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Guidelines and consensus

Algorithm for difficult airway management in pediatrics☆

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ABSTRACT

Objective: To describe a series of activities structured for managing the difficult airway in pediatrics and to suggest an algorithm adapted to the individual child's conditions.
Materials and methods: Case review of medical literature databases (PubMed, BIREME and MD consult); the search was based on the following keywords: algorithm, difficult airway, children and pediatrics in articles published during the last 10 years, including topic reviews, systematic reviews or algorithms. The principal authors who reviewed the articles were reviewed.

The algorithm design is based on an informal consensus of pediatric anesthesiologists and on the review of all the published literature, in accordance with the availability of resources and the experience in our environment.
Results: The result is a proposal for a simple algorithm including sequential one-way steps for managing the difficult airway in pediatrics. Particular emphasis is placed on situations such as a suspicious airway and a suggestion is made about the equipment and devices required to follow the algorithm. These equipment and devices may be adapted to the particular circumstances of the institution.
Conclusion: This review summarizes the management of the difficult airway in pediatrics and is the first proposal ever submitted in Latin America.

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Algoritmo para el manejo de la vía aérea difícil en pediatría

Palabras clave:
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RESUMEN

Objetivo: Describir una serie de actividades estructuradas para el manejo de la vía aérea difícil en pediatría y sugerir un algoritmo que se adapte a las condiciones de cada niño.
Materiales y métodos: Revisión de las bases de datos de la literatura médica (PubMed, Biremey MD Consult) con una búsqueda con las palabras clave: algoritmo, vía aérea difícil, niños y pediatría, de artículos publicados en los últimos 10 años y que fueran revisión de tema, revisión sistemática o algoritmos. Los artículos fueron revisados por los autores principales. El diseño del algoritmo está basado en un consenso informal de anestesiólogos pediátricos y en la revisión de la literatura publicada, adaptado a la disponibilidad de los recursos y a la experiencia en nuestro medio.
Resultados: Como resultado presentamos una propuesta de un algoritmo sencillo, con pasos secuenciales y en un solo sentido para el manejo de la vía aérea difícil en pediatría. Se hace un énfasis especial en situaciones como la vía aérea sospechosa y se presenta una sugerencia de los equipos y dispositivos necesarios para aplicar el algoritmo, los cuales pueden ser adaptados en cada institución.
Conclusión: Esta revisión sintetiza el manejo de la vía aérea difícil en pediatría y es la primera propuesta realizada en Latinoamérica.

Introduction

Perioperative airway problems in children continue to cause considerable perioperative morbidity and mortality.[1] Oxygen desaturation below 80% and secondary hypoxia have been recently reported as the most frequent complications in the pediatric population and are age-dependent. Neonates and children under one year are the highest risk patients.[2] Additionally, children have higher oxygen consumption and this results in a very poor tolerance to apnea (just a few seconds) and they usually develop significant hypoxemia leading to severe bradycardia.[3,4] Airway problems do not present only in high-risk patients, since healthy patients with no predictors of difficult airway may also develop complications if managed by unskilled practitioners in situations where children are seldom treated and the adequate resources for each age group are not available.

Pediatric airway problems require an algorithm with simple strategies adapted to the local policies of the individual institution. This review provides a general overview of the difficult airway, its classification in children, a few suggestions about the minimum equipment requirements and an overview of the various procedures that may be followed when faced with an unexpected difficult airway, in order to avoid serious complications and side effects from hypoxia.

Methodology

The data bases consulted for literature related to the algorithms published on the management of pediatric airway were PubMed, BIREME and MD consult. The keywords used were algorithm, difficult airway, children and pediatrics. The publications reviewing the topic, systematic reviews or algorithms for airway management in the last 10 years either in English or Spanish, were selected. The two principal authors revised the articles. The design of the algorithm is based on an informal consensus of pediatric anesthesiologists from two children hospitals (Rooselvelt Institute of Pediatric Orthopedics in Colombia and Royal Aberdeen Children's hospital in the UK) for managing the difficult airway in children and adapted to the availability, experience and usefulness of the devices available in our environment.

Results

The literature identified on the algorithm of the difficult airway in children is quite limited. One of the findings was a publication in the Spanish Journal of Anesthesiology and Resuscitation and some articles providing practical management guidelines based on local experts consensus from pediatric institutions (Table 1). We then believe that the algorithm proposed is a novel and valuable contribution to medical literature, in addition to providing simple and friendly orientation on a problem frequently seen in pediatric anesthesia.

The difficult pediatric airway

The routine management of the difficult airway is usually easy in experienced hands. The problems with tracheal intubation are more common in children under one year of age, with an estimated incidence of 0.6%; this incidence drops to 0.1% in children of pre-school age and to 0.05% in children older than 8 years of age. Difficulties in facemask ventilation in a healthy child with normal anatomy are extremely rare.[5] This is an