International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 432-439 www.ijdmsrjournal.com ISSN: 2582-6018

A Study on Role of Intravenous Labetolol in Attenuation of Hemodynamic Responses to Endotracheal Intubation

Md Sirajuddin[1], Zara Batool[2], Syeda Shabana Khader[3], Nishad Anjum[4], Mohammed Safwan Shaik[5]

[1]*department Of Anaesthesiology,*
Deccan College Of Medical Sciences,Hyderabad, India

Submitted: 01-02-2023 Accepted: 10-02-2023

ABSTRACT:
Introduction:
Endotracheal Intubation is one of the most commonly performed procedures, where the role of Anesthesiologist in patient care is noteworthy. Endotracheal intubation is the translaryngeal placement of endotracheal tube into trachea via mouthor nose.
There is substantial evidence that laryngoscopy and endotracheal intubation in lightly anesthetized patients is accompanied by considerable increase in heart rateand arterial blood pressure.
Material and Methods: 100 patients belonging to ASA-1 and 2 of both the sexes (each group 50 patients n =50) undergoing surgery under general anaesthesia were randomly selected for the study. Patients of either sex with ASA grade 1 and 2 **and** the patients age ranged between 25 to 50 years were taken intostudy. Patients with history of respiratory problems, angina, palpitation, baseline systolic BP<100, coronary artery diseasewere excluded.
Results and Conclusion:

- Group 1 comprising of control group of 50 patients, who did not receive any pre-treatment and Group 2 comprising of study group of 50 patients who received Labetalol 0.2 mg/kg 10 minutes before intubation as pre-treatment. Induction agents and anesthetic techniques were standardized for both groups.
- Blood pressure and pulse rate were recorded at the time of pre-anesthetic check up i.e. one day prior to surgery, again blood pressure and heart ratewere recorded at following intervals on the day of surgery: Pre induction (Base line); Induction; Laryngoscopy and Endotracheal intubation; 1 minute ; 3 minutes and 5 minutes after intubation. The data obtained was comparedbetween the two groups.
- In the control group immediately after intubation, the hemodynamic parameters increased as follows : Systolic BP by 33 mmHg, Diastolic BP by 17 mmHg, mean arterial pressure by 31 mmHg and Heart rate increased by30 beats per minute.
- In the study group, the hemodynamic parameters were as follows: systolic BP decreased by 5 mmHg, whereas diastolic BP, mean arterial pressure and Heart rate were similar to the base line values.
- From this study, we conclude that intravenous Labetalol effectively attenuates the hemodynamic response to laryngoscopy and intubation.

Keywords: [Endotracheal intubation, Labetolol ,Hemodynamic responses]

I. INTRODUCTION

Endotracheal Intubation is one of the most commonly performed procedures, where the role of Anesthesiologist in patient care is noteworthy. Endotracheal intubation is the translaryngeal placement of endotracheal tube into trachea via mouthor nose.

There is substantial evidence that laryngoscopy and endotracheal intubation in lightly anesthetized patients is accompanied by considerable increase in heart rateand arterial blood pressure[4]. These changes are usually of short duration and well tolerated by patients in absence of cardiovascular diseases or disturbed intracranial pressure homeostasis. The hypertensive response to laryngoscopy and intubation have been shown to be due to sympathetic discharge caused by stimulation of pharynx and larynx causing increase in the levels of catecholamines, especially noradrenaline and activation of alpha and beta receptors[18]. The reaction is not prevented by routine premedication. The increase in heart rate and blood pressure are transitory, variable and unpredictable. Failure to blunt the response to intubation mayhave disastrous consequences in patients with hypertension, coronary artery disease, raised ICP, aneurysmal vascular disease and diseased cerebral vasculature[13]. Attempts were made to differentiate between the effects of laryngoscopy and those of tracheal intubation and their individual contribution to

