COMPARISON OF HAEMODYNAMIC CHANGES FOLLOWING TRACHEAL INTUBATION BY USING LARYNGOSCOPE WITH INTUBATING LARYNGEAL MASK AIRWAY

Aamir Sohail, Sarfraz Khan Janjua, Tassadaq Khurshid*, Muhammad Boota, Irtiza Bhutta***, Khalid Mehmood***, Muhammad Atif**

Combined Military Hospital Peshawar, *Combined Military Hospital Multan, **Military Hospital Rawalpindi, ***Combined Military Hospital Kharian,

ABSTRACT

Objective: To compare haemodynamic changes following tracheal intubation using direct laryngoscopic technique with intubating laryngeal mask airway technique.

Study Design: Randomized control trail (RCT).

Place and duration; Military Hospital Rawalpindi from Jan 2008 to Dec 2008.

Material and Methods: After approval by the hospital ethics committee, 100 patients admitted for elective surgery from OPDs were randomly distributed equally in groups I & II for either direct laryngoscopy or laryngeal mask airway intubation respectively, as a part of general anaesthesia. A uniform protocol of general anaesthesia was followed. Heart rate and mean blood pressure were recorded before and at 1, 3 and 5 minutes after intubation.

Results: It was observed that increase in mean arterial blood pressure and heart rate at 1 and 3 minute was significant in patients intubated with laryngoscope as compared to patients intubated with Intubating laryngeal mask airway (ILMA).

Conclusion: Intubation with ILMA produces less haemodynamic response as compared to direct laryngoscopy.

Keywords: Haemodynamic stress response, ILMA, Intubation, laryngoscopy.

INTRODUCTION

Laryngoscopic endotracheal tube placement is a conventional method used in routine general anaesthesia for many years. The haemodynamic stress response (HSR) to tracheal intubation can precipitate cardiovascular events in patients. Laryngoscopic stimulation of oropharyngolaryngeal structures may be an important factor in the haemodynamic stress response associated with tracheal intubation[1].

Anaesthesiologists all over the globe are making efforts to overcome the HSR related to laryngoscopy and endotracheal tube placement. In this regard many drugs like Lignocaine, Esmolol and Opioids have been studied and found effective but with their own side effects[2,3]. Many anaesthesiologists have worked on equipment changes to overcome this stress response[4,5].

Correspondence: Lt Col Sarfraz Khan Janjua, classified Anaesthetist CMH Peshawar

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The intubating laryngeal mask airway [ILMA] is a device, specially designed to guide blind intubation[6]. In theory, placement of ILMA does not require distension of pharyngeal structures therefore intubation through ILMA should be less stimulating than laryngoscope-guided intubation[7].

Various reports have shown that ILMA has advantage over laryngoscope guided tracheal intubation in patients with cervical trauma and difficult airways. It does not require head and neck manipulation on insertion and facilitates better alignment of tracheal tube[8].

Theoretically, ILMA guided orotracheal intubation leads to less severs haemodynamic responses, than direct laryngoscopy (DLS). However, some studies provide conflicting data on this issue. Zhang et al found that orotracheal intubation by using ILMA and DLS produces similar haemodynamic responses[9]. But in another study Kahl et al have demonstrated that tracheal intubation-associated reduction of cardiovascular and endocrine stress response was more pronounced by using ILMA than that by using

direct laryngoscopy[10]. However, this is yet to be determined whether ILMA is feasible to use as a primary intubating device in patients with normal airways.

In this randomized controlled study, we compared the haemodynamic effects with these two methods of tracheal intubation.

PATIENTS AND METHODS

This study was carried out in the Military Hospital Rawalpindi from Jan 2008 to Dec 2008. After approval by the hospital ethics committee, one hundred adult patients from both genders, ASA I and II admitted for elective surgery from OPDs were randomly (by lottery method) assigned to two equal groups I&II for either direct laryngoscopy (DLS) or itubating laryngeal mask airway (ILMA) respectively as a part of general anaesthesia. A uniform protocol of general anaesthesia was followed. Heart rate and mean arterial pressure were recorded before and at 1, 3 and 5 minutes after intubation.

