INTERNATIONAL SEVEN JOURNAL
OF HEALTH RESEARCH
ISSN: 2764-9415

Physiological changes and the Mallampati classification: Tracheal intubation complications

Modificações fisiológicas e a classificação de Mallampati: Intercorrências na intubação traqueal

DOI: 10.56238/isevjhv3n2-033
Receipt of originals: 06/04/2024
Publication acceptance: 04/26/2024

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ABSTRACT

Introduction: Difficulty in tracheal intubation is a significant factor for morbidity and mortality. Thus, Mallampati made it possible for it to be predicted in advance. Its classification is based on the visualization of pharyngeal structures and is a simple anesthetic evaluation. In practice, some circumstances may modify the Mallampati classification, generating greater complexity in intubation, and knowledge of these is of medical importance. Objectives: To review the literature on circumstances that alter the Mallampati classification. Methods: A review of the literature was conducted on possible physiological changes responsible for changes in the Mallampati classification. The terms "Mallampati modification" and "Mallampati score" associated with "anaphylaxis" and "labor" were searched in the Medline, Scielo and CRD databases and the articles were submitted to critical analysis. Results: Anaphylaxis is one of the interferences in the Mallampati score, which results in upper airway edema, affecting the classification. In addition, pregnancy and labor can influence the score. Some factors such as breast growth, weight gain and pharyngeal edema increase the rate in pregnant women. In addition, there is airway edema, explained by exertion and increased venous pressure in the upper body. In addition, fluid overload and the antidiuretic effect of oxytocin cause changes in the airways. Another situation is that of pediatric patients, where 13% of respiratory problems in anesthesia are related to difficulty in intubation. In children between 4 and 8 years of age without malformations, the index was applicable. However, it is impossible to perform it in those under 4 years of age. Conclusions: The Mallampati score complements the judgment of a general examination that includes anamnesis and physical inspection of the craniofacial structure to identify risk factors, taking into account other situations that may interfere with the classification. Therefore, an understanding of the limitations is necessary for its correct application.

Keywords: Mallampati, Orotracheal intubation, Modifications.

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INTRODUCTION

Difficulty in tracheal intubation is a significant factor for morbidity and mortality in clinical practice (1). For this reason, Mallampati and his colleagues validated the possibility that a tracheal intubation could be predicted before the operation (2,3).

The Mallampati classification is based on the visualization of the pharyngeal structures for a close estimate of the size of the tongue in relation to the oral cavity (3) and, even though its exclusive use has a limited capacity to discriminate against difficult tracheal intubation (4), it is a simple and reliable anesthetic evaluation when performed correctly.

In clinical practice, some situations may modify the Mallampati classification, which may generate greater complexity in tracheal intubation, and knowledge of these circumstances is of great medical importance.

OBJECTIVES

To review the literature on evidence of certain circumstances that lead to changes in the Mallampati classification.

METHODS

A review of the literature was conducted on the possible physiological changes responsible for changes in the Mallampati classification. The following terms were searched in the Medline, Scielo and CRD databases: "Mallampati score AND sleep apnea", "Mallampati score AND anaphylaxis", "Mallampati score AND labor" and 'Mallampati modification' and the retrieved articles were submitted to critical analysis.

DISCUSSION

We reviewed the literature regarding the accuracy, reliability, and feasibility of the Mallampati score, outlining the evidence that may be pertinent and applicable to emergency airway management and procedural sedation. In each of these areas, important challenges and limitations were identified for the Mallampati score(17), such as:

Anafilaxia

Anaphylaxis is a serious, generalized or systemic allergic or hypersensitivity reaction that can be fatal. This reaction is the result of the release of mediators from mast cells and

basophils, which result in symptoms that mainly affect the cutaneous tracts and the respiratory and vascular systems(6).

As a consequence, one of the main results of anaphylactic reaction in relation to the respiratory system is acute upper airway edema, which can consequently affect the Mallampati score. According to studies carried out in 1980, this would be the majority cause of death of patients, since when it affects the larynx and epiglottis, it results in bronchial obstruction and pulmonary hyperinflation (5).

