

ORIGINAL RESEARCH

A Study of Classic LMA vs. Cobra Perilaryngeal Airway In Mechanically Ventilated Patients

R. Pandu Naik¹, N. Sumathi², Uma Pradeepa³, Anuradha⁴

ABSTRACT

Introduction: To determine and compare the insertion conditions and pressor responses of two airway devices 'Laryngeal mask airway' and 'cobra perilaryngeal airway' during elective anesthetic procedures.

Material and method: 60 patients of age between 18-55 years, belonging to ASA grade I and II, scheduled for elective surgeries under general anesthesia were included in the study. All patients were allocated randomly by envelope method into two groups of 30 each, Group-L and Group- C. The study was designed to compare the insertion conditions and Heart rate, systolic BP, Peak airway pressures and post-op sore throat and bleeding between two airway devices cobra perilaryngeal airway and laryngeal mask airway during elective anesthetic procedures.

Results: With respect to pressor responses H.R, systolic B.P, there was no significant differences between two groups. Cobra PLA offered advantages over LMA in regard to post op sore throat and post op bleeding.

Conclusions: Cobra PLA was found to be more useful than LMA with respect to peak airway pressures and better sealability and post op sorethroat and bleeding.

Keywords: Mechanically ventilated, General anesthesia, Cobra perilaryngeal airway.

How to cite this article: R. Pandu Naik, N. Sumathi, Uma Pradeepa, Anuradha. A study of classic LMA vs. cobra perilaryngeal airway in mechanically ventilated patients. International Journal of Contemporary Medical Research 2015;2(4):1059-1064

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Source of Support: Nil

Conflict of Interest: None

INTRODUCTION

The major responsibility of an anaesthesiologist is management of airway so as to provide adequate ventilation to the patient by securing an unobstructed airway when general anaesthesia is administered. As such, no anaesthesia is safe unless diligent efforts are devoted to maintain an intact functional airway. Endotracheal intubation is the overall accepted "Gold standard of securing" the airway and providing adequate ventilation. However, endotracheal intubation requires time, a skilled anaesthesiologist or appropriate instruments and adequate circumstances with respect to space and illumination.

Also endotracheal intubation has many other disadvantages,¹ avoid Trauma during laryngoscopy and insertion used in esophageal intubation, Inadvertent endo-bronchial intubation, Exaggerated pressor responses during laryngoscopy and endotracheal intubation prevent post-operative sore throat and Hoarseness after intubation. The pressor responses to laryngoscopy and endotracheal intubation are very well recognised since 1951. It is a sympathetic reflex provoked by stimulation of the airway leading to transitory, variable and unpredictable increases in blood pressure and heart rate. This may be hazardous as increased blood pressure in susceptible patients may lead to myocardial insufficiency or cerebrovascular accidents.²

Attenuation of pressor responses to manipulation of the airway has been practiced either by deepening the plane of anaesthesia, by the use of drugs known to obtund them or by using advanced airway devices. Advanced airway devices like Laryngeal Mask Airway (LMA) and Cobra perilaryngeal airway are now considered as alternatives to endotracheal intubation for securing the airway and providing adequate ventilation even in difficult intubation and emergency situations.

Laryngeal mask airway was designed by Dr. A. I J. Brain in the year 1981. It was introduced into clinical practice in the year 1987, and it was found that the technique of insertion of LMA obviated the need for laryngoscopy, which was a major cause of the pressor response.³

The use of LMA and COBRA PLA have many advantages over endotracheal intubation⁴ by avoidance of laryngoscopy, has ease of insertion, (can be practiced by paramedics too), Minimal pressor responses to insertion and removal, Minimal rise in I.C.P, I.O.P.

