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Original Research Paper

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COMPARATIVE STUDY OF HAEMODYNAMIC RESPONSE WITH LARYNGOSCOPIC ENDOTRACHEAL INTUBATION AND LARYNGEAL MASK AIRWAY INSERTION IN ADULT HYPERTENSIVE PATIENTS

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ABSTRACT

INTRODUCTION: Laryngoscopy and endotracheal intubation has been the mainstay in providing adequate airway management, delivering general anaesthesia but are associated with hypertension, tachycardia and arrhythmias. These haemodynamic responses may be more hazardous in hypertensive patients.

OBJECTIVE: In this study, we aimed to compare the haemodynamic response elicited by laryngoscopic endotracheal intubation with laryngeal mask airway insertion, in ASA II of adult hypertensive patients.

METHODS: The study conducted on 100 hypertensive patients of either sex aged between 20 and 60 years belonging to ASA II grade and scheduled for elective surgery. The patients were randomly divided into two groups of 50 patients each. In one group (Group I) laryngoscopic endotracheal intubation was done and in another group (Group II) laryngeal mask airway was inserted. Baseline vitals of the patients (SBP, DBP, MAP, HR, SpO2) were documented. Patients were given inj. Midazolam 2mg IM and Phenargan 25 mg IM as premedication before the elective surgery. General anaesthesia was administered. Haemodynamics including heart rate, blood pressure and SpO2 were recorded every minute till intubation or insertion and at 1,3,5 minutes after intubation or insertion and then every 5 minutes till 20 minutes.

RESULTS: All the haemodynamic responses (SBP,DBP,MAP,HR) in Laryngoscopy + Endotracheal Intubation Group compared to the Laryngeal Mask Airway Insertion Group was statistically significant as the p value is <0.05.

CONCLUSION: The laryngeal mask airway may be used for airway management during anaesthesia in hypertensive patients on treatment in whom the pressor response would be deleterious.

KEYWORDS : Haemodynamic response, laryngoscopic endotracheal intubation, laryngeal mask airway

INTRODUCTION:

Airway management is of outmost importance during delivery of general anaesthesia. Patients who have been anaesthetized are unable to maintain an adequate airway on their own and artificial airway maintenance devices are employed.[1] The provision of adequate unobstructed respiration is the major responsibility of the anaesthesiologist towards the patient which is commonly obtained by laryngoscopy and tracheal intubation. Laryngoscopy and endotracheal intubation are not entirely safe procedures and are frequently associated with transient hypertension, tachycardia and arrhythmias.[2,3] In susceptible patients particularly those with systemic hypertension, coronary heart disease, cerebrovascular disease and intracranial aneurysm, even these transient changes can result in potentially deleterious effects like left ventricular failure, arrhythmias, myocardial ischaemia, cerebral haemorrhage and rupture of cerebral aneurysm.[4,5,6] Hypertensive patients due to vascular hyperreactivity show exaggerated response to stress, which can be avoided by avoiding laryngoscopy,[7] in addition to physical and pharmacological interventions.[8] The observed changes are probably due to the sympathoadrenal response caused by stimulation of the supraglottic region and that of the trachea.[9]Therefore, the prevention of hypertension following intubation of the trachea is of major importance in hypertensive patients.[3]

Laryngeal mask airway insertion originally described by Brain, has recently become widely used in airway management. Insertion of LMA after induction of anaesthesia causes less haemodynamic changes than tracheal intubation. The laryngeal mask airway has gained wide spread acceptance as a general purpose airway with worldwide usage estimated at over ten million patients by 1993.The popularity of the device for routine use stems from its perceived benefits for the patients and anaesthetist over traditional forms of airway management. Prospective surveys have shown the overall success rate for the technique to be high and the complication rate low.[3,10,11] In this comparative study, the hemodynamic stress response to laryngoscopic tracheal intubation and laryngeal mask airway insertion in hypertensive patients were evaluated.

MATERIAL AND METHODS

After obtaining approval from the ethical committee of the institution, the study was conducted in Department of Anaesthesiology and Intensive Care Unit, Govt. Medical College and Rajindra Hospital, Patiala. Informed consent was obtained from all patients.