Patients with cardiovascular, pulmonary, renal, liver dysfunctions, oropharyngeal deformities and pregnant women were excluded.

Each patient under went a detailed pre-anaesthesia evaluation. Based on the history, clinical data, laboratory investigations, chest x-ray and electrocardiogram (ECG) patients were graded according to the ASA classification. Necessary pre-operative orders were advised. In the operation theatre intravenous line was established with an 18G cannula. Basic monitors i.e., non-invasive blood pressure (NIBP), ECG and pulse oximeter were attached to the patient. Rapport was established to make the patient comfortable in the operation room environment.

All the patients received 30µj/kg of midazolam and 75µg/kg nalbuphine as premedication 5 min before induction. Pulse oximetery, (SpO_2), NIBP and ECG were monitored for all patients. After pre oxegenation, all patients were given general anaesthesia using Sodium thiopental 5mg/kg and atracurium 0.5 mg/kg intravenously as an induction and relaxation agent respectively. Intermittent positive pressure ventilation (IPPV) was carried out for the next 4 minutes using face mask on Entonox and Isoflurane 1%. The patients in group I were then intubated using Macintosh laryngoscope with blade size of 3 or 4 and patients in group II were intubated using ILMA size 3 or 4. Anaesthesia was maintained with Isoflurane 1% and Entonox. Intubation was confirmed by chest wall expansion, auscultation and capnography. Pulse and mean MAP were recorded just before and 1, 3 and 5 mins after intubation.

Data collected through proforma was entered in the Statistical Package for Social Sciences (SPSS) version 10.0. The variables HR, MAP, and their means were calculated with standard deviation. The pulse and mean arterial pressure were compared for normal laryngoscopic with ILMA intubation using independent t test to find any significant difference. A p value of < 0.05 was considered significant.

RESULTS

There were 100 cases i.e., 50 in each group. The demographic variables in two groups along with p values given in table 1. There was no statistically significanct difference in two groups in term of age and gender.

Mean arterial pressure noted two groups along with p value given in table-2. Heart rate (HR) noted in two groups along with p vale given in talbe 3.

Significant statistical difference between groups was detected in terms of MAP and HR at 1 and 3 minutes after intubation. However there was no significant statistical difference between groups in terms of MAP and HR just before intubation and at 5 minutes after intubation.

DISCUSSION

Maintenance of airways is always the primary concern for the anaesthesiologist. Tracheal intubation during general anaesthesia is usually associated with stress response[1]. This stress response might not be of concern in young healthy patients, but in patients of

Table-1: Demographic variables.

	Group 1	Group II	P value
Male			
Mean	30.75 yrs	28344 yrs	0.654
SD	8.77	8.20	
N	16	18	
Females			
Mean	30.88 yrs	31.78yrs	0.436
SD	7.60	8.54	
N	34	32	

Table-2: MAP comparison in both groups.

MBP (min)	MAP in group I Laryngoscopy	MAP in group II ILMA	P Value
Zero	88.87 ± 7.11	87.53 ± 5.01	0.277
1	100.49 ± 8.49	95.37 ± 3.98	0.001
3	94.52 ± 6.15	91.42 ± 5.51	0.005
5	87.65 ± 5.51	87.98 ± 3.33	0.715

Table-3: Heart Rate comparison in both groups.

HR (min)	HR in group I Laryngoscopy	HR in group II ILMA	P Value
zero	75.22 ± 6.79	74.52 ± 6.08	0.588
1	92.76 ± 8.28	85.66 ± 5.79	0.001
3	83.70 ± 5.15	80.80 ± 4.81	0.004
5	74.16 ± 5.60	73.86 ± 5.89	0.795

cardiovascular disorders, the haemodynamic stress response may be hazardous and totally unacceptable[10].

