubation.

Vani *et al.* [14] conducted a study on 50 patients whose preoperative airway assessment combined Mallampatti grade 3 & 4 and thyromental distance <6cm to Cormack & Lehane grading during intubation. Grade 3 & 4 were considered difficult intubation.

Conclusion

Mallampatti grades 3 & 4 were considered as predictors of difficult intubation. The sensitivity was 68.9%, specificity 99.6%, positive predictive value 95.3% and negative predictive value 96.8%.

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