This prospective randomized study was conducted in 100 hypertensive patients having properly controlled blood pressure aged between 20-60 years of either sex of ASA grade ll. Inclusion criteria Hypertensive patients of 20-60 years undergoing elective surgery. Exclusion criteria Patient suspected or detected nervous system, respiratory, neuromuscular or psychiatric disorders, history of severe hepatic or renal disease, history of cardiovascular abnormalities, head and neck surgery, regurgitation prone conditions, full stomach patients, patients with predetermined difficult airway, SBP>180 mm Hg and DBP>110 mm Hg, baseline heart rate <60 beats per minute, moribund obesity were excluded from the study.

All patients were examined a day prior to surgery which included: sdetailed clinical history from the patient, detailed general physical examination and the haemodynamic variables- were recorded preoperatively and relevant investigations were checked. Patients were randomly divided into 2 groups of 50 each. **Group I:** Haemodynamic response with laryngoscopic endotracheal intubation in controlled hypertensive patients. **Group II:**Haemodynamic response with laryngeal mask airway insertion in controlled hypertensive patients.

Anaesthetic technique: Patients were prepared by overnight

fasting and in the morning inj. Midazolam 2 mg i.m and inj. Phenargan 25 mg i.m. half hour prior to surgery as premedication.Patients were made to lie in supine position. Intravenous access was established with an 18G cannula after arrival in the anaesthetic room and an infusion of Ringer Lactate (RL) was initiated. Pulse oxymeter, noninvasive BP apparatus and ECG leads were connected to the patient in the operation theatre. After stabilization period of 5 minutes, the baseline values of heart rate, systolic BP, diastolic BP and MAP were recorded.Patient received preoxygenation with 100% oxygen via a face mask for 5 minutes. Anaesthesia was induced with propofol 2mg/kg i.v and inhalational anaesthetics (isoflurane1%) and after confirming loss of the eye lash reflex, succinylcholine 2mg/kg i.v. was given for endotracheal intubation or LMA insertion. After the disappearance of fasciculations, tracheal intubation was performed in Group I and LMA was inserted blindly using the standard technique in Group II. Endotracheal tubes of size 7/7.5 for female and 8/8.5 for male patients or laryngeal mask airway size 3/4 for female and size 4/5 for male patients were used depending on body weight. 2% xylocaine gel was used as a lubricant for both the endotracheal tube cuff and LMA cuff. Air was injected into the endotracheal tube or LMA cuff as per recommendation. Anaesthesia was maintained with intermittent positive pressure ventilation (IPPV) using Bain's circuit with N_2O and O_2 (50-50), isoflurane1% and vecuronium 0.1mg/kg. If patient's mean arterial pressure (MAP) exceeds more than 20 per cent above the base line value, injection fentanyl 1-3g/kg was given for haemodynamic stability.

Parameters: The values of heart rate, systolic BP, diastolic BP, MAP, SpO_2 values were recorded just before induction, immediately after intubation or insertion and at 0, 1, 3, 5, 10, 15 and 20 minutes.

Insertion conditions of the LMA were graded as excellent (no resistance to insertion), good (slight resistance to insertion), poor (moderate resistance to insertion) or impossible. If insertion was impossible the patient was intubated endotracheally.

RESULTS: Descriptive statistics was done for all data and were reported in terms of mean values and percentages. Suitable statistical tests of comparison were done. Continuous variables were analysed with the unpaired t test. Categorical variables were analysed with the Chi-Square Test and Fisher Exact Test. Statistical significance was taken as $P < 0.05$. The data was analysed using SPSS version 16 and Microsoft Excel 2007.

TABLE1 : The basic demographic characteristics were comparable in both the groups

	Group I	Group II
N	50	50
Age(yrs)	46.20±9.71	41.78±9.63
Gender	25±14.1	25±19.7
Weight(kgs)	56.02±9.40	53.38±9.08

All values are expressed as mean± SD (Standard deviation) N=no. of patients,Group I=laryngoscopic endotracheal intubation,Group II=laryngeal mask airway

TABLE 2: Haemodynamic data in both the groups (Group I and Group II)

