



Original Research Article

Comparison of changes in haemodynamic parameters in hypertensive patients after laryngoscopic endotracheal intubation or laryngeal mask airway insertion

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ABSTRACT

Introduction: The hemodynamic response associated with laryngoscopy and tracheal intubation may be harmful to certain patients. The laryngeal mask airway avoids the need for laryngoscopy in appropriate patients.

Aims and Objectives: This study compares the changes in haemodynamic parameters in hypertensive patients after laryngoscopic endotracheal intubation or laryngeal mask airway insertion.

Materials and Methods: 60 Hypertensive patients between 40 to 60 years ASA Grade II were randomly allotted to one of the groups of 30 each, group ET and group LMA. LMA insertion or tracheal intubation was performed after induction of anesthesia with Propofol and succinyl choline. The heart rate, mean arterial pressure and rate pressure product were measured after induction and immediately after insertion / intubation and then after 1, 3, 5 minutes.

Results: There was very highly significant difference ($p < 0.000$) in mean increase in heart rate (38.23% in group ET versus 28.26% in group LMA). The increase in arterial pressure were also significant. The systolic BP increased 40.16% in group ET compared with 37.60% in group LMA ($p < 0.000$). The diastolic BP was also seen increasing by 22.73% and 14.23% in group ET and group LMA respectively. The MAP and RPP values were maximum after airway instrumentation however we found that values after LMA insertion were significantly lower when compared to tracheal intubation for the first 3 minutes.

Conclusion: LMA insertion in comparison to laryngoscopy and intubation is advantageous over tracheal intubation in hypertensive patients avoidance of pressure response.

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1. Introduction

General anaesthesia is usually done by securing a definitive airway. Endotracheal intubation by laryngoscopy is one of the most famous and frequent method for securing airway.¹ But conduct of laryngoscopy and intubation of the trachea with endotracheal tube most of the time results in transient tachycardia, varied arrhythmias and hypertension due to sympathetic response and release of catecholamines.^{2,3} This sympathetic response may not be desirable in patients who already have hypertension, myocardial ischemia or cerebrovascular disease.⁴ Patients with existing hypertension have high baseline sympathetic

nervous system activity and will suffer an exaggerated hypertension and tachycardia to laryngoscopic endotracheal intubation.⁵ This exaggerated response may ensue in life threatening complications such as pulmonary edema, intracranial bleed, acute myocardial infarction and biventricular failure.⁶

Other methods of securing airway like usage of laryngeal mask airway (LMA) first introduced by Archie Brain, have been used in frequently during General Anaesthesia.⁷ The haemodynamic changes during insertion of LMA under General Anaesthesia are less than that of tracheal intubation.⁸ This is because the visualization of glottis and opening of glottis is not performed during insertion of LMA. In this comparative study, the changes in

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haemodynamic parameters in hypertensive patients after laryngoscopic endotracheal intubation or laryngeal mask airway insertion is studied.

2. Aims and Objectives

To compare the changes in haemodynamic parameters in hypertensive patients after laryngoscopic endotracheal intubation or laryngeal mask airway insertion.

3. Materials and Methods

After approval of the study protocol by our institutional committee, Sixty patients between the age of 40-60 years of either sex with history of Hypertension of ASA grade II planned for elective surgery that lasting for not more than one hour were selected. The patients should have adequate control of hypertension with oral anti hypertensives. A visit before the operation that was carried out one day before the surgery explained in a very detailed manner about anaesthesia and a consent in the written form was obtained from the patients. Patients with a systolic BP < 180 mm Hg and diastolic < 110 mm Hg measured in the supine position at least 3 occasions measured two hours apart were taken up for the study. Exclusion criteria included known cases of respiratory diseases, central nervous system illnesses or cervical spine disease and gastro oesophageal reflux disease. The patients with anticipated difficult intubation were also excluded.

Oral anti hypertensives were continued as per schedule till the last dose 4 hours before surgery. Premedication of pethidine 1 mg/Kg and promethazine 0.5 mg/Kg intramuscularly one hour prior to surgery was administered to each patient.

At operation theatre, following 18-G venous cannula inserted and Ringer Lactate was started. Standard monitors like ECG, Non-invasive Blood Pressure, Pulseoximetry and Temperature probe were attached. The baseline values of parameters like heart rate, systolic, diastolic and mean blood pressure were recorded after a stabilization period of 5 minutes,

The patients were divided randomly into the two groups (of 30 patients each) – group ET and group LMA. Preoxygenation with 100% oxygen via an anatomical face mask for 5 minutes was administered to all patients in both groups. Anaesthesia was induced with Injection Propofol 2mg/Kg I.V followed by Injection succinylcholine 2mg/Kg I.V. After the disappearance of fasciculations, laryngoscopic endotracheal intubation with size 4 macintosh laryngoscope and appropriate size endotracheal tube was done for patients in group ET. Laryngeal mask insertion with size 4 LMA was done for patients in group LMA. Lubrication done with 2% lignocaine gel for both the LMA and Endotracheal tube cuffs. Air was injected into the cuff of endotracheal

tube or LMA as per instruction. Anaesthesia was maintained with controlled ventilation using closed-circuit with oxygen, Nitrous Oxide and 2% Sevoflurane.