International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 432-439 www.ijdmsrjournal.com ISSN: 2582-6018

hemodynamic changes[25]. The various, complications observed during endotracheal intubation are arrhythmias, MI, acute LVF, intracranial hemorrhage and pulmonary edema[36]. In eclamptic patients convulsions may be precipitated. Almost all types of dysrhythmias have been reported in addition to sinus tachycardia and sinus bradycardia. The common abnormalities are nodal rhythm, atrial and ventricular extrasystoles and pulsus alterans

II. MATERIALS & METHODS

After obtaining Institutional Review Board approval and patient's written informed consent, the present study was conducted in hundred adult patients scheduled for various routine surgical procedures under general anesthesia, in ASA Grade - I and II physical status, after informed consent. The patients in the age group of 20-50 years comprising of bothsexes were taken for the study.

Patients underwent procedures like total abdominal hysterectomy, vaginal hysterectomy, diagnostic laparoscopy, laparoscopic appendicectomy, herniorrhaphy, laparoscopic cholecystectomy etc.

All the patients were assessed clinically pre-operatively and presence of any medical disorder and history of drug intake was ruled out. Patient with h/o angina/palpitations/syncope, h/o respiratory problems, hepatic or renal problems were excluded from the study. Patients with base line Heart Rate <60 beats per minute, base line systolic blood pressure <100 mm Hg, ECG abnormalities were excluded from the study. Patients in whom intubation was thought to be difficult were excluded from the study. All the patients underwent the following investigations viz., complete urine analysis, Hemogram, Blood Chemistry, X-ray chest and a pre-operative ECG.

Patients were randomly assigned into one of the two groups (n=50 each) using a computer generated randomization chart. The study was carried out in a double-blind manner only the attending anesthesiologist, but neither the patient nor the observer during the study period knew which study agent had been used.

GROUP-I CONTROL: Comprising of 50 patients. This group did not receive Labetalolpretreatment.

GROUP-II STUDY: Comprising of 50 patients, who receive intravenous Labetalol 0.2mg/kg 10 minutes before intubation. The premedication, induction agent and muscle-relaxant to facilitate intubation were standardized for both the groups. Intravenous cannulation was done with 18-G cannula after shifting the patient into the waiting area of the operation theatre and connected to a drip of Ringer's lactate solution. Premedication with Inj.Fentanyl 1-2mcg/kg body weight and glycopyrrolate 0.1mg were given slowly intravenously, 20 minutes before induction. Patient was connected to non-invasive blood pressure monitor and pulse oximeter probe and electrocardiographic leads (limb-lead-11). All patients were pre-oxygenated with 100% oxygen for 3minutes. The patient was induced by Thiopentone Sodium (5mg/kg-body weight). Using Vecuronium bromide 0.1mg/kg-body weight facilitatedintubation. The lungs were ventilated with 100% oxygen for 180 seconds . Intubation was carried out 10 minutes after the Labetalol pre-treatment (during peak action of drug). Intubation was achieved by the aid of Macintosh Laryngoscope, an appropriate size oral, cuffed portex endotracheal tube. The time taken for intubation did not exceed 20 second (intubation that needed more than 20 seconds was excluded from the study). Anesthesia was maintained with vecuronium bromide 0.08 mg/kg top-up doses; and intermittent positive pressure ventilation with Nitrous oxide and oxygen as55 : 33 using Bain's circuit connected to the Boyles' machine. Surgery was not-allowed to commence till the recordings were completed. At the end of the surgery, residual neuromuscular blockage was reversed with neostigmine (0.05mg/kg) and atropine (0.02 mg/kg). All the patients were followed in the post operative period. No incidence of any adverse effects of the Labetalol was seen in the post operative period in the study group. No adverse effects were seen in the control group also.

The Parameters recorded were: -

1. Heart Rate
2. Systolic Blood Pressure
3. Diastolic Blood Pressure
4. Mean arterial pressure.

The recordings were noted at various intervals as detailed below, from the studyconducted:-

1. Pre-operatively i.e., after premedication
2. After induction
3. At laryngoscopy and intubation
4. One minute after intubation
5. Three minutes after intubation
6. Five minutes after intubation.