This research evaluated the response to treatment of an anaphylactic reaction to insect bites in 22 patients. In the end, 3 individuals developed hypotension and progressed to anaphylactic shock, with acute upper airway edema present in 2 of them. As a result, the specific airflow presented limitations and is related to the high blood levels of histamine (present in about 60% of the study population).

Histamine is a mediator released by mast cells and basophils capable of inducing bronchoconstriction, airway obstruction, headache, and other hemodynamic changes such as tachycardia. This is mainly mediated by H1 receptors. Thus, histamine is responsible for several complications resulting from anaphylactic shock, including the involvement of the upper respiratory tract demonstrated by the presence of rhinorrhea, sneezing and, more fatally, angioedema (5,6).

It is necessary, therefore, that the management and preservation of the airway is a priority, since it hinders the normal flow of oxygen. Thus, endotracheal intubation is the most appropriate procedure in a characteristic condition with the symptoms mentioned. However, the symptomatology is capable of causing physiological and anatomical changes, thus making it difficult to perform the technique(7,8).

PREGNANCY AND LABOR

During the pregnancy period, some factors, such as breast growth, can influence the difficulty of intubation. However, it is pharyngeal edema that is the main factor responsible for increasing the Mallampati classification in pregnant women and the greater difficulty in tracheal intubation in this population – the failure rate in this procedure is about eight times higher than in other cases. In addition, pregnant women with class 3 airways are 7.58 times more likely to have intubation-related complications than those with class 1 airways. However, the number may increase to 11.3 times when referring to those in class 4 (9).

One photographed study concluded that Mallampati's rating is often increased between the period of 12 to 38 weeks of pregnancy. According to data, the number of pregnant women with class IV Mallampati increased by approximately 34% during this period. A correlation of the score with weight gain during pregnancy was also observed.

In addition, the literature also presents case reports compatible with the statement that the Mallampati class is altered during pregnancy and during labor and delivery periods (10, 12). The above is mainly due to the involvement of the airways by edema, which can be partly explained by the repeated efforts and movements that involve the natural environment. However, other typical events of the pregnancy interval are also capable of generating changes in the airways, such as fluid overload and the antidiuretic effect of the hormone oxytocin (9). The edema can be explained due to the increased venous pressure in the upper part of the body, which is responsible for the osmotic imbalance of the tissues. In this way, the previously mentioned events are capable of occurring (12).

Some anatomical variations have also been observed in pregnant women as hindering intubation (18). Among them are the condition of obesity, the absence of maxillary incisors, and the presence of a shorter neck, as well as facial edema.

PAEDIATRIC PATIENT

The literature demonstrates the importance of predicting difficulty in difficult intubation, and in anesthesia in children, 13% of respiratory problems are related to difficulty in tracheal intubation. (13) In addition, studies on the airway and difficult intubation treat only patients with congenital malformations or those with airway disorders. (14)

In the literature analysis, it was found that, in children between 4 and 8 years old without anatomical malformations and/or genetic syndromes, the Mallampati index was applicable. Children aged between 4 and 8 years were selected because, in this age group, the degree of cognitive development is sufficient to perform predictive tests of difficult intubation and the anatomical pattern presents characteristics different from those of adults. In addition, in the age group of 8 to 10 years, the anatomical structures become very similar to those of adults. (15)

However, it is important to emphasize the age range used in most literatures, from 0 to 16 years, because they could not use the Mallampati index in all children, due to the simple impossibility of its performance in children under 4 years of age. (16)

FINAL THOUGHTS

The Mallampati score is intended to complement, but not replace, the initial clinical judgment of an overall multidimensional examination that includes a history and physical inspection of the craniofacial structure to identify risk factors such as short neck, obesity, obstructive sleep apnea, long maxillary incisors or overbite, restricted mouth opening, micrognathia, macroglossia, laryngomalacia, tonsillar hypertrophy, airway edema, blood or vomiting in the airway, cervical immobility, and facial or cervical trauma. In addition, as demonstrated, there are several factors that make it difficult to carry it out. Therefore, a complete understanding of its limitations and challenges is necessary for its correct application.

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