But, laryngeal mask airway has certain disadvantages like High chances of aspiration, Regurgitation, Vomiting, Leak, Trauma, viz: arytenoids dislocation, minor abrasions, epiglottitis. Cobra has few disadvantages too like, The Cobra PLA does not protect against aspiration.^{5,6,7} Airway obstruction has been reported when the Cobra apparently moved upward, catching the epiglottis between the bars.⁸ Cuff leaks have been reported.⁹

The Laryngeal Mask Airway (LMA) is a supraglottic airway device designed to maintain a clear airway, which sits outside of and creates a seal around the larynx. It is relatively non-invasive as compared to endotracheal intubation and in scenarios where

endotracheal intubation is not mandatory, LMA has emerged as a formidable choice over

endotracheal intubation.¹⁰ Compared with the face mask, the LMA allows for a more “hands-free approach” to airway management.¹¹

In difficult airway management, LMA can bypass obstruction at supraglottic level and allow rescue oxygenation and ventilation, provided that mouth opening is sufficient.¹² The LMA-Classic is a first generation supraglottic airway device, with largest evidence base for efficacy and safety, and is considered benchmark against which newer LMA are judged.¹⁰ However, use of positive pressure ventilation¹³ and the associated gastric insufflations are limitation of its use. Cobra PLA is a relatively new supraglottic airway device that has been proven safe and effective in several clinical settings. Study is done to compare the insertion conditions and pressor responses of two airway devices ‘Laryngeal mask airway’ and ‘cobra perilaryngeal airway’ during elective anesthetic procedures.

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MATERIALS AND METHODS

After obtaining Institutional Ethical Committee clearance and the patient consent the study was carried out on 60 patients posted for various types of elective surgical procedures at Osmnia general hospital, Hyderabad between July 2011 to July 2013.

The study was designed to compare the insertion conditions and Heart rate, systolic BP, insertion conditions, Peak airway pressures and postop sorethroat and bleeding between two airway devices cobra perilaryngeal airway and laryngeal mask airway during elective anesthetic procedures. 60 patients of age between 18-

55 years, belonging to ASA grade I and II, scheduled for elective surgeries were included.

Inclusion criteria

1. ASA group I and II
2. Age between 18 to 55 years of both sexes, scheduled for elective surgeries were included.

Exclusion criteria

1. Uncontrolled cardiovascular, respiratory, hepatic (or) renal diseases.
2. Morbid obesity, pharyngeal masses.
3. History of chronic obstructive pulmonary diseases, oesophageal pathology, sore throat.
4. Duration of surgery more than 90 min.
5. Limitation of neck movement
6. History or risk of difficult airway (mallampati 3, 4)
7. Emergency surgeries and in patient with full stomach or H/O gastroesophageal reflux.

A thorough preanesthetic evaluation was carried out in all the patients and procedure was explained in detail to all the patients (each group had 30 patients).

Patients were allocated randomly by envelope method into 2 groups as Group L & Group C.

The sample size of 60 patients was calculated after discussing with the statistician for a power of >90% and alpha value of 5%.

In Group L (LMA – 30 patients)

Cuff inflated with 30ml air in males (4 no. LMA) and 20ml air in females (3 no. LMA)

In Group C (Cobra – 30 patients)

Cuff inflated with 30-40 ml of air in females (no. 3 cobra) and 40-50 ml of air in males in (no. 4 cobra)

All the patients were investigated preoperatively and investigations were done. As Haemoglobin estimation, Urine examination: albumin, sugar and microscopic examination, Random blood Sugar, ECG, Chest x-ray, Blood urea

All patients were premeditated 15 minutes prior to surgery, iv midazolam dosage is 0.05 mg/kg v Fentanyl- 1mcg/kg. Patients were then pre-oxygenated with 100% O₂, 3min. Patients were induced with iv Thiopentone sodium- 5mg/kg and muscle relaxation was facilitated with iv suxamethonium 1.5 mg/kg. After 1 min later, a 2% lidocaine jelly was applied on the dorsal surface of LMA and then inserted and secured. If LMA insertion was unsuccessful after two attempts, the patients were withdrawn from the study.