Statistical Analysis

The following methods of statistical analysis have been used in this study. The Excel and SSPS (SSPS Inc. Chicago) software packages were used for data entryand analysis.

The results were averaged (mean ± SD) for each parameter for continuous data and numbers and

International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 432-439 www.ijdmsrjournal.com ISSN: 2582-6018

percentage for categorical data presented in table and figure.

1. Student 't' test: the student 't' test was used to determine whether there was statistical difference between the parameters measured.
2. Proportions were compared using Chi's – square test of significance.

3. The level of significance was taken as P > 0.05 -Not Significant

P < 0.05 -Significant
P < 0.01 -Highly Significant

III. OBSERVATIONS AND RESULT

In the control group there was a fall in the systolic BP by about 6 mm Hg, diastolic BP by about 4 mm Hg and mean arterial pressure by about 6 mm Hg. Heart rate increased by about 5 beats per minute.

In the study group there was a fall in the systolic BP Hundred patients, undergoing elective non-cardiac surgery were selected for the study. The patients were randomly divided into two groups of 50 patientseach.

Group-I Control
Group-II Study
Patients did not receive Labetalol pre-treatment.
Patients received Labetalol pre-treatment.

TABLE - I
Weight distribution in both the groups

Group	Confidence interval(Mean±S.D)	T value	P value	Result
Controln=50	45.41174,47.58826	85.866	P<0.05	Significant
Studyn=50	44.06737,46.01263	93.058	P<0.05	Significant

- The range for weight was 38-52 kgs and 36-50 kgs in control and studygroups respectively.
- There was statically significant difference (P < 0.05).

TABLE - II
Hemodynamic parameters recorded after premedication (CONTROL GROUP)

Parameter	Confidence interval(mean±S.D)	t value (control)	P value	Result
Systolic BP	115.4054,121.8746	73.708	P<0.005	Significant
Diastolic BP	75.55184,78.84816	94.129	P<0.05	Significant
Mean Arterialpressure	90.72903,93.27097	145.46	P<0.05	Significant

Heart Rate	81.93404,89.18596	47.419	P<0.05	Significant

TABLE - III

Hemodynamic parameters recorded after premedication (STUDY GROUP)

Parameter	**Confidence interval(mean±S.D)**	**t value (control)**	**P value**	**Result**
Systolic BP	117.7316,121.084	134.3	P<0.05	Significant
Diastolic BP	77.088,79.392	136.48	P<0.05	Significant
Mean Arterial pressure	90.72903,93.27097	145.46	P<0.05	Significant
Heart Rate	87.13802,92.62198	65.872	P<0.05	Significant

There was statistically significant difference in parameters between the two groups($P < 0.05$).

- Values are Confidence interval(Mean±S.D).
- Tests of Significance between groups were carried out by Students t-test ormodified t-test.
- The changes in the parameters when compared between two groups are **statistically significant** ($P < 0.05$).

TABLE – IV

Hemodynamic parameters recorded after induction (CONTROL GROUP)

Parameter	**Confidence interval(mean±S.D)**	**t value (control)**	**P value**	**Result**
Systolic BP	108.0431,112.2769	104.57	P<0.05	Significant
Diastolic BP	71.79892,75.40108	82.12	P<0.05	Significant
Mean Arterialpressure	81.76588,84.23412	135.15	P<0.05	Significant
Heart Rate	85.37955,93.58045	43.853	P<0.05	Significant

TABLE – V

Hemodynamic parameters recorded after induction (STUDY GROUP)

Parameter	**Confidence interval(mean±S.D)**	**t value (control)**	**P value**	**Result**
Systolic BP	104.3932,108.0868	115.61	P<0.05	Significant
Diastolic BP	70.08795,72.47205	120.16	P<0.05	Significant
Mean Arterialpressure	81.76588,84.23412	135.15	P<0.05	Significant
Heart Rate	83.90403,89.69597	60.232	P<0.05	Significant

