

The Laryngeal Mask Airway in Pediatric Anesthesia



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Received:  July 20, 2018; Published:  July 26, 2018

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Abbreviations: LMA-Laryngeal Airway Mask; SV-Spontaneous Ventilation; PSV- Pressure Support Ventilation; PCV-Pressure-Controlled Ventilation

Introduction

Since the reports that the laryngeal airway mask (LMA) could be used safely and effectively in pediatric anaesthesia in 1990s [1,2], LMA are currently recommended for use in a variety of challenging scenarios, such as in the difficult airway, remote locations, ventilation during resuscitation, long-duration surgeries, in children with recent upper respiratory infection, even in laparoscopic surgery and prone position procedures. In the past years, there are many randomized trials carried out in pediatric group among various clinical scenarios. This mini-review aims to present the current literatures on the usage of the laryngeal airway mask in children.

Size of the Laryngeal Mask Airway

The successful use of the laryngeal mask airway in children depends partly on the correct selection of size [3]. The appropriate size of the laryngeal mask airway in children is usually determined by the pediatric's body weight. In addition, there are several alternative methods to predict the size of the laryngeal mask airway. Gallart L et al. [4] proposed a new method that the size of the laryngeal mask airway was determined by the combined widths of the patient's index, middle and ring fingers. They compared the results with the standard method recommended by the manufacturer's weight-related guidelines and found an "excellent agreement" between both methods. The literature proposed that this new approach is of valid and practical use in children. Zahoor A et al. [5] chose the size of the laryngeal mask airway in children according to the size of the external ear that was associated with a success rate of 93%.

That simple method might allow a rapid choice of the correct size of laryngeal mask airway and eliminate the need to remember different tables or formulae. However, in over- or underweight children, Kim HJ et al. [6] found that laryngeal mask airway size according to the manufacturer's weight-based recommendation is to be preferred in overweight children, but laryngeal mask airway size by an ideal weight estimated from the pediatric patient's age is a better choice in underweight children.

Insertion Techniques

A relatively large tongue, a higher and more anterior larynx with a relatively large floppy epiglottis and frequent presence of tonsillar hypertrophy may make correct placement of LMA more difficult in pediatric patients. Hence, the insertion of the LMA by the standard technique is not always easy. Alternative techniques such as rotational, cuff partially inflated and lateral approaches have been used to improve the ease and success of LMA [7] insertion in children. Ghai B et al. [8] compared the success and ease of insertion of three techniques of laryngeal mask airway: the standard Brain technique, a lateral technique with cuff partially inflated and a rotational technique with cuff partially inflated. A rotational technique with partially inflated cuff is associated with the highest success rate of insertion and lowest incidence of complications and could be the technique of first choice for LMA insertion in pediatric patients.

Ventilation Modalities

In clinical situations, there may be different strategies for ventilating children during surgical procedures. Templeton TW et al. [9,10] compared 3 different ventilation modalities (spontaneous ventilation (SV), pressure support ventilation (PSV), and pressure-controlled ventilation (PCV)) in pediatric patients with a ProSeal laryngeal mask airway. They found that all 3 modes of ventilation using a PLMA were safely used, PSV and PCV were more appropriate ventilation strategies to more optimally control ET/CO₂ over time.

Removal of the Laryngeal Mask Airway

Anesthesiologists have been debating on when and how to remove the laryngeal mask airway in children for a long time. Kitching AJ et al. [11] advocated that removal of the laryngeal mask airway during deep anaesthesia reduced coughing in the immediate postoperative period for older infants and young children. Thomas-Kattappurathu G et al. [12] suggested that lateral positioning of children for removal of the LMA provided the safest conditions if the LMA is to be removed at a deep plane of anaesthesia for children more than 1 year old.

Compare with Endotracheal Tube

The laryngeal mask airway and endotracheal tube are the classic tools to management the airway of children receiving general anesthesia. The endotracheal tube carries more risk of trauma to the airway while the laryngeal mask airway is criticized because it cannot wholly protect against aspiration. Patki A [13] compared LMA with endotracheal tube in pediatric airway management. The literature indicated that the LMA was seen to have three advantages over the tracheal tube: lower incidence of cough during emergence, lower postoperative sore throat and lower postoperative vomiting. The LMA provides lesser perioperative airway complications, in comparison to the conventional tracheal tube. In infants (aged 0-12 months) undergoing minor elective procedures [14], greater rates of overall PRAE were found in endotracheal tube group than LMAs group. The risk of PRAE was tripled in endotracheal tube group. Laryngospasm and bronchospasm (major PRAE) occurred approximately five times in endotracheal tube group. However, comparisons among different LMA types, different patient's conditions and different surgical procedures might be explored.

Conclusion

Overall, the availability of smaller sizes of laryngeal mask airway has brought a significant change in the whole approach to airway management in children. The results of several surveys among pediatric anesthetists indicates that the laryngeal airway mask is frequently the airway device of choice in routine practice and difficult airways in children [15,16,17]. However, the risk of pulmonary aspiration, lingual edema, and nerve damage caused by the laryngeal airway mask must be concerned. Further research may bring in more insight into the safely usage of the laryngeal airway mask.

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ISSN: 2574-1241

DOI: 10.26717/BJSTR.2018.07.001480

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