

COMPARING TWO METHODS OF LMA INSERTION;
CLASSIC VERSUS SIMPLIFIED (AIRWAY)

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Abstract

Background: The aim of this study is to compare two methods of LMA insertion, "classic" versus "simplified" (AIRWAY), due to factors such as: time to insertion, number of attempts, blood stained LMA, air leak around LMA, and gastric inflation. The word "AIRWAY" refers to the similarity of this method to oropharyngeal airway insertion.

Method: One hundred ASA class I and II patients elected for lower limb orthopedic surgery but without any head and face injury or head and neck abnormality, having their tooth intact, were selected and divided to two groups of fifty; classic and simplified.

In the classic group, the index finger used as a guide, pushes the back of LMA towards the hard palate, inserting it into the pharynx till a resistance is felt and the LMA is then fixed in its place.

In the AIRWAY group, the deflated LMA is entered into the mouth in a 180 degree inside-out position compared to the classic method without using fingers and is proceeded until it enters the pharynx (sudden loss of resistance) and then returned 180 degree back to its normal position to be fixed in the right place. The attempt numbers, time to insertion, complications such as laryngospasm, blood stained LMA and gastric inflation is being investigated.

Result: Demographic data such as age, sex and ASA class, demonstrate no meaningful statistical difference between the two groups.

Successful first attempt in AIRWAY group (86%) had no meaningful statistical difference with the classic group (80%) ($p > 0.05$). The overall success rate in LMA insertion (within two attempts) was 100% and 82% in AIRWAY and classic groups respectively ($p > 0.05$) and 11 patients with failed insertion attempts, were excluded from the study. The time for successful insertion was meaningfully less in the AIRWAY group compared to the classic one ($p < 0.0001$). In the classic group 32% of LMAs became blood stained compared to 16% in the AIRWAY group, which the difference was not meaningful. No other complications such as laryngospasm or oxygen desaturation occurred.

Conclusion: Comparison of the whole advantages and disadvantages of both groups, mention that, by putting the LMA insertion time together with the low complication rates, the AIRWAY method can be assumed as a preferred simplified method with few complications for inserting LMA.

Keyword: LMA, Facilitated method insertion, Airway management

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Introduction

LMA has changed to a common alternative way in airway management. This instrument has been used more successfully by inexperienced staff and has given an appropriate way in managing the airway both in controlled and spontaneous breathing methods.

Considering the problems of a successful airway management which occurs frequently in unauthorized people (e.g.: residents, health care centers staff) in ERs and trauma centers, LMA works as a supraglottic airway manager which is placed close to the larynx to let spontaneous or controlled ventilations with airway pressures less than 15 mmHg be applied⁵ even in prone and lateral positions^{1,2,3,4,6}.

There are several methods of inserting LMA none of them considered to be the definite one^{2,3}, but all tend to decrease the complications^{7,8,9,10,11}.

One of these methods is the classic one, with LMA inflated a little and another method used in paralyzed patients is the triple airway maneuver with the patient's mouth opened, head extended and forward mandibular pressure¹².

In the standard method of inserting LMA usually the cuff is empty and the first attempt success rate is 67^{2,3,11}%90-. A little inflation of the cuff is useful in LMA passing posterior pharyngeal arch and eases the insertion resulting a higher success rate. Here the instrument is positioned midline and while having direct contact with patient's mouth and tongue is preceded forward into the pharyngeal space via some help from operator's hand in contact with the esophagus touching it with LMA's tip^{2,3,4,7,8}.

In this study we inserted the LMA with a new approach which is similar to the way an oral airway is inserted and thus is named the AIRWAY method. This method was first practiced as a pilot on 20 cases and demonstrated itself as an easier method with less complications besides not having those problems such as hand entrance into patient's mouth and contact with patient's tooth which can be harmful^{13,14}.

Patients and Methods

In this study which was performed on the first 6 months of 1386 in Pursina educational hospital, one hundred ASA class I and II parents candidate for limb

orthopedic surgery but without any head and facial injury or head and neck abnormality, having their tooth intact, were selected and divided into two groups of fifty; classic and simplified (airway).

Informed consent was achieved from the patients and any patient having any contraindications for LMA insertion was excluded. Insertions were performed randomly by anesthesiologists with at least 100 successful LMA insertions.

Two groups of 50; named AIRWAY (facilitated) and CLASSIC were studied. In the classic method, the index finger is used as a guide which by pushing the back of LMA towards the hard palate, slides it into the pharynx up to the point of feeling a resistance. The LMA cuff is then filled with an appropriate volume of air and then fixed in place.

