

Comparison between Pre-Operative Psychological Stress Induced Change in Hemodynamics with Intubation Stress

Dr. Nikhil Mathew Simon¹, Dr. Radhesh Hegde²

¹Post Graduate Resident, Department of Anaesthesiology, Father Muller Medical College Hospital, Kankanady, Mangalore

²Head of Department and Professor, Department of Anaesthesiology, Father Muller Medical College Hospital, Kankanady, Mangalore

Abstract: ***Background:** Pre-operative anxiety is a very typical occurrence before surgery, frequently because of the seriousness of the dangers involved and the unfamiliar setting. Increases in systemic blood pressure, heart rate, and plasma catecholamine concentrations are brought on by preoperative anxiety as well as by stimulation of proprioceptors near the base of the tongue during laryngoscopy. In our study we tried to determine if preoperative mental stress is equivalent to physical intubation stress. **Objectives:** To assess and quantify the severity of anxiety in pre-operative patients and its effect on hemodynamics and compare it with the intra operative change in hemodynamics during laryngoscopy when administering general anaesthesia **Methodology:** This study was a prospective analytical study done in Father Muller Medical College. The day before the surgery, the patients were made to fill out the Generalised Anxiety Disorder-7 (GAD-7) questionnaire themselves after which the procedure of general anaesthesia and the surgery were then explained to following which heart rate and blood pressure were monitored. On the day of the surgery, vitals were recorded every minute for the first three minutes following intubation. The average blood pressure and heart rate were recorded and then compared to the baseline blood pressure and base heart rate. **Results:** 42 individuals were included in our study and it was noted that preoperative and intraoperative haemodynamic values namely heart rate and blood pressure for severely anxious patients were comparable. **Conclusion:** There is a correlation between the psychological strain brought on by worry and expectation before surgery and the stresses put on the body during laryngoscopy. This signifies that it is important to not only attenuate the stress during Intubation but also to alleviate the mental stress prior to the surgery.*

Keywords: Anxiety, Endotracheal Intubation; Stress, General Anesthesia, Laryngoscopy

1. Introduction

Pre-operative anxiety is an extremely common occurrence prior to surgery often due to the severity of the risks involved and the foreign environment. An estimate of nearly 60 percent of the patients undergoing scheduled surgery develops pre-operative anxiety [1]. Anxiety experienced by each patient differs and is dependent on a multitude of factors. These include the surgery itself, fears about the agents employed by the anaesthesiologist, perioperative pain, and the final result of the procedure [2, 3]

Preoperative anxiety increases the catecholamine secretion, and catecholamine causes tachycardia, hypertension, and arrhythmias. [4, 5] There are a variety of influences that affect preoperative stress levels ranging from demographic and psychosocial behaviour of the patient that also need to be taken in account, for instance, standard anxiety levels without any stimulus, personality traits and use of coping mechanisms. Other significant variables include medical comorbidities, the nature of the surgery, prior surgical history, and counselling obtained. [6]

A regular practice of general anaesthesia involves securing the patients' airway. The use of the laryngoscope during endotracheal Intubation is significantly responsible for a stress response. The main stimulus to this response arises from the forces exerted by the laryngoscope blade on the base of the tongue while lifting the epiglottis, the reason for the hemodynamic response to laryngoscopy and orotracheal intubation is proposed to be by somato-visceral reflexes. Stimulation of proprioceptors at the base of the tongue

during laryngoscopy induces impulse dependent increases of systemic blood pressure, heart rate and plasma catecholamine concentrations. [7, 8]

It has been hypothesized that psychological stress is often comparable with physical stress. In our study we tried to compare the effect of preoperative mental stress in anxious individual undergoing elective surgeries with the physical intubation stress of the laryngoscope intra-operatively by monitoring the heart rate and blood pressure.

2. Materials and Methods

This was a prospective, observational, hospital based, analytical study conducted in Father Muller Medical College Hospital. Study subjects included surgical patients who presented for elective surgery under general anaesthesia (both male and female) aged between 18 and 60 years of American Society of Anesthesiology (ASA) physical status 1-2.

