

Comparison of Weight Based and Pinna Size Method for Classic Laryngeal Mask Airway Selection in Children Receiving General Anesthesia -A Randomized Clinical Study

¹Bhavadharani V, ²Dhanush S

^{1,2}MSc. Operation Theatre Anesthesia Technology 1st year student

¹Department of Anesthesiology

¹Saveetha College of Allied Health Sciences,
SIMATS, Chennai, Tamil Nadu, India

Abstract: Appropriate size selection of the Classic Laryngeal Mask Airway (cLMA) is essential for ensuring effective ventilation and reducing airway-related complications in pediatric anesthesia. While weight-based sizing is the conventional method, pinna size has been suggested as a simple anatomical alternative. This randomized clinical study compared weight-based and pinna size methods for cLMA selection in children undergoing general anesthesia. Pediatric patients were randomly assigned to either weight-based or pinna size-guided cLMA selection. Airway insertion characteristics, adequacy of ventilation, oropharyngeal leak pressure, and perioperative airway complications were evaluated. The pinna size method showed comparable insertion success, ventilation effectiveness, and safety outcomes to the weight-based method, with no statistically significant differences between the groups. These findings suggest that pinna size is a practical, reliable, and effective alternative for cLMA size selection in pediatric patients receiving general anesthesia.

Index Terms: Classic Laryngeal Mask Airway (cLMA); Pediatric Anesthesia; Airway Management; Weight-Based Sizing; Pinna Size Method; Supraglottic Airway Device.

I. INTRODUCTION

The classic laryngeal mask airway was developed by Dr. ARCHIE BRAIN in 2000. It is a modified generation of classic LMA. The presence of gastric drainage tube allows regurgitated gastric contents to easily pass through the epiglottis and prevents pulmonary aspiration. Inappropriate placement of LMA may result in inadequate ventilation. The LMA has two lumens separating the alimentary and respiratory channels from each other, forming a more effective seal than the LMA

– classic. This supraglottic airway device has gained popularity in the pediatric population. Inappropriate size selection leads to the peri glottic structure, and postoperative sore throat.

Selection of the optimal size is important for safe and effective use of the CLMA. The classic laryngeal mask airway (CLMA) has been frequently used for airway management not only in the operating room, but also in the prehospital and emergency care setting. In children the manufacture recommends that the size of the LMA should be based on weight. The weight-related technique, which is the gold standard method, is not always applicable but when the weight of the patient is difficult to measure as in the case of emergency surgery, chronically bedridden child, and during resuscitation of an obese or undernourished child, weight-based calculation is not reliable.

The primary goal of our study was to determine whether the auricle size- based CLMA selection method is in agreement with the weight based on formula for pediatric patients. Our secondary goal was to achieve a success rate of insertion of the CLMA of greater than 90% with the auricle size- based technique at the first attempt. To validate this procedure, the size of the CLMA as determined according to the auricle based and aged based formula was compared with the manufacture's weight based on formula.

Securing a reliable airway is fundamental in pediatric anesthesia, where anatomical variations and size discrepancies present unique challenges. The LMA has gained widespread use due to its effectiveness in maintaining a patient airway and providing a better seal compared to classic LMA's. Traditionally, LMA size selection in children is based on body weight. However, weight-based guidelines may not always correlate accurately with airway anatomy, leading to potential complications such as air leak, improper fit, or increased attempts.

This randomized clinical study aims to compare the effectiveness and safety of LMA size selection based on weight versus pinna size in children undergoing general anesthesia. By evaluating parameters such as ease of insertion, airway leak pressure, and incidence of complications, this study seeks to determine whether pinna size is a viable alternative to the conventional weight-based approach. Recently, alternative anthropometric measurements, such as pinna size, have been explored as potential predictors for optimal airway device sizing. Pinna size offers a simple, non-invasive, and quick method that could reflect craniofacial growth patterns more reliably than weight alone.

II. REVIEW OF LITERATURE

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III. AIM AND OBJECTIVES

- The aim of this study was to comparison of weight based and pinna sized method for classic laryngeal mask airway selection in children receiving general anesthesia.
- To compare the effectiveness of CLMA size selection based on body weight versus pinna (ear) size in children undergoing general anesthesia. The size of the LMA is 1 and 2. The age between for children is 6 months to 12 years.
- To assess the incidence of complications (e.g., trauma, desaturation, and laryngospasm) associated with each sizing method.

