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# ATTENUATION OF HEMODYNAMIC RESPONSE DURING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION – A COMPARATIVE STUDY BETWEEN LIGNOCAINE AND FENTANYL

Anaesthesiology

**Dr. P. Tapan Kumar Yadav** Postgraduate,Department of Anaesthesiology,Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh 534005, India.

**Dr. P. Harish Gautam** Assistant Professor, Department of Anaesthesiology,Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh 534005, India.

**Dr. B. S. T. Sai*** Associate Professor, Department of Anaesthesiology,Alluri Sitarama Raju Academy of Medical Sciences, Eluru, West Godavari District, Andhra Pradesh 534005, India. *Corresponding Author

**Dr. Ch. Aditya Trilochan** Post Graduate, Department of Anaesthesiology, Alluri Sitarama Raju Academy of Medical Sciences Eluru, West Godavari District, Andhra Pradesh 534005, India.

## ABSTRACT

**Background:** Local anaesthetics and opioids have been frequently used to attenuate the pressor response during laryngoscopy and endotracheal intubation. This study compared the efficacy of fentanyl with that of lignocaine in attenuating the pressor response to laryngoscopy and intubation.
**Material and Methods:** This is a prospective randomized controlled single-blinded clinical study conducted on 60 patients posted for elective surgeries at Alluri Sitarama Raju Academy of Medical Sciences, Eluru between August 2018 to August 2019. Patients were randomly divided into two equally sized (n = 30) study groups. Patients received fentanyl 2 mcg/kg intravenously in Group F and lignocaine 1.5 mg/kg intravenously in Group L 5 minutes before the induction of anaesthesia. Heart rate, systolic blood Pressure, diastolic blood pressure and mean arterial pressure are measured at different durations and compared.
**Results:** We found that there was less rise in heart rate, systolic blood pressure, diastolic blood pressure, and Mean arterial pressure immediately after intubation in fentanyl group when compared to lignocaine group.
**Conclusion:** We conclude that Fentanyl is better than lignocaine in attenuating pressor response during laryngoscopy and endotracheal intubation.

## KEYWORDS

Fentanyl citrate, lignocaine, pressor response to laryngoscopy and intubation.

## INTRODUCTION:

Direct laryngoscopy and endotracheal intubation are integral parts of the day to day anaesthetic technique in modern anaesthesia[1]. Major improvement in equipment and development of new neuromuscular blockers combined with the technical skills of anaesthesiologist have made the direct laryngoscopy and endotracheal intubation, a safe and common practice.

Laryngoscopy and tracheal intubation frequently induce a cardiovascular stress response characterized by hypertension, tachycardia, arrhythmias and increased serum concentrations of catecholamines which are transient and are considered innocuous in patients with normal cardiovascular status[2]. This response is undesirable in any patient with compromised cardiovascular status and may prove dangerous in patients with preexisting hypertension, coronary artery disease, valvular heart disease cerebrovascular disease, abdominal aortic aneurysm, dissecting aortic aneurysm, pheochromocytoma, etc[3].

In these patients, the pressor response to direct laryngoscopy and tracheal intubation ultimately increases cardiac workload which may culminate in perioperative myocardial ischemia and acute heart failure and lead to intracranial hemorrhage and raised intracranial tension[4].

Lignocaine hydrochloride is an amide local anaesthetic which has a rapid onset of action, exerts peak hemodynamic effects within minutes which is ideal for control of the short-lived hemodynamic sequelae[5].

Fentanyl citrate is a synthetic opioid (4-Anilino piperidine) derivative and is 80 times more potent than morphine[6]. It is short-acting but has a relatively long elimination half-life because of rapid redistribution in the body with the onset of effect is 1-2 minutes and the duration of action is 1 hour[7].

The present study was undertaken to compare the efficacy of i.v. Lignocaine 1.5 mg/kg and i.v. Fentanyl 2 mcg/kg in suppressing the pressor response during laryngoscopy and endotracheal intubation.

## MATERIALS AND METHODS:

The present clinical comparative study entitled —Comparison between the efficacy of i.v. Lignocaine 1.5mg/kg and i.v. Fentanyl 2mcg/kg in attenuation of pressor response to laryngoscopy and endotracheal intubation was conducted on 60 patients posted for elective surgeries selected randomly. General anaesthesia was provided with endotracheal intubation for all the patients.