Patient with a history of difficult intubation, pathology of oral cavity, neck, upper respiratory tract and upper alimentary tract, body mass index (BMI) more than 30, pregnant women and a known history of Hypertension or Ischemic heart diseasewere excluded from the study.

The day before the surgery, the patients were made to fill out the Generalised Anxiety Disorder-7 (GAD-7) questionnaire themselves after which the procedure of general anaesthesia and the surgery were then explained to the patient in their own language following which heart rate and blood pressure

were monitored with the help of an automatic noninvasive blood pressure monitor and pulse-oximeter once every five minutes for 15 minutes. The average blood pressure and heart rate recorded was taken as the pre-operative value. The patients were premedicated with 150mg RANITIDINE the night before the surgery.

On the day of the surgery, standard ASA monitors namely an ECG, a noninvasive automatic blood pressure monitor, and a peripheral oximeter were attached to the patient. Patients were pre-oxygenated and anesthesia was induced with Inj PROPOFOL 2mg/kg IV. When the loss of verbal response was checked, vecuronium 0.1 mg/kg was injected intravenously. Manual ventilation was performed for 3 minutes. Then tracheal intubation was performed by an anesthesiologist with 1 year of experience. Vitals were

recorded every minute for the first three minutes following intubation. The average blood pressure and heart rate within 5 minutes after tracheal intubation were recorded and defined to be the patient's highest blood pressure and highest heart rate. They were then compared to the baseline blood pressure and base heart rate.

After measurements were taken for 5 minutes, isoflurane and fentanyl 2 µg/min/kg were used for anesthetic maintenance. . If tracheal intubation was not successful on the first attempt, the patient was excluded from the research study.

Data was entered in Microsoft Excel 2007 and analyzed using SPSS version 22.0.

3. Results

Our study included a total of 42 subjects with comparable demographics.

Table 1, 2 and 3: Demographic characteristics with respect to age, sex and ASA classification

	Age	Valid Percent
<30	9	21.4
31-40	8	19
41-50	14	33.3
51-60	11	26.2
Total	42	100

	SEX	Valid Percent
F	18	42.9
M	24	57.1
Total	42	100

	ASA Classification	Valid Percent
1	27	64.3
2	15	35.7
Total	42	100

Table 4: Comparison of Mean Arterial Pressure pre-operatively and intra-operatively Paired T Test to Compare the Before and After Values

		N	Mean ± SD	Mean difference ± SD	T	P Value
Mild Anxiety	Pre Op MAP	19	94.54±7.01	5.49±3.99	6	<0.001
	Intra Op MAP	19	100.04±5.91			
Moderate Anxiety	Pre Op MAP	19	102.00±7.82	1.09±1.53	3.11	0.006
	Intra Op MAP	19	103.09±6.90			
Severe Anxiety	Pre Op MAP	4	105.67±3.38	-1.33±1.66	-1.61	0.21
	Intra Op MAP	4	104.33±3.21			

At 5% significance level, there is not sufficient evidence to support the claim that mean values of Intra-Op MAP are different from Pre-Op MAP values for Severe Anxiety patients.

Table 5: Comparison of Heart rate pre-operatively and intra-operatively Paired T Test to Compare the Before and After Values

		N	Mean ± SD	Mean difference ± SD	T	P Value
Mild Anxiety	Pre Op HR	19	74.00±9.04	5.49±3.99	5.53	<0.001
	Intra Op HR	19	80.21±8.12			
Moderate Anxiety	Pre Op HR	19	85.53±7.07	1.09±1.53	1.38	0.18
	Intra Op HR	19	86.68±5.24			
Severe Anxiety	Pre Op HR	4	98.50±7.77	-1.33±1.66	-1.99	0.14
	Intra Op HR	4	91.00±8.60			

At 5% significance level, there is not sufficient evidence to support the claim that mean values of Intra-OpHR are different from Pre-Op HR values for Moderate and Severe Anxiety patients.