Group C: COBRA was passed, if the ventilation is inadequate, unsuccessful after two attempts, the patients were withdrawn from the study. Anesthesia was

maintained with O₂: N₂O (50:50) and iv Vecuronium bromide was used for muscle relaxation and volume control mode ventilation. At the end of procedure patients were adequately reversed with IV glycopyrrolate 0.008mg/kg and iv neostigmine 0.05 mg/kg. LMA and COBRA were removed after ascertaining that the patient was able to open his/her mouth on command.

Cuff was deflated for removal of LMA and COBRA, After removal the device was checked for presence of any macroscopic bleed.

Postoperatively patient was followed up for presence of any sorethroat which was graded accordingly. All data are reported as mean values \pm 2SD. Statistical Analysis of the demographic data was done using chi-square test. Comparison between the groups was done using student 't' test.

RESULTS

The present study was designed to compare the insertion conditions and Heart rate, systolic BP, Peak airway pressures, rate of air leakage and postop sorethroat and bleeding between two airway devices cobra perilaryngeal airway and laryngeal mask airway during elective anesthetic procedures. 60 patients between 18-55 years of both sexes belonging to ASA class I and II undergoing elective surgeries under general anaesthesia were included in this study.

There was no significant difference in sex distribution age and body weight in the two groups.

In the study, the mean heart rates were compared

T1 just before induction,

T2 immediately after induction,

T3 5 min after insertion of device,

T4 15 min after the insertion of device,

T5 5 min after releasing the device

There was no significant difference between the two groups.

Shows the grades of insertion conditions of the LMA and COBRA group. Insertion conditions are better with COBRA when compared to LMA. COBRA PLA has a better sealability compared to LMA

P<0.0001

Cobra PLA offered advantages with regard to maximum airway pressure

Cobra PLA offered advantages in regard to post op sore throat.

DISCUSSION

Pressor responses to endotracheal intubation have been studied from the past and have shown that epipharyn-

geal and laryngeal stimulation caused by laryngoscopy have led to transient significant increase in heart rate, blood pressure and increase in plasma catecholamine levels. Hypertensive patients are prone to much greater pressor responses than normotensive patients and show higher increases in the level of plasma catecholamines. Shribman et al concluded that the major cause of the sympathoadrenal response to tracheal intubation arises from stimulation of the supraglottic region by tissue irritation induced by direct laryngoscopy. Insertion of the tube through the vocal cords and inflation of the cuff in the infraglottic region should contribute very little additional stimulation.

In another study Hassan et al reported that, by activating proprioceptors, direct laryngoscopy induces arterial hypertension, tachycardia and increased catecholamine concentrations proportional to the intensity of the stimulus exerted against the base of the tongue. However, subsequent tracheal intubation should stimulate additional receptors in the larynx and the trachea, thus enhancing the pressor and epinephrine response.

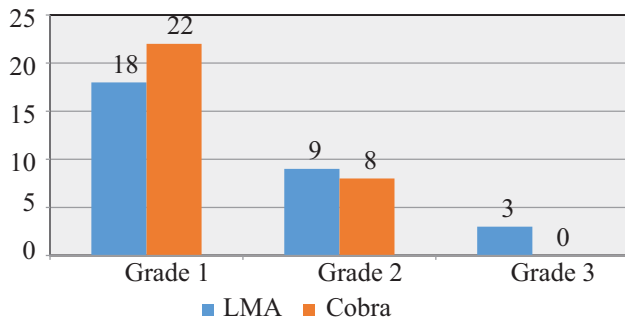
The use of laryngeal mask airway and cobra perilaryngeal airway avoids the need for the laryngoscopy resulting in less painful stimulation of the airway, and hence lesser degree of pressor response. Since there are very few studies comparing pressor responses, ease of insertion, rate of air leakage, mean peak airway pressures, postop bleeding and postop sore throat during LMA and cobra PLA insertion the objective of this study was to compare the above parameters during LMA and cobra PLA insertion in healthy adult patients during elective surgeries. The two groups were designated as groups L (laryngeal mask airway) and group C (cobra). All the patients received iv glycopyrrolate 0.004 mg/kg and iv midazolam-0.05 mg/kg and iv fentanyl 1 μ g/kg pre-operatively and preoxygenated with 100% O₂ for 3min. All the patients were induced with iv thiopentone sodium 5mg/kg and muscle relaxation was achieved with iv suxamethonium 1.5mg/kg.