The study was conducted between August 2018 to August 2019 at Alluri Sitarama Raju Academy of Medical Sciences, Eluru. Patients were selected from ENT and General Surgery departments posted for elective surgeries like tympanoplasty, modified radical mastoidectomy, laparoscopic cholecystectomy in each group under General anaesthesia.

**Following criteria were adopted for selecting the patients.**
**Inclusion Criteria: -**

- Patients scheduled for elective surgeries.
- Age between 20-60years of both the sexes.
- Patients with ASA grade I or II.
- Mallampati airway assessment of grade I & II.

**Exclusion Criteria:**

- Unwilling patients
- Anticipated difficult intubation
- Patients with cardiovascular diseases
- Patients on beta-blockers or calcium channel blockers or other $\alpha_2$ agonists.
- Patients in whom laryngoscopy and intubation proved to be prolonged or difficult.

Patients were selected after thorough pre-anaesthetic assessment and investigations. Informed written consent was taken from all the patients.

**60 patients** of both genders were randomly allocated into two equal groups of 30 each.
**Group F-** Fentanyl group. In this group, 2mcg/kg of Fentanyl was given intravenously 5 min before induction of anaesthesia.
**Group L**- Lignocaine group. In this group, 1.5 mg/kg of Lignocaine was given intravenously 5 min before induction of anaesthesia.

**PROCEDURE:**
All the Patients were examined the day before surgery, and pre-anaesthetic counselling was done. All patients received Alprazolam 0.5mg orally on the night before surgery. Inj. Ondansetron 0.1mg/kg i.v. and Inj.Ranitidine 1mg/kg i.v. given on day of surgery.

Patients were monitored by a pulse oximeter, noninvasive blood pressure and ECG monitors. A pre-induction heart rate, systolic, diastolic & mean blood pressures were recorded. Intravenous infusion of RL solution was started.

In Group F, Fentanyl in a dose of 2 mcg/kg was given intravenously in a bolus dose 5 min before induction. In Group L, Lignocaine in a dose of 1.5 mg/kg was given in a bolus dose 5 min before induction. Induction was achieved with Inj. Thiopentone sodium 5mg/kg I V given in 2.5%solution.

After induction of anaesthesia heart rate, systolic and diastolic blood pressures were recorded. Succinylcholine was administered in a dose of 2mg/kg I.V. Laryngoscopy was done and Intubation was done with appropriately sized disposable cuffed endotracheal tube. Heart rate, systolic blood pressure, diastolic blood pressure & mean arterial pressure were recorded before study drug administration, after study drug administration, at intubation and 1,3 and 5 minutes after intubation.

Anaesthesia was maintained with nitrous oxide (67%), oxygen (33%) and Sevoflurane 1%. Intermittent boluses of vecuronium was used to achieve muscle relaxation.

**PARAMETERS OBSERVED:**
From the study conducted the following observations regarding Heart rate, Systolic blood pressure, diastolic blood pressure, mean arterial pressure, $SpO_2$ were measured at the following periods: -

- Baseline vitals
- Post-study drug (Fentanyl& Lignocaine)
- At intubation.
- 1 minute after intubation.
- 3 minutes after intubation.
- 5 minutes after intubation.

**RESULTS:**
**Table 1: Heart Rate At Various Points Of Time During The Period Of Observation**

| HR (in bpm) | Group F | | Group L | | P-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Base line | 74.93 | 9.26 | 72.53 | 8.15 | 0.29 |
| Post study drug | 72.23 | 11.80 | 70.96 | 8.73 | 0.40 |
| At intubation | 79.12 | 10.20 | 81.66 | 7.51 | <0.02 |
| 1 min | 78.46 | 8.30 | 79.12 | 7.90 | <0.04 |
| 3 min | 77.8 | 7.05 | 77.30 | 7.12 | <0.04 |
| 5 min | 73.06 | 7.90 | 72.30 | 7.87 | <0.01 |

P-values of heart rate in group F & L during the time of pre-anesthetic check-up (B), just prior to intubation was statistically insignificant. After intubation heart rate at 1 min, 3min, 5 min was (78.46bpm, 77.8bpm, 73.06bpm) in group F and (79.12bpm,77.30bpm,72.30 bpm) in group L which shows that there is less rise of heart rate in group F than in group L when compared to their baseline values.

