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Nasal Intubation via Laryngoscope in Maxillofacial Surgeries: Changes in Hemodynamic Parameters

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Abstract

Background: The purpose of the present study was to check the hemodynamic response of conventional nasal intubation in oral and maxillofacial surgeries. **Subjects and methods:** After taking approval of the hospital ethical committee on research, 30 consenting adult patients, of either sex, of ASA physical status 1 and 2, in the age group of 18-60 years coming for oropharyngeal and maxillofacial surgery were included in the study. After induction of general anaesthesia patients were intubated by conventional nasal intubation technique. **Results:** When heart rate and mean arterial pressure were compared before and after intubation, significant increase in heart rate and mean arterial pressure were observed. **Conclusion :** From this study it was concluded that conventional nasal intubation can cause significant change in hemodynamic parameters.

Keywords: Endotracheal intubation, Conventional nasal intubation, Heart rate, Mean arterial pressure.

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Introduction

Nasal intubation is preferred to oral intubation in patients requiring oropharyngeal and maxillofacial surgery. Nasal intubation provides unrestricted access to mouth which facilitates the insertion of instruments.[1] Use of laryngoscope blade can cause circulatory change along with the process of insertion of endotracheal tube and inflation of tracheal tube cuff due to mechanical nociception of upper respiratory tract resulting in sympathetic stimulation.[2] Endotracheal tube insertion is considered as most invasive stimuli.[3,4] Due to this sympathetic stimulation there is increase in heart rate and blood pressure. This stress response can cause significant morbidity and mortality in some patients.[5] The present study was undertaken to analyze the hemodynamic response during conventional nasal intubation.

Subjects and Methods

A randomized controlled study, approved by the ethical committee of the institution was carried following the Declaration of Helsinki on medical protocol and ethics. Thirty adult consenting patients of ASA physical status 1 and 2 in the age group of 18-60 years of either sex planned for oral and maxillofacial surgery were included in the study. Patients with anticipated history of difficult airway, pregnancy, bleeding disorders or those on antiplatelet / anticoagulant medication, were excluded from the study. All patients were premedicated with tablet alprazolam 0.25 mg at bedtime on the day before surgery and two hours before the scheduled surgery. Baseline mean blood pressure and heart rate were recorded. Two drops of xylometazoline were applied in each nostril 15 minutes and 5 minutes before the anaesthesia induction. Injection glycopyrrolate 0.2 mg intravenously was given to all the patients 15 minutes before anaesthesia induction. All the patients were preoxygenated for 3 minutes followed by standardized induction of anaesthesia with fentanyl 2 micrograms/kg and propofol 2mg/kg body weight intravenously. Muscle relaxation was achieved with injection atracurium 0.5mg/kg body weight. Injection propofol 20 mg was given after 2 minutes. Intermittent positive pressure ventilation was done for 4 minutes. Heart rate and non-invasive blood pressure measurements were done just before intubation (0 minute). Endotracheal tube lubricated with water based sterile gel was introduced into the more patent nostril and further advanced through the larynx into the trachea under vision in the conventional manner using a Macintosh laryngoscope if necessary, with the help of Magill's forcep.

Heart rate and mean blood pressure were recorded at 1 minute after tube insertion and thereafter at 3 minutes, 5 minutes and 10 minutes after intubation. The heart rate and mean arterial pressure were compared at 0 minute i.e. just before the start of intubation procedure to that of 1, 3, 5 and 10 minutes after intubation to check the hemodynamic response due to intubation. Complications during intubation procedure like pain in nose , sore throat or epistaxis were also recorded.

Results

Comparison of Heart Rate

Significant difference was observed in the measurements of heart rate between 0 minute and 1 minute, and 0 minute and 3 minute. There was significant increase in heart rate after intubation and the increase remained significant for 3 minutes. Maximum heart rate observed at 1 minute after intubation.

Comparison of Mean arterial pressure

Significant difference was observed in the measurements of mean arterial pressure between 0 minute and 1 minute, and 0 minute and 3 minute and 0 minute and 5 minute. Maximum mean arterial pressure observed at 1 minute after intubation.

Complications observed:

Two patients had both pain in nose and sore throat, five patients had only sore throat and one patient had only pain in nose. No episode of epistaxis was observed.