In the group (L) approximately 1 min later, a well lubricated LMA of size #3 was inserted for females and inflated with 20ml of air, whereas for males it was size #4 and inflated with 30ml of air and secured. In the group (C) a size 3, 4, 5 sizes of cobra was inserted depending on Weight and appropriate amount of air was inflated and tube was secured.

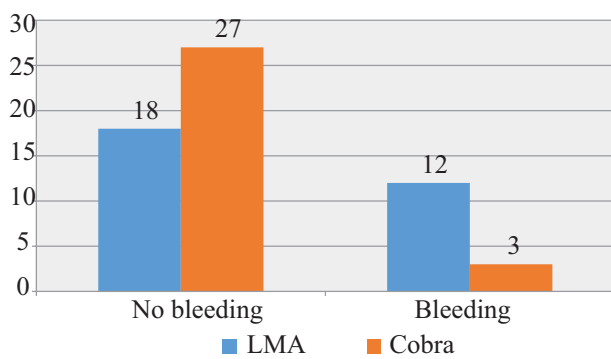
In our study there were no failures with either of the devices. Anesthesia was maintained with O₂ + N₂O (50:50) + iv vecuronium bromide, for muscle relaxation and volume control ventilation. At the end of surgery patients were reversed with iv Glycopyrrolate 0.008 mg/

Group	Airway device used	Number	Male/ female	Mean age (yrs) ± SD	Mean weight (kg) ± SD
Group-C	COBRA	30	16/14	35.27 ± 10.49	56.93 ± 10.05
Group-L	LMA	30	20/10	40 ± 9.59	55.70 ± 5.54
P Value			0.291	0.073	0.55

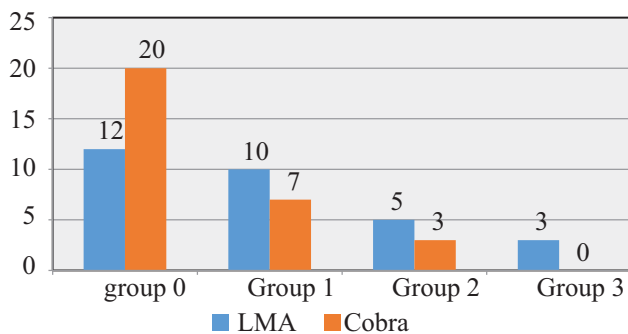
Table-1: Demographic data in present study



Graph-1 - Insertion conditions



Graph-2 The comparison of bleeding following releasing the airway device



Graph-3: The comparison of rate of sore throat after the procedure

Kgand iv neostigmine 0.05 mg/ kg

LMA and COBRA was removed after ascertaining that patient was able to open his/her mouth on command. Both the airways were removed after completely deflating the cuff.

In our study the demographic data of patients age, sex and body weight were similar in the two groups as shown in Table-I. It was observed that insertion conditions are better with COBRA when compared to LMA as shown in table 2. (P< 0.005). Similar results were

Group		No.	Mean	S.D	P Value
HR1	LMA	30	96.06	14.57	0.225
	COBRA		90.96	17.55	
HR2	LMA	30	96	14.76	0.762
	COBRA		97.43	21.43	
HR3	LMA	30	97.27	14.76	0.617
	COBRA		94.9	21.53	
HR4	LMA	30	95.93	13.67	0.697
	COBRA		94.3	18.35	
HR5	LMA	30	95.76	13.70	0.770
	COBRA		94.6	16.82	
SBP1	LMA	30	92.90	10.25	0.759
	Cobra		93.66	8.85	
SBP2	LMA	30	92.60	9.89	0.675
	Cobra		93.57	7.85	
SBP3	LMA	30	90.33	8.84	0.042
	Cobra		94.67	7.26	
SBP4	LMA	30	87.46	9.12	0.069
	Cobra		92.06	10.12	
SBP5	LMA	30	85.06	9.71	0.120
	Cobra		89.33	11.21	