**TABLE 2: Systolic blood pressure at various intervals**

| SBP (in mm Hg) | Group F | | Group L | | P-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Base line | 129.66 | 7.35 | 124.76 | 11.82 | 0.06 |
| Post study drug | 123.03 | 11.90 | 121.13 | 9.30 | 0.74 |
| At intubation | 132.23 | 14.49 | 132.10 | 11.01 | <0.01 |
| 1 min | 131.65 | 16.55 | 130.46 | 11.16 | <0.01 |
| 3 min | 130.43 | 10.56 | 127.13 | 10.01 | <0.02 |
| 5 min | 128.56 | 10.02 | 125.08 | 11.22 | <0.03 |

Compared with baseline value, changes in systolic blood pressure in group F & L was statistically insignificant just before intubation. After intubation, systolic blood pressure values at 1min, 3min and 5min were (131.65,130.43,128.56 mm of Hg) in group F and (130.46,127.13,125.08 mm of Hg) in group L which shows that there is less rise of systolic blood pressure in group F than in group L when compared to their baseline values.

**Table 3: Diastolic Blood Pressure At Various Intervals**

| DBP (in mm Hg) | Group F | | Group L | | P-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Base line | 78.20 | 14.04 | 72.83 | 8.23 | 0.07 |
| Post study drug | 76.60 | 12.13 | 70.93 | 7.15 | 0.06 |
| At intubation | 81.26 | 9.46 | 79.16 | 9.83 | <0.02 |
| 1 min | 79.53 | 8.60 | 74.66 | 10.02 | <0.01 |
| 3 min | 78.86 | 10.27 | 73.91 | 8.44 | <0.01 |
| 5 min | 77.03 | 11.41 | 71.56 | 8.45 | <0.01 |

Compared with baseline value, changes in diastolic blood pressure in group F & L was statistically insignificant just before intubation. After intubation diastolic blood pressure values at 1min, 3min and 5 min were (79.53 mm of hg,78.86 mm of hg, 77.03mm of hg) in group F and (74.66 mm of hg, 73.91 mm of hg, 71.56 mm of hg ) in group L which shows that there is less rise of diastolic blood pressure in group F than in group L when compared to their baseline values.

**TABLE 4: Mean arterial pressure at various intervals**

| MAP (mm Hg) | Group F | | Group L | | P-value |
|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | |
| Base line | 97.38 | 11.84 | 93.50 | 9.21 | 0.16 |
| Post study drug | 92.36 | 10.26 | 89.87 | 7.02 | 0.19 |
| At intubation | 102.63 | 12.83 | 106.16 | 8.69 | <0.01 |
| 1 min | 100.03 | 13.69 | 99.06 | 9.47 | <0.01 |
| 3 min | 98.45 | 14.86 | 96.91 | 7.44 | <0.01 |
| 5 min | 96.05 | 10.33 | 94.73 | 7.13 | <0.01 |

Compared with baseline value, changes in mean blood pressure in group F & L was statistically insignificant just before intubation. After intubation, mean arterial pressure values at 1min, 3min and 5min were (100.03 mm of hg, 98.45 mm of hg,96.05mm of Hg) in group F and (99.06 mm of Hg, 96.91 mm of hg, 94.73 mm of hg) in group L which shows that there is less rise of mean arterial pressure in group F than in group L when compared to their baseline values.

**DISCUSSION:**
Demographic data comparing age, sex, height, weight shows no statistical difference between the two groups.

In our study, baseline Mean arterial pressure and Heart rate in Group F were 97.38±11.84 mm of Hg& 74.93±9.26 bpm, and in Group L, they were 93.50±9.21 mm of Hg& 72.53±8.15 bpm. After administration of study drugs, there is a decrease in mean arterial pressure and Heart rate in both the groups (Group F - 92.36 mm of Hg&72.23 & Group L - 89.87 mm of Hg& 70.96).There is more decrease in Mean arterial pressure and Heart rate in Group F when compared to Group L. Similar results were observed in a study conducted by **A Malde V Sarode et al** [8],where there is greater decrease in mean arterial pressure and Heart rate in Group F when compared to Group L after the administration of study drug (8.8% decrease in Group F and 7.3% decrease in Group L).
In study conducted by **Hirbo Samuel et al.**[9]baseline systolic blood pressure in group F and L were 132.19 & 132.8mm of Hg. At 1min, there was a rise in systolic blood pressure in both the groups (Group F-141.9&150 mm of Hg). There was a greater rise of systolic blood pressure in group L (150 mm of Hg>132.8 mm of Hg) when compared to group F (141.9 mm Hg>132.19 mm Hg) and this difference was statistically significant ($p< 0.02$). Systolic blood pressure at 3min after intubation in group F & group L were 127.7 & 132.65 mm of Hg and Systolic blood pressure at 5min after intubation in group F, and L were 120.25 & 123.19 mm of Hg, i.e. they observed a gradual decrease of systolic blood pressure at 3min, 5min after intubation. Similar to the above study, in our study also systolic blood pressure gradually decreased 3min and 5min after intubation.

