Original Article

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Comparative Study between Modified Mallampathi and Extended Mallampathi and Thytomental Distance in Predicting Difficult Intubation in Obese Individuals

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Abstract

Background: The modified Mallampati (MMP) classification is a standard method of oropharyngeal evaluation for predicting difficult laryngoscopy. Previous studies have demonstrated that the predictive value of the MMP is improved when thepatient's craniocervical junction is extended rather than neutral (Extended Mallampati Score, EMS). In the present study, we compared the predictive value of the MMP, EMS and thyromental score in the obese.

Methods: We performed a prospective study of adult patients with a Body Mass Index (BMI) 40 comparing the MMP and EMS. The performance of the MMP, EMS, and thyromental distance was compared forthe ability to predict difficult laryngoscopy, defined as a Cormack-Lehane grade of 3 or 4. Positioning and direct laryngoscopic techniques were not standardized.

Results: Hundred patients with a BMI >35 were evaluated withboth the MMP and EMS and received direct laryngoscopy. On average, craniocervical extension decreased the MMP class. Compared to the MMP, the EMS improved specificity and predictive value while maintaining sensitivity. Compared to the MMP and thyromental distance, an EMS class of 3 or 4 were statistically significant predictors of difficultlaryngoscopy in the obese. There was no difference in the incidence ofdifficult laryngoscopy or intubation in the obese compared to patientswith a BMI >35.

Conclusions: The EMS was Superior to the MMP in the Prediction of Difficult; Laryngoscopy in the Obese Population.

Keywords: Modified Mallampathi; Extended Mallampathi; Thyromental Distance; Cormac Lehane Grading; Obesity.

Introduction

The modified Mallampati (MMP) examination is astandard method of evaluating the airway for potentially difficult laryngoscopy [1-3]. As originally described, the MMP examination is performed with thepatient sitting upright, head neutral, tongue maximally protruded, and no phonation [3]. It has beendemonstrated that the predictive value of the examinationis dependent on the position of the cervicalspine:

Lewis et al. recommended that the MMP be performed with the patient sitting and with extension of the craniocervical junction [4].

Method

During the preanesthetic evaluation of the patient Anesthesia providers score adult patients using the standard MMP evaluation: sitting, head in neutral lposition, mouth open fully, tongue protruded maximally, no phonation and with the examiner eye toeye. The EMS is performed with the patient sitting, craniocervical junction extended, mouth openfully, tongue protruded maximally, no phonation, and the examiner eye-to-eye. MMP and EMS classification are scored as follows:

Class 1: Entire uvula clearly visible

Class 2: Upper half of uvula visible

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Class 3: Soft and hard palate clearly visible

Class 4: Only hard palate visible

Thyromental distance was measured along a straight line from the thyroid notch to the lower border of the mandibular mentum, with the head fully extended and the mouth closed [5].

Thyromental distance (T)

Grade 0: T _ 6.5 cm 0

Grade 1: T 5.5e6.4 cm 1

Grade 2: T < 5.5 cm

Informed written consent was obtained from all the participants. Hundred adultpatients aged 18 to 70 years, irrespective of sex, of the American Society of Anesthesiologists (ASA) physical status I or II, scheduled for elective surgeries under general were enrolled for the study. Patients with an obvious difficult airway (fractured mandible or cervical spine disorder, obstructive airway tumor, edentulous patients, mouth opening <3 cm etc.), or those who refused to participate, were excluded.

Results

Standard fasting guidelines were observed in all patients. Monitors for electrocardiogram (ECG) lead II and V, noninvasive blood pressure, heart rate and peripheral oxygen saturation were applied before induction. Following preoxygenation for 3 minutes, patient was premedicated with intravenous midazolam (0.02 mg/kg) and fentanyl (2 mg/kg) and induced with propofol. Muscle relaxant vecuronium bromide (0.1 mg/kg) was administered intravenously and ventilation continued for 3 minutes. Laryngoscopy was performed in sniffing position using a Macintosh laryngoscope and the best possible laryngoscopic view was obtained. Difficult laryngoscopy was defined as the view observed corresponding to Grade 3 or 4 of the Cormack and Lehane (CL) laryngoscopic view and attempts to intubation more than 2.