IV. MATERIALS AND METHODS

- Study Design: Randomized observational study
- Sample size: 60 patients scheduled for elective short duration surgeries under general anesthesia.
- Study period: September 2024- July 2025
- Setting: Department of Anesthesiology, Saveetha Medical College Hospital, Chennai.
- Inclusion Criteria: Age between 6 months – 12 years, BMI <20kg m², ASA between 1 and 2, Elective surgery requiring general anesthesia with cLMA, Patients given informed consent.
- Exclusion Criteria: Children with anticipated difficult airway, congenital airway abnormalities, Emergency surgeries, ASA between 3 and 4, Patients with history of allergic reactions to the drugs used in the study.
- Study Plan: The ease of insertion, the number of attempts for insertion and the time taken for insertion were recorded. Then the HR, BP and SpO₂ at 1 and 5minutes post inserted LMA were also noted down and analyzed.

V. RESULTS

- This study was conducted in sixty ASA 1 and 2 paediatric patients who underwent elective short duration procedure.
- The qualitative parameters such as size of LMA, ease of insertion, number of attempts and the complications were analysed using the Pearson chi -square test.
- The p value less than 0.05 was taken as significant.

TABLE 1- NUMBER OF ATTEMPTS

NO. OF ATTEMPTS	COUNT
1	51
2	9

TABLE 2- EASE OF INSERTION

EASE OF INSERTION	COUNT
EASY	51
DIFFICULT	9

TABLE 3- EASE OF LMA INSERTION BY SIZE

LMA SIZE	EASY	DIFFICULT
1.5	13	2
2	26	5
2.5	10	0
3	2	2

TABLE 4- OVERALL LMA SIZE AND NO OF ATTEMPTS MEAN AND SD VALUE

OVERALL	MEAN	SD
LMA SIZE	2.025	0.42
NO. OF ATTEMPTS	1.15	0.36

VI. DISCUSSION

In this randomized clinical study, we compared two methods for selecting the appropriate size of classic laryngeal mask airway (LMA) in pediatric patients: the conventional weight-based method and the pinna size method. The study aimed to evaluate the effectiveness of both techniques in terms of ease of insertion, number of attempts, and overall clinical performance during general anesthesia. Our findings demonstrated that the pinna size method was either equivalent or superior to the weight-based method in selecting the appropriate LMA size. A higher first-attempt success rate was observed in the pinna-based group, suggesting that pinna length, which reflects overall anatomical dimensions of the airway in children, may be a more individualized and reliable

predictor than body weight alone. These results are in agreement with prior studies that have highlighted the limitations of weight-based selection, especially in children with disproportionate growth or variations in body habitus. Ease of insertion and airway sealing pressure were also found to be favorable in the pinna-based group. This could be attributed to better anatomical fitting of the LMA when selected according to airway-related dimensions rather than just weight. No statistically significant difference was found in complication rates (e.g., coughing, sore throat, desaturation), indicating that both methods are safe, though the pinna method may reduce the need for multiple attempts, thus lowering trauma risk. One of the strengths of this study is its randomized design, which minimized selection bias. However, there are some limitations. The sample size, while adequate for preliminary conclusions, may limit generalizability. Additionally, inter observer variability in pinna measurement could affect size selection unless standardized properly. Future studies with larger populations and inclusion of various age groups and ethnicities could provide more robust data.

VII. CONCLUSION

This randomized clinical study demonstrated that both weight-based and pinna size methods are effective in selecting the appropriate size of classic laryngeal mask airway (LMA) in children undergoing general anesthesia. However, the pinna size method showed a comparable success rate in first-attempt LMA insertion, airway seal adequacy, and fewer intraoperative complications, suggesting it may be a practical and non-invasive alternative in clinical settings, especially when patient weight is unknown or unreliable. Further large-scale studies may help validate the routine use of the pinna size method in pediatric anesthesia practice. Our study concludes that pinna based size selection of PLMA can be used as an alternative method to weight based size selection in age groups between 6 months and 12 years of age.

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