In a study conducted by **RanjithR.Thippaswamy, SupreethR. Shetty**[10] mean Systolic blood pressure and Diastolic blood pressure values at 1,3,5 min after intubation in Group F (140.37mm of Hg,139.27 mm of Hg,132.6mm of Hg) & (83.17 mm of Hg,81.9 mm of Hg,78.67mm of Hg) were significantly lower than Group L (149.8 mm of Hg,150.3 mm of Hg,139.03mm of Hg) & (89.7 mm of Hg ,88.1 mm of Hg,82.8mm of Hg) and there was a significant difference between both the groups. These results were comparable to our results as we also found mean systolic blood pressure and diastolic blood pressure values were significantly lower in Group F than in Group L.

**CONCLUSION:**
From the present study it can be concluded that when compared to

Lignocaine 1.5 mg/kg, Fentanyl 2mcg/kg is a better alternative for suppressing the pressor response to laryngoscopy and endotracheal intubation in patients posted for elective surgery under general anaesthesia. Fentanyl was not associated with systemic toxicity, cardiovascular side effects like changes in heart rate and rhythm, and hence can be a better alternative to Lignocaine in suppressing the pressor response.

## REFERENCES:


1. Ritesh Sharma, ShailendraSingh. Comparison of lignocaine and fentanyl for attenuation of cardiovascular response during laryngoscopy and tracheal intubation in cardiac surgery patients. International journal of biomedical research 2018; 09(10): 342-345.
2. JyotsnaYadav.C, AbhishekVuppala. Attenuation of cardiovascular response during direct laryngoscopy and intubation: A comparative study between fentanyl, lignocaine and placebo during general anaesthesia. International journal of advanced research; 5(6): 918-924.
3. M AKaleemSiddiqui and Kiran N. Analytical study of the effects of intravenous lignocaine on pressor response during laryngoscopy and intubation. International journal of biomedical research. 2015; 6(02) 104-107.
4. Dr.LiaquatAli, Mushtaq. Laryngoscopy and endotracheal intubation; Efficacy of i.v.Lignocaine in attenuating hemodynamic responses. Professional medicine J. Sept 2005; 12(3): 267-272.
5. Smith JE, King MJ. Effect of fentanyl on the circulatory responses to orotracheal fiberoptic intubation.Anaesthesia J .1992 Jan; 47(1): 1365-2044
6. N.Dahlgren and K.Messeter.Treatment of stress response to laryngoscopy and intubation with fentanyl. Anaesthesia J .1981; 36: 1022-1026.
7. ValiallahHassani, Gholamreza. Comparison of fentanyl and fentanyl plus lignocaine on the attenuation of hemodynamic responses to tracheal intubation in controlled hypertensive patients undergoing general anaesthesia. Anesth pain J.2013; 2(3): 115-118.
8. A Malde. V Sarode. Attenuation of the hemodynamic response to endotracheal intubation: Fentanyl versus Lignocaine. The Internet Journal of Anesthesiology. 2006; 12(1): 1-9.
9. Hirbo Samuel, MisrakWeldeyohannes. Comparison of intravenous fentanyl and lidocaine on the attenuation of hemodynamic responses to laryngoscopic intubation in adult elective surgical patients at TikureAnbessa specialized hospital, Addis Ababa, Ethiopia, Open Journal of Anesthesiology, January 2019; 9(9): 167-178.
10. Ranjith Kumar R Thippesamy, Supreeth R Shetty. Intravenous low dose fentanyl versus lignocaine in attenuating the hemodynamic responses during endotracheal intubation: A randomised double-blind study. Anaesthesia essays and research. 2018; 12(4): 778-785.