In the airway method the LMA without being primarily filled with air, is turned in a 180 degree inside-out position compared to the classic position and is inserted into the patient's mouth without contacting the anesthesiologist's hand till there is a sudden loss of resistance due to pharyngeal entrance, and then is returned 180 degree to the normal position and inserted in the pharynx (Figure 1-6).

Induction of anesthesia was done with fentanyl (12- μ g/kg), TPN (46-mg/kg), Succinylcholine (0.5mg/kg). Maintenance was with Halothane and O₂/N₂O (50%/50%) while the patient breathing spontaneously.

All patients received ECG, SpO₂ & ETCO₂ monitoring while airway management efficacy was supervised by bilateral auscultation, chest wall movement and no resistance in inspiration and expiration and finally confirmed by ETCO₂.

Insertion ease was considered as the time needed for LMA insertion from the beginning to ventilation confirmation.

The number of insertion efforts and complications such as laryngospasm, blood-stained LMA and abdominal distention was also evaluated. Epigastric area auscultation during manual ventilation was done and if insertion failed it was repeated by giving repeated doses of TPN and after the third failure, alternative methods were used for airway management.

Airway efficiency and patency and LMA position was checked by a resident who didn't know anything



Figure 1
The patient candidate for LMA insertion

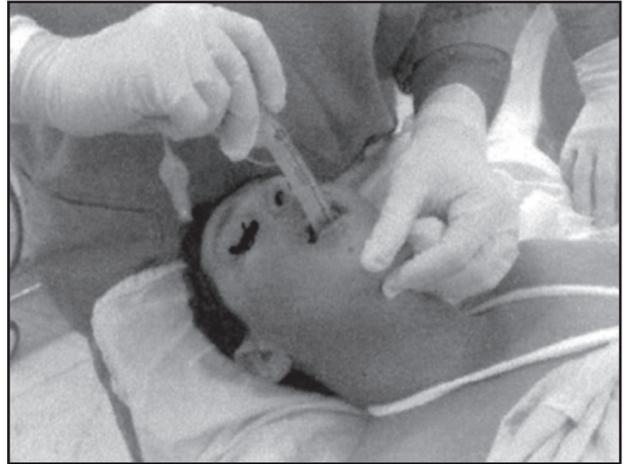


Figure 4
LMA direction to pharynx

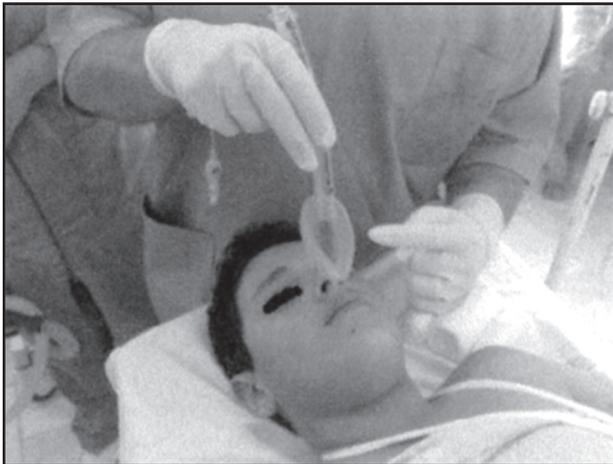


Figure 2
Without hand contact



Figure 5
The 180° rotation of LMA



Figure 3
LMA insertion as airway method



Figure 6
Total insertion of LMA

about the patient's group and air leak was detected by giving 20 CmH₂O pressure and divided into grade 1: no leak; grade 2: palpable leak; grade 3: just palpable leak with appropriate ventilation; grade 4: audible leak with inappropriate ventilation and grade 5: complete obstruction with no ventilation.

Because the airway method compared to the classic method increases the first attempt success rate from 70% to 95% so with $\alpha = 0.05$ and power of 90%, the number of patients in each group was calculated as 50.

The data collected was analyzed by SPSSver 10 and compared in two groups with unpaired T-Test or MANWITHNYU by case. Again Chi-square test was used to analyze numerical data and $p < 0.05$ was considered as meaningful.

Results

One hundred patients entering in two groups of 50, the classic group contained 36 male and 14 female and the airway group 41 and 9 respectively with no meaningful difference. Demographic data such as

age, weight, and ASA class had also no difference (Table 1).

