

Comparison of Hemodynamic Changes after Insertion of Classic Lma and Proseal Lma

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Abstract

Background and Objectives`

Various drug regimens and alternative airway techniques have been used to attenuate the stress response to Laryngoscopy and intubation including Laryngeal mask airway. The aim of this prospective randomised double blind study was to compare the hemodynamic response during insertion of Classic LMA with Proseal LMA

Methods:Sixty ASA physical status I patients scheduled for surgery under general anaesthesia were randomly allocated equally into Classic and Proseal groups in a double blinded fashion. Measurements of SBP, DBP, MAP and HR were recorded immediately after induction, during insertion of LMA, 1min, 3mins and 5mins after insertion.

Results:The mean maximum HR and MAP values obtained after 0,1,3,5mins after insertion of Classic LMA were 78.066 ± 7.099 , 81.066 ± 6.614 , 82.733 ± 5.76 , 79.8 ± 6.28 , 77.73 ± 6.55 bpm and 89.36 ± 4.04 , 95.4 ± 3.65 , 96.53 ± 3.41 , 92.23 ± 3.85 , 89.80 ± 3.98 respectively. They were significantly lower when compared with values obtained after insertion of Proseal LMA which were 78.56 ± 7.42 , 87.83 ± 7.93 , 88.36 ± 6.61 , 87.83 ± 5.56 , 82.9 ± 5.73 bpm and 89.73 ± 4.83 , 101.62 ± 5.72 , 103.13 ± 5.53 , 97.63 ± 6.12 and 92.33 ± 5.39 respectively.

Conclusion:The hemodynamic response to insertion of Proseal LMA is more when compared with Classic LMA and is probably due to the larger cuff design and presence of an additional dorsal cuff in Proseal LMA.

Keywords: Classic LMA, Proseal LMA, Hemodynamic changes

I. Introduction

Induction of General Anaesthesia is known to induce clinically relevant changes in hemodynamic variables¹³ probably generated by Direct Laryngoscopy and Endotracheal Intubation which appear to be attenuated by alternative airway managements.

Tracheal Intubation causes a reflex increase in sympathetic activity that may result in hypertension, tachycardia and arrhythmia¹⁴. A change in Plasma catecholamine¹⁵ concentration also has been demonstrated to be a part of the stress response to tracheal intubation. Although in majority of patients undergoing anaesthesia, these responses are transient and probably of little consequence, it is harmful mainly in those with myocardial or cerebrovascular diseases.

The extent of this stress response is affected by many factors : the technique of laryngoscopy and intubation, use of various alternative airway instruments like the laryngeal mask airway, drugs. Compared to Laryngoscopy and Endotracheal intubation, insertion of Classic LMA has been associated with minimal hemodynamic stress response^(1,2,3). The Proseal LMA was invented to overcome the limitations of Classic LMA which includes an imperfect seal and lack of protection against aspiration⁸.

We conducted a prospective randomised double blind study to compare the hemodynamic responses produced by insertion of Classic LMA with Proseal LMA in healthy normotensive anaesthetised patients.

II. Materials And Methods

This study was conducted in the Government Hospital, Coimbatore Medical College after getting the approval from the hospital ethical committee. A total of sixty American society of Anaesthesiologists Physical status I patients in the age group of 25-50 yrs of both sexes posted for elective surgeries under general anaesthesia were included in the study. Informed written consent was obtained from all of the patients.

Patients with cardiac, pulmonary, neuromuscular diseases, hepatic, renal insufficiency were excluded from the study as were pregnant patients and those with BMI > 28 kg/m². The airway was clinically assessed to exclude those in whom difficulty with intubation was anticipated.

Out of sixty patients, 30 were randomly allocated to Classic LMA and 30 to Proseal LMA group. The surgical procedures for which LMA were inserted include appendicitis, umbilical hernia, fibroadenoma breast and gynecological procedures.

All patients were fasted for atleast 8hrs and premedicated with inj glycopyrolate 0.01mg/kg IM 45mins before surgery and inj midazolam 0.5mg/kg IV 10mins before anaesthesia. In the operation theatre, standard

monitoring was established and baseline measurements of systolic BP, diastolic BP, mean arterial pressure and heart rate were recorded.

Patients were preoxygenated with 100% oxygen for 3mins. Induction was done with inj propafol 2mg/kg IV and inj succinylcholine 2mg/kg IV. LMA insertion was attempted after complete relaxation of the jaw. Sizes 3 and 4 were used according to the body weight of the patients. Both Classic and Proseal LMA was inserted by the standard digital technique⁹ by a single experienced investigator.

Measurements of SBP,DBP,MAP,HR were recorded immediately after induction, during insertion of LMA (I) and 1min (I+1), 3mins (I+3), 5mins (I+5) after insertion. A second investigator not aware of the patients group recorded these measurements.

The patients lungs were ventilated with tidal volume of 10ml/kg and respiratory frequency of 12 bpm using closed circuit. Anaesthesia was maintained with 1% sevoflurane, 70% nitrous oxide in oxygen, inj fentanyl 2µg/kg IV and intermittent doses of inj vecuronium.

