

FREQUENCY OF DIFFICULT AND FAILED INTUBATION IN APPARENTLY NORMAL PATIENTS UNDERGOING ELECTIVE SURGERY

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ABSTRACT

Objective: To find the frequency of difficult and failed intubation in apparently normal patients undergoing elective surgery. We also aimed to look at sensitivity and specificity of Mallampatti classification in our population.

Study Design: Cross sectional study.

Place and Duration of Study: Combined Military Hospital, Rawalpindi and Multan from 1st May 2013 to 1st June 2013.

Patients and Methods: There were 467 patients, who underwent elective surgery with general anesthesia and endotracheal intubation. During their pre-anesthetic visit, we assessed the airway according to Mallampatti score. After endotracheal intubations, frequency of difficult intubations was evaluated (i.e. Grade III and Grade IV) with special emphasis on intubation done by consultant anaesthetist and post graduate trainees followed by frequency of failure of intubation and other complications during intubation were also noted. Furthermore, comparison of Mallampatti with Cormack & Lehane's classification of difficult intubation was done.

Results: Difficult intubation in these centers was 4.28% (20/467). Sensitivity of mallampatti was 98.2%. Incidence of failure of intubation was 0.42% in our study.

Conclusion: The frequency of difficult intubation is 4.28% whereas failure of intubation is very low (0.42%) and was observed in special cases only. In our study, the sensitivity of Mallampatti to Cormack & Lehane's classification of intubation was 98.2% which suggests that it is a sensitive predictor of difficult intubation but complete accuracy cannot be determined by using the Mallampatti score.

INTRODUCTION

Difficult endotracheal intubation under general anesthesia can cause intubation delay or failure, which can bring on fatal results¹. The American Society of Anesthesiologists (ASA) defines difficult endotracheal intubation as 3 attempts at endotracheal intubation when an average laryngoscope is used or when endotracheal intubation takes 10 min or more². Numerous investigators have attempted to predict difficult intubation by using a simple bedside physical examination³. Mallampatti classification introduced in 1985 is a currently well-known screening test that classifies visibility of oropharyngeal structures. The Mallampatti score may estimate the size of tongue relative to oral cavity and may possibly indicate whether displacement of the tongue by the laryngoscope blade is likely to be easy or

difficult. In addition, it assesses whether the mouth can be opened adequately to permit intubation^{4,5}. The purpose of this study was to evaluate difficulty of intubation in our set-up and likewise to find out the failed intubations and their relation to pre-anaesthetic assessment of Mallampatti score. Furthermore, a comparison to relate the incidence of difficult intubation with international centers is also done.

PATIENTS AND METHODS

This cross-sectional study was conducted at Combined Military Hospital, Rawalpindi and Multan from 1st May 2013 to 1st June 2013. Patients who were scheduled for elective surgery under general anesthesia of any age and both the gender were included in the study. Total of 467 patients were included in the study through non-probability convenience sampling. A performa was filled after compilation of airway management in the operating theatre. Variables recorded were age of patient, gender, date and time, type of surgery or procedure, presence/absence of oropharyngeal pathology,

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mallampatti score, type of muscle relaxant used, Cormack and Lehane's Grades of intubation, number of attempts of intubation, intubation done by consultant/trainee, oral/nasal intubation and any problem faced during intubating the patient. Intubation was confirmed on capnographic trace. Data had been analyzed using SPSS version 17. Descriptive statistics were used to describe the results i.e. mean and standard deviation (SD) for quantitative variables while frequency and percentage for qualitative variables. Sensitivity analysis was carried out for mallampatti score taking Cormack and Lehane's Grades of intubation as gold standard.

RESULTS

Total 467 patients were included in the study with average age of 30.68 ± 18.26 years. Majority of the patients (68%) were above 18 years of age. Two hundred and forty (51.3%) were male patients. Department-wise division of patients is given in fig-1. Majority (80.72) of the patients were of Mallampatti class I i.e. 377 (80.72%) followed by Class II score were 68 (14.56%), Class III score 15 (3.21%) and of Class IV score were 7 (1.50%). The oropharynx was observed by direct laryngoscopy by post graduate trainees or consultants and noted down as follows, Grade I Intubations were 380 (81.37%), Grade II intubations 67 (14.35%), Grade III intubations 18 (3.85%) and Grade IV intubations were 2 (0.42%) in number. Sensitivity of Mallampatti for predicting difficult intubation is 98.2%, specificity was 70%, PPV was 98.6%, NPV was 64% and accuracy was 97%. Area under the curve was 0.841 ($p < 0.001$) (Fig-2). The percentage of individuals with oropharyngeal pathologies was calculated as 8.99%. In few cases, complications were encountered which included damage to teeth in 1 (0.21%) case, Lip/tongue laceration 3 (0.64%) cases, failure to intubate in 2 (0.42%) cases.