In the classic group 90% of patients had LMA number 4 and 10% number 3 and in the airway group 86% and 14% respectively, which showed no meaningful difference.

Successful first attempt insertion rate in airway group was 86% compared to classic group as 80% with no meaningful difference ($p > 0.05$).

Eleven patients were excluded from the study because of unsuccessful insertion. The successful insertion time was meaningfully shorter in airway group than classic ($p < 0.0001$).

Blood stained LMA rate was 32% in classic and 16% in airway group with no meaningful difference. No laryngospasm or SpO₂ decrease occurred. Gastric distention from positive pressure ventilation was meaningfully more in classic than airway group. Air leak was 76% in grades 1 and 2 and 24% in grade 3 of the classic group compared to 88% and 12% in airway group respectively with no meaningful difference ($p > 0.05$).

Table 1
Demographic, monitoring and Parameters complication data

parameter	Classic group N = 50	Airway group N = 50	P value
Age (years) (mean \pm SD)	30 \pm 9.4	32 \pm 7.9	ns
Weight (kg) (mean \pm SD)	68 \pm 9.6	10.7 \pm 70	ns
sex m/f	36/14	41/9	ns
Use of facilitative method	-----	-----	
Thiopental Na(mg)	372 \pm 51	363 \pm 33	ns
size LMA			ns
4	90%(45)	86%(43)	
3	10%(5)	14%(&)	
No .Of attempt) n(ns
1	80%(40)	86%(43)	
2	12%(6)	14%(7)	
3	8%(4)	-----	
Time of successful insertion)min(21.7 \pm 4.8	10.6 \pm 3.7 6	<0.0001
Blood on LMA (n)	(16)32%	(8)16%	0.06
Gastric insufflation (n)	(11)22%	(5)10%	ns
Leak around the cuff (n)			
Grade 1	(20)40%	(22)44%	ns
Grade 2	(18)36%	(22)44%	ns
Grade 3	(12)42%	(6)12%	ns

Discussion

Using airway method is shown to be more successful in LMA insertion in terms of time needed compared to classic method. Analyzed data demonstrated less time needed in airway method. The disadvantage of standard method of inserting LMA is that in this form, LMA slides over the tongue and may displace the tongue and epiglottis posteriorly but the alternative methods such as semi-filled or lateral usually make less mechanical insult and easier LMA passage.

The results show 80% success rate in the first attempt. In airway method there was a 86% success rate in first attempt and 14% in the second one.

Condra et al had 97% and 100% success rates respectively probably due to lower LMA cuff volume which couldn't prevent posterior displacement of the tongue as well.

A variety of LMA insertion methods have been discussed. In Dingley et al study in Wales, 30% of invertors used the original method while 34% used the alternative ones like semi-filled for laryngoscopic procedures.

Wakeling et al mentioned LMA complete filling for facilitating its insertion and lessening mucosal damage.

Dingley's studied about sore throat in 3 groups¹³ which showed that using insertion aid lowers the complications.

Nagai S. et al used the modified method for pediatric LMA insertion¹⁵, rotating it 90 degree and after inserting two thirds of it through the larynx them re-rotating it and leading it deeply.

Nakayama studied 145 pediatric cases using rotating versus routine method⁹. The success rate in first and second attempt was 99% versus 75^{1,2,3,40}% using semi-filled method simultaneously which changed the rates to 96% and 100% respectively.

One of our limitations was blinding the LMA insertion time and the number of attempts. We used another person for recording the results to lessen the bias of time and number of attempts.

Airway method insertion facilitates LMA passage towards the larynx and sliding over the tongue. Successful attempts correlates well with complications such as hypoxia, laryngospasm, and trauma, due to the number of attempts (secondary to light anesthesia and mucosal damage).

Complications in two groups were not in a meaningful range but further studies with larger groups may give more acceptable results. Gastric distention due to displacement of LMA is appropriate in airway group which can be considered as a success factor.

Many methods including low inflation, jaw trust, LMA insertion education, airway axis usage, fiberoptic bronchoscopic insertion and NGT guidance all have advantages and disadvantages^{3,6,7,8,4,5}.

Our study doesn't need low inflation, special maneuvers such as jaw trust and aiding instruments. This method is known as a facilitating method for LMA insertion^{7,8,9,11,10}.

Overall comparison of success and failure rates in this method including the insertion time, shows that the airway method can be considered as a facilitating method with low complication rates.

Further studies with larger groups are needed to clarify the differences between different methods.

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