Discussion

Laryngoscopy and passage of endotracheal tube through the larynx is a noxious stimulus which can provoke untoward response in cardiovascular, respiratory and other physiological systems.[6] The cardiovascular response has been the center of attraction for investigators for more than three decades. During endotracheal intubation, there is mechanical stimulation of the upper respiratory tract, mainly: the nose, the pharynx, and the tracheo-bronchial tree. This stimulation is associated with enhanced neuronal activity in cervical sympathetic efferent fibers and therefore, induce reflex cardiovascular responses.[7] The hemodynamic response to laryngoscopy and intubation is regulated by the hypothalamo-pituitary-adrenocortical and sympathetic adreno-medullary response.As a result, there is secretion of cortisol, norepinephrine and epinephrine. The consequence may vary from milder problems such as tachycardia, hypertension, increase in intra cranial tension and occasional dysrhythmias to life-threatening problems such as angina, myocardial infarction, stroke, etc.[1,6] This stress response can cause significant morbidity and mortality and may be hazardous particularly in patients with cerebral or cardiovascular disease.[8] The magnitude of this response is directly related to the force and duration of laryngoscopy.[9]This cardiovascular response is maximum at approximately thirty to forty five seconds after laryngoscopy and intubation. Blood Pressure (BP), Heart Rate (HR), plasma adrenaline, noradrenaline and vasopressin concentrations increase slightly and then all return to baseline within 5 minutes.[10]Laryngoscope blade transmits approximately 40 N force on to the base of the tongue and this stimulus is considered exceptionally invasive during conventional laryngoscopy resulting in rise in blood pressure and heart rate.[11]

Mean blood pressure, heart rate, time taken for intubation, incidence of bleeding and presence of any complications after intubation were recorded in this study. For heart rate and mean arterial pressure monitoring, noninvasive methods of monitoring were used, as invasive monitoring would not have been ethically acceptable in our patients.

This study showed that after intubation there was a significant increase in heart rate. This increase in heart rate was compared with post induction (0 minute) heart rate. This increase in heart rate remained significant for three minutes. Mean arterial pressure of patients before and after intubation was recorded in this study. This was observed that there was significant increase in mean arterial pressure after intubation. This increase in mean arterial pressure was compared with post induction (0 minute) mean arterial pressure measurements. After intubation, mean arterial pressure remained elevated for five minutes which was significant.

Omprakash et al,[12] conducted similar study in a hundred patients between 18-50 years of age of ASA grade I and II of either sex undergoing elective surgical procedures. They observed that tracheal intubation caused significant increase in mean heart rate and mean arterial pressure compared with baseline and post induction values. Mean arterial pressure remained elevated for shorter duration in their study which can be attributed to the use of isoflurane for maintenance during bag and mask ventilation and after intubation resulting in more depth of anaesthesia in their study.

Smith et al,[8] studied heart rate and arterial pressure changes during nasotracheal intubation in sixty ASA class 1 patients aged between 16 and 48 years who required elective nasotracheal intubation for oral surgery under general anaesthesia. Significant increase in mean heart rate and mean arterial pressure values after tracheal intubation compared to pre-induction values was observed in their study which was comparable to this study.

Xue et al,[13] studied blood pressure and heart rate changes during nasotracheal intubation under general anaesthesia and observed significant rise in these parameters. He also studied hemodynamic response in children. Xue et al,[14] conducted orotracheal intubation in Forty-three children, ASA I and II scheduled for elective plastic surgery under general anesthesia and found significant rise in hemodynamic parameters.

Table 1: Heart rate at different time intervals

Heart rate	0 min	1 min	3 min	5 min	10 min
Mean	83.23	101.6	93.33	87.97	84.73
Standard deviation	13.07	15.63	13.88	13.46	10.93
p value	-	P<0.0001	0.0045	0.1717	0.6315
Results	-	Significant	Significant	Not Significant	Not Significant

Table 2: Mean arterial pressure at different time intervals

MAP	0 min	1 min	3 min	5 min	10 min
Mean	79.43	107.07	95.63	87.33	81.86
sd	10.26	15.99	13.70	11.20	8.23
p value	-	p<0.0001	<0.0001	0.0061	0.3158
Results	-	Significant	Significant	Significant	Not significant

Tushar et al,[11] observed hemodynamic response in nasotracheal intubation under general anaesthesia after conventional laryngoscopy in 50 ASA grade I and II patients scheduled for an elective surgery under general anesthesia. They observed significant rise in heart rate and mean arterial pressure, but the elevation in mean arterial pressure remained for shorter duration than that in our study which might be because of use of isoflurane instead of halothane, and due to commencement of intubation following 90 seconds after induction.

In this study eight patients showed some complications after the procedure like sore throat and pain in nasal cavity. No incidence of epistaxis was recorded. From this study we have concluded that conventional nasal intubation is itself an invasive stimulus and to be performed with caution in patients with decreased cardiovascular reserve.

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