The heart rate, systolic, diastolic and mean blood pressure was recorded after induction, just after intubation or insertion and at first, third and fifth minutes after securing airway. Surgical incision or other painful stimulus was avoided during this period. Rate pressure product was derived as a product of heart rate and systolic blood pressure. After five minutes the anesthetic management continued according to surgical requirements.

All the values were expressed as mean \pm standard deviation. Statistical comparisons were performed by students paired and unpaired t-test and chi-square test. P value of >0.05 was considered to be statistically not significant, a value of <0.05 as statistically significant, a P value of <0.01 as statistically highly significant and a P value of <0.001 as statistically very highly significant.

4. Results

The demographic data of two groups - Group ETT and Group LMA -were comparable with in age, gender and weight of the patients.

The mean increase in heart rate for both the groups were as shown in Table 1.

The heart rate increased after induction and continued to be elevated for more than 3 minutes after LMA insertion and tracheal intubation. The increase in Heart rate was more in ET group than LMA group.

The mean increase in mean blood pressure for both the groups were as shown in Table 2.

There was increase in MAP both after intubation or LMA insertion. The values remained high for 5 minutes in Group ET and only for 3 minutes in Group LMA. Group LMA had lower values at all times when compared to Group ET.

The rate pressure product for both the groups were as shown in Table 3.

Increase in RPP were noted in both groups Although the rise of values in Group LMA is far less Group ET.

5. Discussion

Increase in heart rate, blood pressure and arrhythmia are caused by endotracheal intubation because of increased release of catecholamines and a marked raise in reflex sympathetic activity.^{9,10} Though these effects are short-lived they produce significant hemodynamic effects in hypertensive patients making them vulnerable to adverse cardiovascular events like Myocardial infarction, CVA or end organ damage.¹¹ The supraglottic airway devices like Laryngeal mask airway are designed to provide a patent airway and facilitate positive pressure ventilation while circumventing the disadvantages of an endotracheal

Table 1: Comparison of mean heart rate

Time of measurement	Group ET	Group LMA	p value
Baseline	71.8±7.327	77.67±7.836	0.004*
After induction	77.60±6.831	85.90±9.241	0.000**
After intubation			
Immediate	110.03±14.69	105.93±12.53	0.25
60 Seconds	99.93±15.256	99.6±12.21	0.926
180 Seconds	93.40±12.94	91.23±8.74	0.451
300 Seconds	86.57±11.81	86.83±8.73	0.921

*p value <0.01 – highly significant

**p value <0.001 – very highly significant

Table 2: Comparison of mean MAP

Time of measurement	Group ET	Group LMA	p value
Baseline	113.71±7.55	108.07±8.79	0.010*
After induction	111.2s2±7.39	108.07±9.57	0.159
After intubation			
Immediate	144±15.20	132.54±11.85	0.002**
60 Seconds	134.08±13.73	128.38±11.04	0.082
180 Seconds	123.85±8.55	116.57±6.59	0.000***
300 Seconds	116.59±6.28	112.6±8.24	0.039*

*P value < 0.05- significant

**P value < 0.01- highly significant

***P value < 0.001-very highly significant

Table 3: Comparison of mean RPP between groups

Time of measurement	Group ET	Group LMA	p value
Baseline	10831.37±1505.883	11030.13±1187.01	0.572
After induction	11268.87±1571.99	12241.57±1806.31	0.030*
After intubation			
Immediate	19532.67±5680.046	19081.80±3141.223	0.705
60 Seconds	18258.57±3524.33	17282.53±2853.24	0.243
180 Seconds	15527.77±2514.42	14088.07±1697.85	0.012*
300 Seconds	13083.13±3207.818	12850.30±1719.99	0.727

*P value < 0.05- significant

intubation. As these devices are not introduced into glottis they do not cause much haemodynamic changes.¹²

In this study, following LMA insertion, the percentage change from the baseline in HR was 28.26% as compared to 38.23% following endotracheal intubation. The results were in parallel with study done by Anita and colleague¹³ in which they noted that during insertion of LMA there was no significant increase ($P > 0.05$) in mean pulse rate but after laryngoscopic endotracheal intubation there was significant increase ($P < 0.05$) in pulse rate which remained high till 1 minute after intubation

In our study in Group LMA showed there was markedly less increase in MAP values than Group ETT. The RPP values in group ET reached a mean peak increase of 19532.67, corresponding mean peak increase in group LMA was 19081.80 which is parallel with the study done by Jayita Sarkar and colleagues¹⁴ in which they differentiated Hemodynamic response to endotracheal

intubation using C-Trach assembly and direct laryngoscopy

From this study we infer that in hypertensive patients where intubation pressor response is desirably avoided, LMA can be preferred over laryngoscopic intubation.

6. Conclusion

Our study concludes that, insertion of the laryngeal mask airway causes lesser haemodynamic response than tracheal intubation in hypertensive patients.

7. Source of funding

None.

8. Conflict of interest

None.

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