Statistical Analysis

Patient’s characteristics were compared using standard t test, and measurements of HR,SBP,DBP and MAP were analysed using repeated measures analysis of variance. Statistical significance was defined as p < 0.05. Data are presented as Mean ± SD.

III. Results

The two groups were matched for demographic data and there was no significant difference among the two groups with respect to age, gender and weight.

**TABLE: 1
DEMOGRAPHIC PROFILE OF PATIENTS IN BOTH GROUPS**

PARAMETERS	GROUP-CLMA	GROUP-PLMA
Mean Age in Yrs (± S.D*)	34.666 ± 8.4551	35.033 ± 9.112
Mean Weight in Kgs (± S.D)	54.666 ± 6.886	54.838 ± 7.0846

* S.D – Standard Deviation

The mean values of HR and MAP were compared among the two groups . There was no statistically significant difference in the baseline (B) and induction values of HR and MAP among the two groups . However there was statistically significant difference in the insertion (I),I+1,I+3,I+5 values of HR and MAP among the two groups .The values were less with CLMA group than with PLMA group.

TABLE:2 HEART RATE

Heart Rate	Group- CLMA MEAN±S.D	Group –PLMA MEAN ± S.D	p values	
			f	p
Baseline	78.0667 ± 7.0951	78.5667 ± 7.4263	.071	.791
Induction	79.933 ± 7.2489	79.600 ± 7.5822	.230	.633
Insertion	81.666 ± 6.614	87.833 ± 7.9398	16.025	.000
Post Insertion (1min)	82.733 ± 5.7451	88.3667 ± 6.6149	12.365	.001
Post Insertion (3 min)	79.8000 ± 6.2885	87.3000 ± 5.5656	23.929	.000
Post Insertion (5 min)	77.733 ± 6.5545	82.900 ± 5.7316	10.563	.000

COMPARISION OF HEART RATE

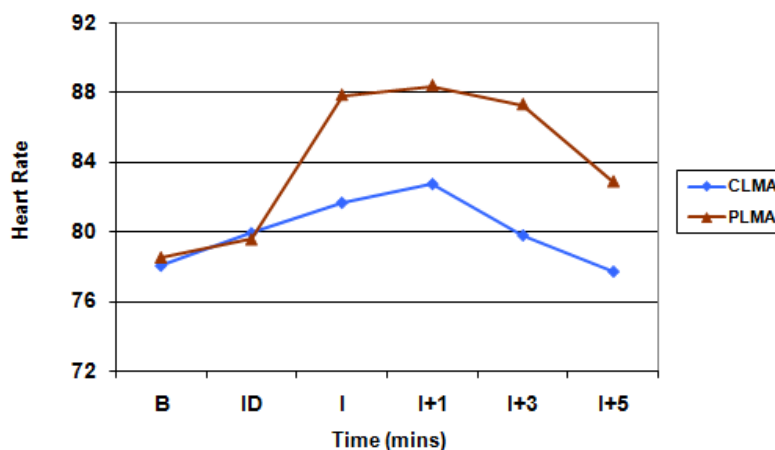
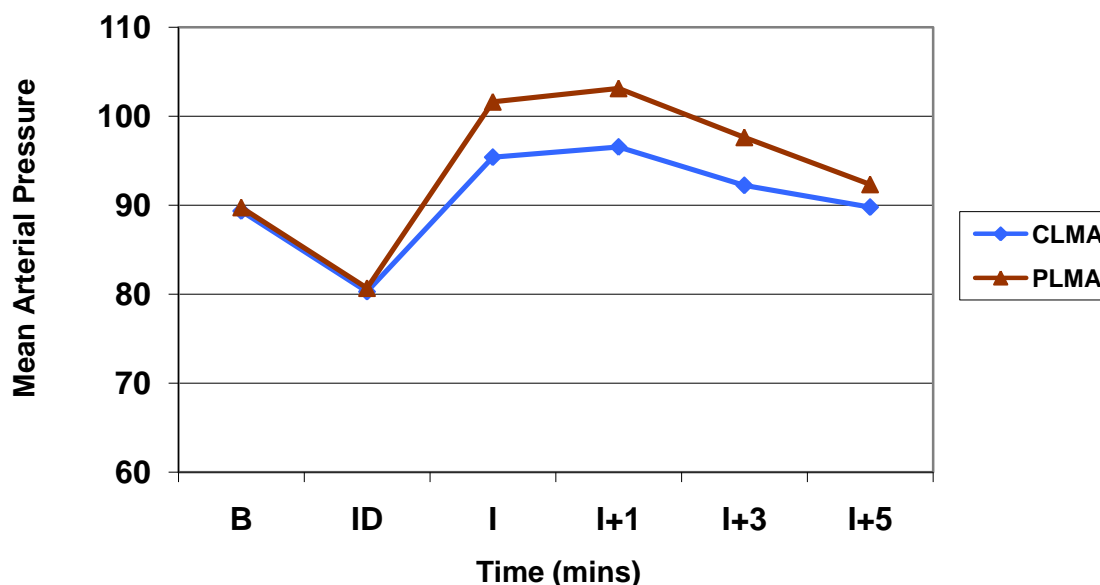