4. Discussion

Stress is the body's reaction to any change that requires an adjustment or response. Preoperative anxiety is a challenging problem in the perioperative care of patients. [9] Major cardiac events, postoperative discomfort, increased analgesic and anaesthetic intake, prolonged hospital admissions, negative effects on anaesthesia induction and patient recovery, and a decline in patient satisfaction with the perioperative experience are all possible outcomes.

Preoperative anxiety level is difficult to measure accurately. Anxiety scales have been used to analyze and determine the severity of anxiety. Having considered that assessments among perioperative patients are to be timely and convenient and given the lack of available professional assessors on staff, self-reported scales are the most suitable. [10] This study has employed the GAD-7 scale to determine the degree of perioperative anxiety due to its simplistic nature and wide use. However, it can be estimated indirectly by measuring blood pressure, pulse, and decreased heart rate variability and patient irritability. [11]

The direct stimulation of the pharynx, larynx, and trachea by the laryngoscope blade itself can cause a pressor response, which is a sympathetic nervous system reflex with a measurable increase in plasma catecholamines consisting of transient increase of blood pressure and heart rate. [12]

The objective of this study was to assess and quantify the severity of anxiety in pre-operative patients and its effect on hemodynamics and compare it with the intra operative change in hemodynamics during laryngoscopy when administering general anaesthesia

The study included 42 patients who were divided as per their level of anxiety. The frequency by categories was 9.5% with severe anxiety, 45.2 percent with a moderate level of anxiety, and 45.2% with a mild level of anxiety. Thus, we can conclude that all patients had a level of preoperative anxiety. The study also revealed that hemodynamic changes- (mean arterial blood pressure, heart rate) in the pre and intra-operative period are comparable in persons having severe anxiety indicating that severe psychological stress can be comparable to physical stress.

The association between patients' preoperative anxiety and hemodynamics during tracheal intubation was clarified by the study of Won-Sung Kim et al [13] The study of the older age group revealed that anxiety was useful in predicting the change in heart rate and mean arterial pressure, demonstrating that patients with high levels of preoperative anxiety are more likely to experience hemodynamic alterations during anaesthetic induction. Our study also proved that hemodynamics of severely anxious patients were comparable in the pre-operative and intra-operative period which can help the anesthesiologist predict the change intra-operatively and better attenuate the response.

Arash Farbood et al [14] study on the impact of preoperative depression and anxiety on heart rate variability in breast cancer patients found that patients with high levels of preoperative anxiety had significantly higher systolic, diastolic, and mean blood pressure both before and after the induction of anaesthesia, which was similar to our study.

Jasmina Ahmetovic-Djug et al [15] study on the effect of preoperative anxiety in patients on hemodynamic changes and an anaesthetic dose during induction of anaesthesia revealed that average values of mean arterial pressure, preoperatively and after the induction of anaesthesia differed, but there was't any observed statistically significant association between anxiety and differences in blood pressure, which is not consistent with our study.

5. Conclusion

Pre-operative anxiety is a regular occurrence in modern medicine, and it has a substantial impact on hemodynamics. There is a correlation between the psychological strain brought on by worry and expectation before surgery and the stresses put on the body during laryngoscopy. Thus, it is reasonable to conclude that attenuation of preoperative mental stress is equally important as alleviating the stress during laryngoscopy. In order to reduce preoperative stress and anxiety, precautions must be taken in the form of counselling, psychological treatments, and pharmaceutical interventions. To protect the patient from any adverse event, consideration should also be given to hemodynamic reactions during anaesthetic induction.

6. Limitations

Information on patients with past surgical experience and the varying levels of curiosity of the patients who had many questions on the surgery were not included in the research study, which limited the analysis. The inclusiveness of a variety of surgeries and the effect of different disease states on haemodynamic parameters may have skewed the results.

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