International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 432-439 www.ijdmsrjournal.com ISSN: 2582-6018

- by about 13 mm Hg,diastolic BP by about 7 mm Hg and mean arterial pressure by about 9 mmHg. Heart rate was also decreased by about 3 beats per minute.
- When compared to pre-induction values, these changes are **statisticallysignificant** ($P < 0.05$)

TABLE - VI

Values during intubation in both the groups (CONTROL GROUP)

Parameter	Confidence interval(mean±S.D)	t value (control)	P value	Result
Systolic BP	142.5143,149.9657	78.88	P<0.05	Significant
Diastolic BP	91.1278,96.5522	69.53	P<0.05	Significant
Mean Arterial pressure	110.036,120.924	42.627	P<0.05	Significant
Heart Rate	111.8943,120.7457	52.817	P<0.05	Significant

TABLE - VII

Values during intubation in both the groups (STUDY GROUP)

Parameter	Confidence interval(mean±S.D)	t value (control)	P value	Result
Systolic BP	116.8088,119.9912	149.53	P<0.05	Significant
Diastolic BP	73.69739,79.90261	49.744	P<0.05	Significant
Mean Arterial pressure	90.22612,92.77388	144.34	P<0.05	Significant
Heart Rate	86.89407,91.98593	70.598	P<0.05	Significant

- In the control group systolic BP increased by about 33 mmHg, diastolic BP increased by about 17 mmHg and mean arterial pressure by 21 mmHg. Heart rate increased by about 30 beats per minute.
- In the study group, systolic BP decreased by 5 mmHg and diastolic BP, mean arterial pressure and Heart rate were almost same as base line values.
- The changes in the parameters when compared between two groups are **statistically significant (P < 0.05).**

IV. DISCUSSION

Cardiac and hemodynamic disturbances following laryngoscopy and endotracheal intubation with traditionally used anesthetic techniques were first reported by REID and BRACE in 1940. Reflex cardiovascular effects of laryngoscopy and intubation in anesthetized patients have been described previously and include apressor response and tachycardia despite the increase in systemic arterial pressure(King "et al." 1951).[1]

In general anesthesia with endotracheal intubation, a stress response due to sympatho adrenal outflow is commonly observed. This response is seen during laryngoscopy and intubation due to stimulation of laryngeal and tracheal tissues. Such response is usually well tolerated by normotensive patients. Hypertensive patients are more prone to complications due to such response. In case of healthy normal individuals, this transient rise in HR and MAP probably does not face such risks. The prevention of such stress response following tracheal intubation is paramount important in hypertensive patients.[11,12,13] The change in hemodynamic response initiated immediately after tracheal intubation and reaches to maximum level within one minute. Hence, the timing of drug selected to attenuate stress response shouldcorrespond to peak effects of the drug.[11]

Wattwil et al, observed that cardiovascular

response to intubation is abolished in patients undergoing total thoracolumbar anesthesia. In contrast, the blockade of the sympathetic outflow by epidural anesthesia, either cervicothoracic anesthesia without blocking the adrenal gland or lumbar epidural anesthesia without blocking the heart, did not affect the cardiovascular response to tracheal intubation.

The onset of action of labetalol is usually 2 min. and its peak effect reaches at 5 min to 15 min.[13]In this study, the hemodynamic response to laryngoscopy and intubation for a period of 10 min. was studied. This is mainly due to the average period for stress induced during laryngoscopy and intubation are believed to last for 10 min.[8,9]