TABLE: 3
MEAN ARTERIAL PRESSURE

MAP *	GROUP- CLMA MEAN ± S.D	GROUP- PLMA MEAN ± S.D	P value	
			f	p
Baseline	89.3667 ± 4.070	89.733 ± 4.834	.101	.751
Induction	80.3000 ± 3.1639	80.7000 ± 5.4085	.122	.728
Insertion	95.4 ± 3.656	101.6222 ± 5.728	28.353	.000
Post Insertion (1 min)	96.53333 ± 3.418	103.133 ± 5.535	2.882	.025
Post Insertion (3 min)	92.233 ± 3.8568	97.6333 ± 6.1222	16.709	.000
Post Insertion (5 min)	89.800 ± 3.9862	92.333 ± 5.390	4.284	.043

* MAP – MEAN ARTERIAL PRESSURE

COMPARISION OF MEAN ARTERIAL PRESSURE



The mean values of HR and MAP were compared with baseline in each group.

In CLMA group, there is statistically significant difference in the mean values of HR and MAP of I, I+1, I+3 from baseline B (p<.05). There is no statistically significant difference in mean values of HR and MAP of I+5 from B (p>.05) TABLE: 4

CLASSIC LMA GROUP

CLMA	HEART RATE		MEAN ARTERIAL PRESSURE	
	t	p	t	p
B and I	-12.070	.000	-17.909	.000
B and I + 1	-5.607	.000	-11.284	.000
B and I +3	-2.673	.012	-5.957	.000
B and I + 5	.512	.612	-.994	.325

In PLMA group ,there is statistically significant difference in the mean values of HR and MAP of I, I+1,I+3 and I+5 from the baseline B (p<.05)

**TABLE: 5
PROSEAL LMA GROUP**

PLMA	HEART REATE		MEAN ARTERIAL PRESSURE	
	t	p	t	p
B and I	-12.858	.000	-9.902	.000
B and I + 1	-11.401	.000	-13.732	.000
B and I + 3	-10.397	.000	-11.670	.000
B and I + 5	-4.927	.000	-5.066	.000

IV. Discussion

There have been numerous studies concerning the hemodynamic stress response to laryngoscopy and intubation and the various ways by which it can be attenuated. It is found that the major stimulus to sympathetic hemodynamic stress response is the force exerted by the laryngoscope blade upon the structures of the oropharynx (Tongue, Epiglottis)^(12,13,14) and the direct stimulation of the trachea by tracheal tube. Insertion of LMA have been associated with minimal Cardiovascular changes.^(2,3)

Shahin N Jamil et.al.¹⁶ in their study on comparison of LMA with endotracheal intubation in children have reported that the hemodynamic response to LMA insertion is much less compared to endotracheal intubation.

In our study , we compared the hemodynamic stress response produced by the insertion of Classic LMA with that of Proseal LMA. There was an increase in the HR and MAP from the base line at the time of insertion in both Classic LMA and Proseal LMA groups. However the increase in HR and MAP was much more in the Proseal LMA group than the Classic LMA group. This increase in HR and MAP persisted upto 5 mins in the Proseal LMA group while it came to the baseline within 3 mins in the Classic LMA group.

Our study has certain limitations. Firstly we conducted our studies on patients with normal airways and no cardiac disease. Secondly we studied patients in whom airways were successfully managed on 1st attempt. So we could not observe the differences in hemodynamic changes in cases of repeated trials. Thirdly all sizes of the mask have not been studied separately.

T.M. cook et.al.²⁰ in their study on comparison of of Classic LMA with

Proseal LMA have found that the seal pressure with the Proseal LMA group was significantly greater than with Classic LMA group. The median seal pressure with Proseal LMA was 12cm

H2O greater than with Classic LMA. Hence Proseal LMA provides an effective seal during positive pressure ventilation.

K.Jinn Chinn.et.al.¹⁹ in their study on laryngyal edema associated with Proseal LMA have concluded that the special design of Proseal LMA results in increased contact with glottic structures especially the aryepiglottic folds. This increases the risk of upper airway complications.

Brimacombe et.al.⁹ in their study have reported that the larger cuff design of Proseal LMA results in a better seal than with Classic LMA .The PLMA has a larger, deeper bowl and an additional dorsal cuff which pushes the ventral cuff more firmly into the periglottic tissues.The larger ventral cuff plugs gaps in the proximal pharynx and hence provides an improved seal.

However the larger cuff design and an additional dorsal cuff results in more pressure in the glottic area than the Classic LMA at equivalent cuff volume. This causes a more hemodynamic stress response when compared to Classic LMA. In this study , we found that the stress response was more with Proseal LMA when compared to Classic LMA.

V. Conclusion

It is concluded that the hemodynamic stress response (HR and BP) to the insertion of Proseal LMA is higher and of prolonged duration compared to Classic LMA.This is probably due to the larger cuff design and an additional dorsal cuff of Proseal LMA.

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