Variable	Group	Preinduction	postinduction	Immediately post intubation /Insertion	1 min	3 min	5 min	10 min	15 min	20min
SBP (mmHg)	I II	139.88±12.68 141.76±7.99	126.44±11.60 123.48±8.03	144.50±10.25 142.04±6.93	125.94±12.00 124.48±9.50	120.30±10.29 119.84±7.38	118.20±9.17* 114.36±7.56*	118.68±10.25* 113.62±6.45*	119.50±9.67* 114.56±7.62*	120.58±9.40* 112.18±5.77*
DBP (mmHg)	I II	85.38±9.95 85.22±9.23	75.02±9.50 75.80±7.05	96.52±17.99* 89.38±7.19*	77.54±9.91 78.58±6.94	76.40±10.11 77.00±8.18	76.00±9.66 74.52±8.00	75.32±7.17* 70.78±5.62*	74.62±9.52* 70.52±6.24*	74.94±8.76* 69.88±4.56*
MAP (mmHg) HR (bpm)	I II I II	103.36±10.18 104.21±7.42 76.32±8.22 76.42±9.07	92.28±8.75 91.74±5.77 78.56 ±7.32* 69.36± 8.39*	110.56±8.64* 106.98±6.15* 95.32 ±9.46* 88.50 ±8.76*	96.87±10.89 94.95±6.56 102.50±8.39* 89.88±6.70*	93.48±9.26 92.08±6.61 101.26±8.40*88.72±5.66*	90.03±8.39 87.98±6.68 92.90±9.96* 82.76±6.95*	89.74±6.80* 85.68±5.11* 86.88±6.99* 72.50±7.19*	89.42±8.16* 85.58±5.13* 84.14±7.74* 72.82±6.54*	90.13±7.62* 84.04±3.32* 82.66±6.30* 72.54±6.05*
Spo2(%)	I II	100.00±0.00 99.94±0.24	99.96±0.20 99.94±0.24	99.96±0.20 99.98±0.14	99.98±0.14 99.98±0.14	99.96±0.20 99.96±0.20	99.92±0.27 99.96±0.20	99.94±0.24 99.98±0.14	99.88±0.33 99.96±0.20	99.98±0.14 100.00±0.00

All values are expressed as mean ±SD, SBP=systolic blood pressure, DBP= diastolic blood pressure, MAP=mean arterial pressure, HR= heart rate, Spo_2 =saturation of peripheral oxygen, Group-I (laryngoscopic+endotracheal intubation), Group-II (laryngeal mask airway insertion),*p<0.05

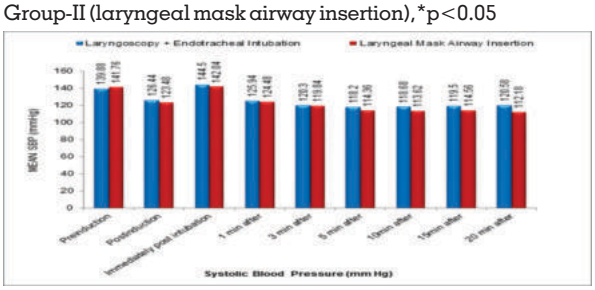

Fig.1:Increase in systolic blood pressure after laryngoscopic endotracheal intubation

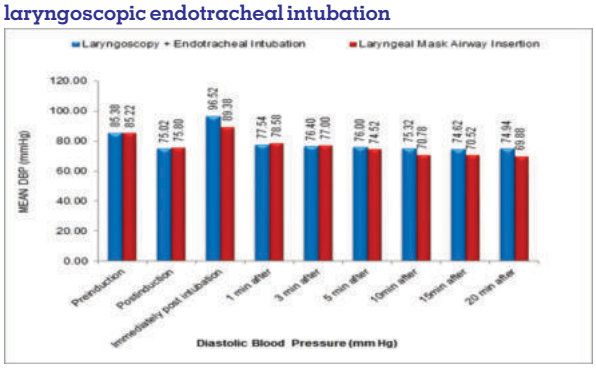

Fig.2: Increase in diastolic blood pressure after laryngoscopic endotracheal intubation

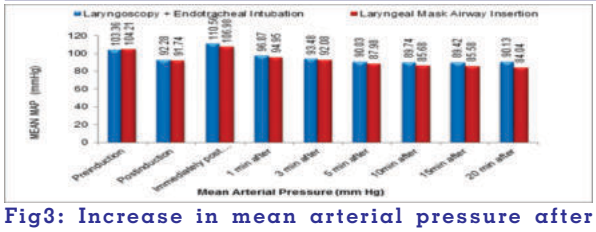

Fig3: Increase in mean arterial pressure after laryngoscopic endotracheal intubation