From a sum total of 467 intubation data, in our study frequency of failure to intubate the patient was 0.43% (2 out of 467). The cases of failed intubation were thoroughly discussed in evening staff meetings and were confirmed as follows; in one case, the patient was a male of

age 4 months and presented to CMH-OT Rawalpindi for a procedure of Hypospadias. Mallampatti could not be done however after

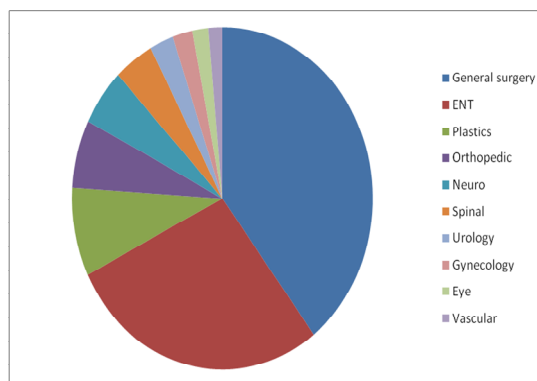


Figure-1: Department-wise division of patients (n = 467).

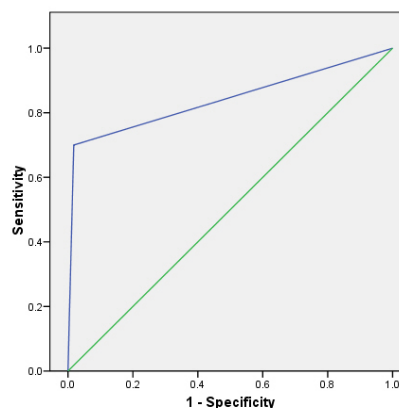


Figure-2: ROC curve of Mallampatti classification for difficult intubation.

induction and complete muscle relaxation, he was graded according to Cormack & Lehane's classification as a Grade 1 intubation by the consultant but after repeated attempts (more than 3), the consultant was unable to intubate the patient. The reason of failure was unknown at that time and a laryngeal mask airway of size 2.5 was used instead, for the procedure. At a later date, his airway was re-assessed with aid of fiber optic bronchoscope by ENT specialist and tracheal webbing was noted which resulted in failed intubation. In the second case, a male patient presented to OT-CMH Rawalpindi for direct laryngoscopy ± biopsy for hoarseness of voice. During his pre-anesthetic assessment he

was scored as Class 1. After complete protocol till muscle relaxation, laryngoscopy was performed for intubation of the patient and was graded as Cormack & Lehane's Grade 4 intubation. A laryngeal growth was seen and the patient could not be intubated, however direct laryngoscopy and biopsy of the lesion was done with intermittent face mask ventilation and propofol supplementation.

DISCUSSION

The incidence of failed intubations in a study conducted at Hokkaido University Hospital from January 2005 to December 2010 on 21,982 patients resulted in incidence of failed intubations as 0.3%⁶. According to Cormack & Lehane's classification of intubation, we have termed Grade III and Grade IV intubation as difficult intubations⁷. During our study the difficult intubations were reported as 4.28% of total intubations i.e. 20 out of 467 intubations in our set-up. In another study the incidence of difficult intubation on 1674 Turkish Patients on seven study sites undergoing elective surgeries was 4.8%⁸ and in another study conducted at Scandinavia in 1996 reported that difficult laryngoscopy or intubation varies from 1.5% to 13%⁹. In our study it was observed that Mallampati classification is a sensitive classification to predict difficult tracheal intubation. According to a study done in Thailand, the specificity of Mallampatti for predicting difficult intubation in 1888 patients was 95.5%¹⁰. However, in certain cases Mallampati classification did not correlate grade-to-grade with Cormack & Lehane grading on direct laryngoscopy.

In military hospitals of Pakistan, the usual method documented for assessing airway for intubation is the Mallampatti score whereas internationally several other criteria are also used. These include thyromental distance which measures distance from the thyroid notch to the end of the chin while the neck is fully extended¹¹. In a study, done in Thailand on 1888 patients, the specificity of thyromental distance was evaluated to be 96.1%¹⁰ whereas the combined specificity of Mallampatti with thyromental distance is evaluated 92.3%. Another assessment factor for endotracheal

intubation is Body Mass Index (BMI) evaluation, it has been studied that high BMI is a weak but statistically significant predictor of difficult intubation. In a Danish database on 91,332 patients, the sensitivity of predicting difficult intubation is 95%¹². Furthermore, inter-incisor gap is another contributing factor to airway assessment, a study in Thailand in year 2007 on 342 patients resulted in a specificity of 81%¹³.

Specificity of Mallampatti classification in international centers was 95.5% in 1888 patients in Thailand¹⁰, 82.4% in 1518 patients in Czech republic¹⁴, where as our study showed 70% specificity of Mallampatti score in predicting difficult intubation.

CONCLUSION

The frequency of difficult intubation is 4.28% whereas failure of intubation is very low (0.42%) and was observed in special cases only. In our study, the sensitivity of Mallampatti to Cormack & Lehane's classification of intubation was 98.2% which suggests that it is a sensitive predictor of difficult intubation but complete accuracy cannot be determined by using the Mallampatti score.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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