Increased cervical sympathetic action in an anaesthetized cat following mechanical stimulation of nasopharyngeal and epipharygeal region was recorded by Tomori and Widdicombe (1969). Hypertension and Tachycardia are common responses in normotensive patients (Dingle, 1966, Forbes and Dally, 1970; Prys Roberts "et al"., 1971; Takki "et al.", 1972; Fox "et al.", 1977; Lehtenin, Hororka and Widholm 1984. Although direct recording of sympathetic nervous activity is difficult in man, measurements of plasma concentration of catecholamines have consistently demonstrated increase in noradrenaline following laryngoscopy (Russel "et al.", 1984)and so confirmed sympathetic mediation in this response. There has been many studies which demonstrated increased sympathetic response to laryngoscopy and endotracheal intubation. In our study we have confirmed the hemodynamic response to laryngoscopy and intubation.[12]

The efferent sympathetic outflow to the heart originates from the spinal cord between T1 and T4, and that to the adrenal medulla from between T3 and L3.The outflow may, in turn, be modulated by supraspinal centers. Therefore, the cardiovascular responses to laryngoscopy and tracheal intubation may be altered incord injuries.

There are two phases of release of catecholamines by sympatho adrenal stimulation which occurs during laryngoscopy and intubation. These two phases are during laryngoscopy and during the endotracheal tube placement. The author Shribman "et al." in his study showed the differences between these two events. Supraglottic stimulation was observed even during stable anesthesia where in laryngoscopy was performed. The rise in both SBP and DBP observed in contrast to the measurements before induction. The increase in BP and HR are mainly due to norepinephrine and epinephrine discharge respectively.[11]

The phase two is observed during infra glottic stimulus which occurs due to the placement of endotracheal tube in phase two. An additional cardiovascular response and catecholamine discharge occurs during this phase. During this stage, stress response increases SBP and DBP by 36–40% in comparison with control group readings. The rise in HR levels is more than 20% with tracheal intubation in contrast to [6,7] laryngoscopy.

The result of the present study has demonstrated IV administration of Inj. Labetalol in 0.2 mg/kg in pre-induction time attenuates the stress response which is caused due to direct laryngoscopy and orotracheal intubation. Always the tachycardia causes more stressful effect on the heart when compared to rise in BP as tachycardiaincreases myocardial oxygen demand, also decreases diastolic filling period, and may lead to myocardial infarction as there will be reduction in the time needed for coronary circulation. Tachycardia when seen in pre-existing hypertensive patients increases the risk of myocardial infarction and or ischemia.

Post intubation response have been associated with ST segment changes, ventricular arrhythmias, pulmonary edema, rupture cerebral aneurysm. In hypertensive patients this hyperdynamic response is exaggerated and undoubtedly causes a large increase in myocardial oxygen demand. Infact the anesthetic stress can induce myocardial ischemia. Some authors, infact, consider the intubation period one of the periods of greatest risk in surgical patients with coronary artery disease. It may be also be dangerous in increased intracranial pressure.[9]The hemodynamic response is dangerous when perfusion of vital tissue is compromised (Fischer, C. Dubois, 1985).

Various methods to attenuate the sympathetic response to laryngoscopy have been studied. Such as topical anesthesia of the pharynx along with superior laryngeal nerve block, intratracheal lidocaine spray, intravenous lidocaine, deeper planes of inhalational anesthesia, beta blockers, alpha blockers, Sodium Nitroprusside, Nifedipine, increased dose of Thiopentone, Nitroglycerine, (intranasal, Ointment, Intravenous), narcotics such as Morphine, Buprenorphine, Fentanyl, Alfentanyl.[4]

A variety of anesthetic techniques and drugs are available to control the hemodynamic response to laryngoscopy and intubation. The method or drug of choicedepends on many factors, including the urgency and length of surgery, choice of anesthetic technique, route of administration, medical condition of the patient, and individual preference. The possible solutions number as many as the medications andtechniques available and depend on the individual patient and anesthesia care

provider.

In the present study, the study group received intravenous labetalol 0.2 mg/kg body weight 10 minutes before intubation in 50 adult, healthy ASA class 1 and II patients belonging to age group between 20 to 50 years, undergoing elective surgeries.

