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SCIENTIFIC ARTICLE

Comparison of different tests to determine difficult intubation in pediatric patients

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KEYWORDS Difficult intubation; Pediatrics; Predictive tests	 Abstract Background: The difficulties with airway management is the main reason for pediatric anesthesia-related morbidity and mortality. Objective: To assess the value of modified Mallampati test, Upper-Lip-Bite test, thyromental distance and the ratio of height to thyromental distance to predict difficult intubation in pediatric patients. Design: Prospective analysis. Measurements and results: Data were collected from 5 to 11 years old 250 pediatric patients requiring tracheal intubation. The Cormack and Lehane classification was used to evaluate difficult laryngoscopy. Sensitivity, specificity, positive predictive value and AUC values for each test were measured. Results: The sensitivity and specificity of modified Mallampati test were 76.92% and 95.54%, while those for ULBT were 69.23% and 97.32%. The optimal cutoff point for the ratio of height to thyromental distance and thyromental distance for predicting difficult laryngoscopy was 23.5 (sensitivity, 57.69%; specificity, 86.61%) and 5.5 cm (sensitivity, 61.54%; specificity, 99.11%). The modified Mallampati was the most sensitive of the tests. The ratio of height to thyromental distance was the least sensitive test. Conclusion: These results suggested that the modified Mallampati and Upper-Lip-Bite tests may be useful in pediatric patients for predicting difficult intubation. @ 2014 Sociedade Brasileira de Anestesiologia. Published by Elsevier Editora Ltda. Este é um artigo Open Access sob a licença de CC BY-NC-ND
PALAVRAS-CHAVE	Comparação de diferentes testes para determinar intubação difícil em pacientes
Intubação difícil;	pediátricos
Pediatria;	Resumo
Testes preditivos	Justificativa: As dificuldades no manejo das vias aéreas são a principal causa de morbidade e

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Objetivo: Avaliar o valor do teste modificado de Mallampati, teste da mordida do lábio superior, distância tireomentoniana e relação altura-distância tireomentoniana para prever intubação difícil em pacientes pediátricos.

Projeto: Análise prospectiva.

Mensurações e resultados: Dados coletados de 250 pacientes pediátricos, com idades entre 5 e 11 anos, submetidos à intubação traqueal. A classificação de Cormack e Lehane foi usada para avaliar laringoscopia difícil. Os valores de sensibilidade, especificidade, preditivo positivo e AUC para cada teste foram registrados.

Resultados: A sensibilidade e especificidade do teste modificado de Mallampati foram 76,92% e 95,54%, enquanto para o ULBT foram 69,23% e 97,32%. O ponto de corte ideal para a relação altura-distância tireomentoniana e distância tireomentoniana para prever laringoscopia difícil foi 23,5 (sensibilidade, 57,69%; especificidade, 86,61%) e 5,5 cm (sensibilidade, 61,54%; especificidade, 99,11%). O teste de Mallampati modificado foi o mais sensível dos testes. A relação entre altura-distância tireomentoniana foi o teste menos sensível.

Conclusão: Esses resultados sugerem que os testes de Mallampati modificado e da mordida do lábio superior podem ser úteis em pacientes pediátricos para a previsão de intubação difícil.

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Introduction

Difficulties with airway management in pediatric patients are a major reason for cardiac arrest, brain injury and death.¹⁻⁴ Thus preoperative evaluation of the difficult intubation is important.

Different predictive tests for difficult laryngoscopy were used in adult patients, ⁵⁻¹¹ but there was controversy about the usage of these tests in pediatric patients.

The modified Mallampati test (MMT) is a simple airway assessment method and is widely used.⁵ The upper lip bite test (ULBT) found by Khan et al.⁶ is another predictive test. The measurement of thyromental distance (TMD) remains widely used.⁷ The ratio of height to TMD (RHTMD)⁸ is another method for difficult airway prediction.

The goal of this study was to assess the value of different predictive tests for difficult laryngoscopy in pediatric patients.

Materials and methods

After obtaining Ethics Committee approval for the study, written informed consent was obtained from the parents of each child. Patients aged 5–11 years requiring endotracheal intubation were taken into the study. Patients with limitation of cervical movement or unable to open the mouth were not included in the study.

Preoperatively, the MMT, ULBT, TMD and RHTMD measurements were recorded by an anesthesiologist who was unaware about the study.

The MMT was classified as follows: Class I – soft palate, fauces, uvula, and pillars can be seen; Class II – soft palate, fauces, and uvula visualized; Class III – soft palate and base of uvula can be seen; and Class IV – soft palate not seen.⁵ Class III and IV are accepted as difficult intubation signs.

The ULBT was performed using the following criteria: Class I – lower incisors can bite the upper lip above the vermilion line, Class II – lower incisors can bite the upper lip below the vermilion line, and Class III – lower incisors cannot bite the upper lip. Classes I and II were accepted as easy intubation, and Class III was accepted as difficult intubation. 6,7,9

The TMD, described as the distance between the laryngeal prominence of the thyroid and the mental protuberance of the mandibula, was recorded. The RHTMD was then calculated.

Standard monitoring was used for each patient. Intravenous thiopental (3 mg/kg), fentanyl citrate (1 μ /kg) and atracurium (0.5 mg/kg) were used. Anesthesia was maintained with 2.0% sevoflurane and 1:1 O₂/N₂O at 2 L min⁻¹.

Anesthesiologists, blinded to the study, evaluated the airway by using the Cormack–Lehane classification.¹² Grades I (glottis fully exposed) and II (glottis partially exposed with anterior commissure not seen) were accepted as easy intubations. Grades III (only epiglottis seen) and IV (epiglottis not seen) were accepted as difficult intubations.

Statistical analysis

Results are expressed as mean \pm standard deviation or number. Area under the curve (AUC) of the receiver operating characteristic (ROC) curve was calculated. Cut-off points, sensitivity, specificity, and positive and negative predictive values were calculated. AUCs were compared by using z statistics. A p value <0.05 was considered as statistically significant.

Results

A total of 250 patients were taken into the study. Of these, 131 (52.4%) were male and 119 (47.6%) were female. The mean age of the patients was 9.34 ± 1.59 years, the mean weight was 33.40 ± 6.76 kg and the mean height of the patients was 134.42 ± 7.11 cm (Table 1).

In all, 220 patients had class I or II MMT while 30 patients had class III or IV MMT; 226 patients had class I or II ULBT

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