Some anaesthesiologists have worked on equipment changes to overcome this stress response and in this way different types of laryngoscopes have been invented and used in clinical practice. Because mechanical stimuli to oropharyngolaryngeal structures caused by a direct laryngoscope are considered as major causes of the haemodynamic responses to laryngoscopy and tracheal intubation, many studies have focused on an intubation method that is able to attenuate or avoid the mechanic stimuli[2-5].

Many studies hav been conducted throughout the world which have compared the number of parameters like ease of insertion, time taken for intubation, haemodynamic stress response to intubation, oropharyngolaryngeal mucosal injuries, use in emergency, use in difficult airways between ILMA intubation and other intubating devices and showed conflicting results. Brain[6] and Baskett et al[7] have shown that placement of the ILMA is associated with reduced stress response compared to conventional laryngoscope intubation and is likely to be advantageous in patients suffering from hypertension and ischaemic heart disease. Zhang Guo-hua et al[9] showed that orotracheal intubations by using ILMA and DLS produced similar haemodynamic response. ILMA had no advantage in attenuating the haemodynamic responses to orotracheal intubation compared with DLS. Their results contradict ours and may be due to difference in duration of time taken for intubation after giving muscle relaxation which in our study was 4 minutes as compared to 2 minutes. Kahl et al[10] demonstrated that tracheal intubation- associated reduction of cardiovascular and endocrine stress response was more pronounced by using ILMA than that by using DLS. It is likely that these conflicting results are resulting from different duration of laryngoscopy, the times of attempts and methods of operation during ILMA-guided orotracheal intubation, and anesthetics and subject selection.

We compared stress response (MAP and HR) to tracheal intubation between two intubating techniques i.e. direct laryngoscopy with Macintosh laryngoscope (DLS) and ILMA by following uniform protocol of general anesthesia. We found that there is an increase in MAP and HR after intubation in both groups, but increase in MAP and HR was greater in group I than group II.

Wilson et al[11] studied in 40 healthy patients and compared the cardiovascular responses induced by the insertion of laryngeal mask airway with laryngoscopic tracheal intubation. The mean maximum increase in systolic blood pressure after laryngoscopy and tracheal intubation was 51.3% compared with 22.9% for the ILMA insertion (p<0.01). Increase in maximum heart rate was similar, although heart rate remained elevated for longer period after tracheal intubation. In our study, results showed similar increase in BP and HR but

duration of changes remained same in both groups.

In another study by Naik[12] both groups showed a significant (p<0.05) increase in heart rate from baseline after tracheal intubation. The mean arterial pressure was increased significantly (p<0.05) after tracheal intubation in laryngoscope group. However, the increase in blood pressure was insignificant in ILMA group and comparable to baseline values. Our study showed rise in MAP and HR in both groups after intubation but response was insignificant in group II as compared to group I which is comparable to the study of Kihara et al[13] who have concluded that intubation through intubating laryngeal mask airway is accompanied by minimal cardiovascular responses than those associated with direct laryngoscopic tracheal intubation. that tracheal intubation through ILMA may be less stimulating than.

Siddiqui and Khan[14] have shown an increase in heart rate and MAP for the first three minutes post-intubation compared with baseline values when compared to our study the rise in MAP and HR are similar in group I but increase in MAP and HR in group II is less.

Our study has certain limitations, most importantly all the patients are ASA-I and ASA-II. Use of midazolam and nalbuphine may have altered the results in our favour. Moreover it was performed on elective patients and so it cannot be applied to emergency conditions.

CONCLUSION

On the basis of our results it is concluded that haemodynamic stability after tracheal intubation with ILMA has an edge over DLS. This fact can be of great importance in patients having compromised cardiovascular status. With more expertise in routine use of ILMA it can be a feasible device for intubation in normal individuals also.

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