The control group consisted of 50 healthy, ASA class I and II patients, comparable in age, sex, weight and type of surgery. Control group did not receive any Labetalol pre-treatment. Both groups were pre-medicated with Fentanyl 1-2 mcg body weight and glycopyrrolate 0.1mg approximately 20 minutes before pre-treatment.

Blood pressure and heart rate response to laryngoscopy and intubation was studied in both the groups who received the same drugs for induction and intubation.

The pre-induction hemodynamic values were slightly less than the values seen onday prior, at the time of pre-anesthetic checkup, but the difference was not statistically significant. The basal pre-induction values were comparable.

After induction with thiopentone there was a fall in systolic blood pressure and increase in heart rate in both the groups, the difference was not significant.

In the control group there was increase in hemodynamic values after laryngoscopy and intubation. The increase is as follows: Systolic blood pressure increased by 33 mmHg, Diastolic blood pressure by 17 mmHg and Mean arterial pressure by 21 mm Hg. Heart rate increased by 30 beats per minute.

The increase was significant when compared to pre-induction values in the same group. The increase in hemodynamic parameters though significant was less than the values given by some authors, this may be because of the narcotic premedication wehave used. So, this study confirms the potential hypertensive and tachycardia effects of laryngoscopy and intubation.

In the study group, systolic BP decreased by 5 mmHg whereas diastolic BP, mean arterial pressure and Heart rate were similar to base line values.

The changes when compared to changes in control group were statistically significant. This shows that Labetalol effectively attenuates the hemodynamic response to laryngoscopy and endotracheal intubation. The rise in heart rate from the preoperative values are significant ($P < 0.05$) in group L1 and L2 when compared to control group. Increase in HR and MAP at intubation in the placebo group were 23% and 17%, respectively, in the L1 group, 15% and 11% and L2 group 11% and 9% respectively. The results found in our study are comparable with the results found by the author Amar "et al." who administered 0.15 mg/kg of Inj. Labetalol for induction and 0.25–0.3 mg/kg during maintenance of anaesthesia to study effects of Inj. Labetalol in perioperative stress management. Increases in HR and MAP at intubation in the placebo group were 33% and 52% respectively; and in the labetalol group, 7.3% and The author Kim et al reported that a single dose of Inj. Labetalol 21.3% respectively.

(0.25 mg/kg) when administered preoperatively 5 min. before intubation decreases HR significantly after intubation up to 10 min. In a study conducted by Roelofse et al, the Inj. Labetalol with the dosage of 1 mg/kg when administered a bolus dose 1min. before laryngoscopy was not effective in the attenuation of HR. This failure of attenuating the stress response was explained by the peak effect of Inj. Labetalol seenafter 5–10 min.

V. CONCLUSION

- Group 1 comprising of control group of 50 patients, who did not receive any pre-treatment and Group 2 comprising of study group of 50 patients who received Labetalol 0.2 mg/kg 10 minutes before intubation as pre-treatment. Induction agents and anesthetic techniques were standardized for both groups.
- Blood pressure and pulse rate were recorded at the time of pre-anesthetic check up i.e. one day prior to surgery, again blood pressure and heart rate were recorded at following intervals on the day of surgery: Pre induction (Base line); Induction; Laryngoscopy and Endotracheal intubation; 1 minute ; 3 minutes and 5 minutes after intubation. The data obtained was comparedbetween the two groups.
- In the control group immediately after intubation, the hemodynamic parameters increased as follows : Systolic BP by 33 mmHg, Diastolic BP by 17 mmHg, mean arterial pressure by 31 mmHg and Heart rate increased by30 beats per minute.
- In the study group, the hemodynamic parameters were as follows: systolic BP decreased by 5 mmHg, whereas diastolic BP, mean arterial pressure and Heart rate were similar to the base line values.
- From this study, we conclude that intravenous Labetalol effectively attenuates the hemodynamic response to laryngoscopy and intubation.
- The principal advantages of using intravenous Labetalol over other methods for attenuation of hemodynamic response to laryngoscopy and