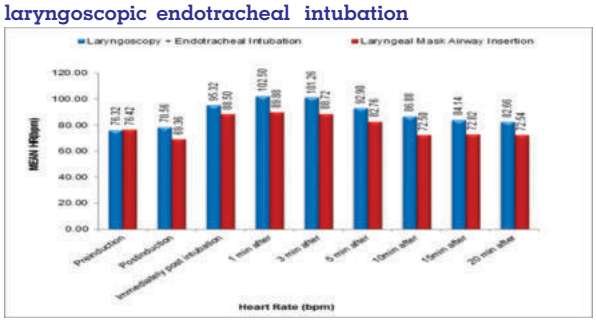

Fig.4: Increase in heart rate after laryngoscopic endotracheal intubation

DISCUSSION

Hypertensive patients are more prone to haemodynamic changes after tracheal intubation.[3] Laryngoscopy and endotracheal intubation after induction of anaesthesia offers maximum stress to the patient[7,12] and is frequently associated with transient hypertension, tachycardia and arrhythmias.[9,13] These transient responses may, probably, be of little consequence in a healthy individual but it may be more severe and more hazardous in hypertensive patients.[7,9]. There are a number of ways to blunt these haemodynamic changes which include minimizing the duration of laryngoscopy, the use of intravenous narcotics, lidocaine, vasodilators, magnesium sulphate and beta- blocking agents and supraglottic devices.[4]

We conducted the study comparing the haemodynamic response with laryngoscopic endotracheal intubation and laryngeal mask airway insertion in adult hypertensive patients. This study demonstrated that there were a haemodynamic responses consisting of an increase in HR, SBP, DBP and MAP that comes with laryngoscopic endotracheal intubation as well as with LMA insertion. However, the response caused by laryngoscopic endotracheal intubation is significantly greater ($p<0.05$) than that caused by LMA insertion.

This was also proved by study conducted by Bhattacharya et al[14] (2008) in patients with controlled hypertension to determine the pressor responses following insertion of laryngeal mask airway (LMA) as compared to endotracheal intubation. The results showed that increase in systolic and diastolic blood pressure following endotracheal intubation was much more as compared to LMA. Heart rate also increased from baseline value in endotracheal intubation group than in LMA.

Our results are also in accordance Singhal et al[13] (2008) where it was demonstrated that laryngoscopy without or with ETT intubation causes stress response in form of transient hypertension, tachycardia, bradycardia or dysrhythmias. Jarineshin et al[15] (2015) compared the immediate haemodynamic effects of the insertion of laryngeal mask airway supreme (LMA-S) and classic (LMA-C) with laryngoscopy and Endotracheal Intubation (ETT). They observed that laryngeal mask airway is associated with less cardiovascular responses compared to direct laryngoscopy and tracheal intubation. In our study, HR, SBP and DBP were almost higher in the Group I compared to the Group II after instrumentation.

This persistent increase in haemodynamic variables after laryngoscopy and ETT intubation was consistent with the findings of Fujii et al[3] (1995) in hypertensive patients. This is due to increase in noradrenaline concentration after tracheal intubation was greater than after laryngeal mask airway insertion. Siddiqui NT et al[16] and Bharti N et al [17] found an attenuated hemodynamic response after insertion of laryngeal mask airway compared to endotracheal intubation. The mean arterial pressure (MAP) values in our study increased after tracheal intubation or insertion of LMA. Similar to other hemodynamic variables the MAP in group LMA was significantly lower than group ET.

In our study, HR, SBP and DBP were almost twice as high in the Group I compared to the Group II after instrumentation.

CONCLUSION:

we can safely conclude that mean HR, SBP, DBP, MAP measurement was significantly and consistently higher in laryngoscopy + Endotracheal Intubation Group compared to the laryngeal Mask Airway Insertion Group when used in ASA II grade adult controlled hypertensive patients. Laryngeal mask airway may be used for airway management during anaesthesia in hypertensive patients on treatment in whom the pressor response would be deleterious.

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