Table 1: Comaprison of difficult intubation between EMS,TMD and MMS

EMS	No. of pts	Difficulty	
1	23	E	20 (86.9%)
		D	3 (13.1%)
2	21	E	19 (90.5%)
		D	2 (09.5%)
3	6	E	2 (33.3%)
		D	4 (66.7%)
4	0	E	0
		D	0
TMD			
0	27	E	24 (88.8%)
		D	3 (11.2%)
1	18	E	14 (77.7%)
		D	4 (22.3%)
2	5	E	1(20.0%)
		D	4 (80.0%)
MMS			
1	21	E	20 (95.2%)
		D	1 (04.8%)
2	13	E	11(84.6%)
		D	2 (15.4%)
3	14	E	9 (64.2%)
		D	5 (35.8%)
4	2	E	0
		D	2 (100%)

EMS: Extended mallampathi score, TMD: Thyro mental distance, MMS: Modified mallampathi score, E: Easy intubation, D: Difficult intubation

Discussion

A major factor that has been considered to be related to the morbidity and mortality following

anesthesia isunexpected difficult intubation [6]. For this reason, itis necessary to investigate for a simple and accuratepredictive test. Increasedconsumption of oxygen and decreased functional residualcapacity in the morbidly obese population, accurate prediction of difficult laryngoscopy is especially important. The MMP examination has become astandard method of oropharyngeal evaluation, althoug has a single test it is thought to be of limited diagnostic value [7]. Indeed, there has been wide variationin the reported sensitivity and specificity of theMMP, as well as low positive predictive value. Thereare statistical reasons for such values. As Yentis hasnoted, positive predictive values will always be lowwhen the outcome of interest (such as difficult laryngoscopyor tracheal intubation) is relatively uncommon [8]. Other reasons for poor predictive value include anintrinsic lack of value to the test or poor execution of thetest.It has been established that the positive predictivevalue of the MMP is dependent on the position of thepatient. Lewis et al. studied 24 different sets of conditions in 213 patients, combining various body, head,and tongue positions [4]. They demonstrated that the position associated with the best positive predictivevalue of the MMP was the patient sitting, head extended, and tongue maximally protruded. This verywell designed study was not clinically realistic, however, as there were only two examiners for the patientsand laryngoscopic positioning and technique werestandardized. Mashour and Sandberg tested the EMSon the basis of these results, allowing multiple examinersand nonstandardized laryngoscopy [9]. In a studyof 60 patients, they found that performing the MMPwith the patient sitting and in craniocervicalextension improved the positive predictive value. This study was limited due to the relatively small number ofpatients and the detailed instructions given to theexaminers. Furthermore, since the examiners knew thehypothesis being tested and were the ones performing laryngoscopy, there was the potential for a Hawthorneeffect.

We demonstrate thatthe EMS is superior to the MMP in the prediction ofdifficult laryngoscopy in the morbidly obese population.The EMS predictions demonstrate better agreementwith Cormack-Lehane grades compared to the MMP (P _ 0.0001) obese patients. Our data show that EMS class 3 or 4 in the obese, compared to MMP and other standard methodsof airway evaluation is a better predictor of difficultlaryngoscopy Other commonly used bedsidetests, such as thyromental distance and mandibularprotrusion were not effective in predicting difficultlaryngoscopy in this study. Given the low sensitivityand predictive values of both Mallampati examinationswithin the morbidly obese population, furthertests need to be developed.

Our data agree with those of Brodsky et al. [10], in thatmorbid obesity is not an independent predictor ofdifficult direct laryngoscopy *per se* .

There are several limitations to our study. Therewas a heterogeneity of examiners and laryngoscopists, which creates the potential for inter-rater variability inthe evaluation of both oropharyngeal classifications.

Conclusion

In conclusion, we find that the EMS is a betterpredictor of difficult laryngoscopy than MMP in theobese population. The EMS is associated with loweroropharyngeal scores, improved specificity, and improved predictive value. This study, therefore, represents a validation of the EMS in obesepopulation in a routine perioperative setting.

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