endotracheal intubation are;-

- Good attenuation of pressor response
- Good attenuation of heart rate response
- Provides good intraoperative protection against hemodynamic response to surgical stimuli.
- Labetalol provides protection against adverse hemodynamic response at the time of extubation in most of the cases because its half life is 5.5 hours.
- In conditions where deep sedation or deeper plane of inhalational anesthesia is undesirable, in those conditions alpha and beta blocked patient under light general anesthesia is better and stable.
- The drug is freely available, easy to administer and cost is reasonable.
- Side effects are minimal and can be readily reversible.
- Can be given intravenous as well as orally.

Acknowledgement: None
Conflict of Interest: None
Source of Funding: None
Ethical Approval: Approved

REFERENCES

[1]. Madi A, Kezsler M, Yacoub H. Cardiovascular reaction to Laryngoscopy and tracheal intubation following small and large intravenous doses of Lignocaine. Can.Anesthesia. Soc. t. 1977; 24(12).

[2]. Allen R.W, James M.F.M. Attenuation of the pressor response to intubation in hypertensive proteinuria patients by lignocaine, alternate and magnesium sulphate. Br. J. Anaesth. 1991;66 : 216 - 223.

[3]. Arnsdorf M.F,BIGGER J.J. Effects of lidocaine hydrochloride on membrane conductance in mammalian cardiac purkinje fibres. J. Clin Invest. 1972; 51 : 2252 - 2263.

[4]. Lee J.L, Dhamee M.S, Olund T.L, George V, et al. The use of esmolol, nicardipine or their

[5]. combination to blunt hemodynamic changes after laryngoscopy and tracheal intubation. Anaesth Analg. 2000; 90(2): 280 - 5.

[6]. Bach F, Jensen W, Kastrup T.S, Stigs J, Desigard A. The effects of intravenous lidocaine on nociceptive processing in diabetic neuropathy. Pain. 1990; 40 : 29-34.

[7]. Barash P.G, Koprivon C.J, Giles R, Berger H, Tarabarkar S. Global ventricular function and intubation . Radionuclear profiles. Anaesth Analg. 1980; 58(3):l09.

[8]. Basu SM, Pramani K. Duration and degree of circulatory changes following laryngoscopy and intubation and study of a method of attenuation of these changes. Ind. J. Anesth. 1988; 26 : 29-33.

[9]. Bernstein J.S, Nelson M.S, Ebert T.J, Woods M.P. Beat to beat cardiovascular response to rapid sequence intubation in humans effects of labetalol. Anaesth Analg.1987; 7(3):32.

[10]. Bean B.P, Cohen C.J, Sien R.W. Lignocaine block of cardiac sodium channel. J.Gen. Physiol. 1983; 613 - 642.

[11]. Bensky KP, Donatue - Spencer L, Hertzge - Anderson M.T, James R, et al. Studied the dose related effects of bolus esmolol on heart rate and blood pressure following laryngoscopy and intubation. Anath J. 2000; 68 (5): 437 - 42.

[12]. Charles S.R, Richard M.W. Ultrashort acting beta blockade. A comparison with conventional beta blockade. Clin. Pharm. Therap. 1985; 38(2): 579.

[13]. Chdng K.S, Sintara RS , Hajr - Isson P.M, Chung J.H. Does intermediate dose of Labetalol block the heart rate and blood pressure response to laryngoscopy and intubation. A placebo controlled study. Anaesth Analg. 1988; 69:43.

[14]. Chung K.S, Sintara R.S, Halerr J.D, et al. A comparison of Fentanyl, Esmolol and their combination for blunting the hemodynamic response during rapid sequence induction. Can J. Anaesth. 1992; 39 :774 - 9.

[15]. Churchill H.C, Davidson. A practice of anesthesia, 1984; 5" edition.

[16]. Coleman A.J, Jordan C. Cardiovascular response to anesthesia. 1980;35:972-978.