Table-2: Comparison of heart rate and systolic blood pressure between two groups

Group		No.	Mean	S.D	P Value
PAP-3	LMA	30	16.40	1.310	<0.0001
	COBRA		12.76	1.621	
PAP-4	LMA	30	17.51	1.474	<0.0001
	COBRA		13.31	1.756	

Table-3: Comparison of peak airway pressures at t3-t4

reported by other authors M.Agah, Peyman yahyavi et al¹⁵, Agnieszka wronska-Sewruk et al¹⁶, D.M.Kim, S.B.Nam and D.W.Han et al¹⁷, Galvin and Doorn et al.¹⁸ Hence Cobra PLA is easier to insert than LMA.

In our study, the mean heart rates were compared There was no significant difference between the two groups regarding heart rate In the study by M.Agah, Peyman yahyavi et al¹⁵, where in the pressor responses like HR after insertion of COBRA and LMA were compared in a group of 200 patients they found out that there were no significant differences between the two groups with respect to H.R Similarly in another study by Agnieszka wronska-Sewruk et al¹⁶, conducted with a aim to compare LMA and COBRA supraglottic devices in a group of 50 patients for minor urological surgeries it has been observed that no statistically significant dif-

ferences exist between the two groups with respect to HR

In our study, the mean systolic BP were compared. There was no significant difference between the two groups regarding Systolic BP. In the study by M. Agah, Peyman yahyavi et al¹⁵, where in the pressor responses like Mean and Systolic BP after insertion of COBRA and LMA were compared in a group of 200 patients they found out that there were no significant differences between the two groups with respect to systolic BP. Similarly in another study by Agnieszka wronska-Sewruk et al¹⁶, conducted with a aim to compare LMA and COBRA supraglottic devices in a group of 50 patients for minor urological surgeries it has been observed that no statistically significant differences exist between the two groups with respect to Systolic BP.

Rate of airway leak was compared between cobra PLA and LMA in which we observed cobra PLA had a better sealability. A better sealability controls ventilation more adequately by minimizing the gases entering the stomach. Cobra PLA provides a higher airway leak pressure (i.e the airway peak pressure at which a leak starts to occur)and takes less time to insert than LMA classic in paralysed patients. The airway leak pressure was significantly greater with cobra PLA which is comparable to findings from other studies.

In Gaitini L et al.¹⁹ study LMA, cobra PLA, PAXpress pharyngeal airway were compared with each other and cobra PLA offered advantages over the two other pharyngeal airway devices in regard to sealability of airway. In a study conducted by Dr. Akca et al.²⁰, cobra PLA and LMA were compared with each other regarding their usefulness in positive pressure ventilation and there complications and demonstrated that the two devices are similar in terms of insertion and oropharyngeal insertion but cobra PLA had a better sealability as compared to LMA. Obviously, a better sealability controls ventilation more adequately by minimizing the gases entering the stomach.

The latest study in this regard was conducted by Gaitini et al¹⁹, in 2006 comparing LMA and cobra PLA in general anaesthesia and spontaneous ventilation. Also with respect to post op complications like sore throat and bleeding cobra PLA caused less sore throat and trauma (bloody secretions) as compared to LMA.

CONCLUSION

In this study we concluded that insertion conditions (ease of insertion) were better with cobra PLA than with LMA. With respect to pressor responses H.R, sys-

tolic B.P there was no significant differences between two groups, Cobra PLA offered advantages over LMA with respect to peak airway pressures and ability to fitness of airway(rate of air leak),Cobra PLA offered advantages over LMA in regard to post op sore throatand post op bleeding.

Based on our conclusions, we can say that cobra PLA and LMA are equally useful for establishing an adequate airway during short general anaesthesia.Cobra PLA was found to be more useful than LMA with respect to peak airway pressures and better sealability and post op sorethroat and bleeding.

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