

Comparative Study Of Standard Drug Dose Mixture Versus Fentanyl In Attenuating Stress Response During Laryngoscopy And Tracheal Intubation In Neurosurgery: A Prospective Observational Study

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Abstract

Background: Opioid-free anesthesia (OFA) is gaining prominence, particularly in neurosurgery, due to its potential to minimize opioid-related complications such as postoperative nausea and vomiting (PONV) and shivering. This Prospective observational study aims to compare the efficacy of a standard drug dose mixture comprising intravenous magnesium sulphate, lignocaine, paracetamol, and tramadol with fentanyl in attenuating the hemodynamic stress response during laryngoscopy and tracheal intubation.

Methods: Sixty neurosurgical patients, aged 18 to 60 years, undergoing cervical or lumbar discectomies under general anesthesia in our institute were divided into two groups. One group received the standard drug dose mixture, and the other received fentanyl. Hemodynamic parameters, including pulse rate, blood pressure, oxygen saturation (SpO₂), and electrocardiogram (ECG) changes, were recorded at baseline, during intubation, and at one- minute intervals for five minutes post-intubation.

Results: Both groups demonstrated stable hemodynamics with no significant differences in pulse rate or blood pressure. No ECG abnormalities were observed, and SpO₂ remained above 96% in all patients. Additionally, the standard drug dose mixture group showed a reduced incidence of PONV and shivering compared to the fentanyl group.

Conclusion: The standard drug dose mixture provides a safe and effective alternative to fentanyl for attenuating the hemodynamic stress response during laryngoscopy and tracheal intubation, with fewer side effects. Further randomized controlled trials are recommended to confirm these findings and explore the benefits of opioid-free anesthesia in various surgical procedures.

Keywords: Opioid-free anesthesia, Hemodynamic stress response, Laryngoscopy, Tracheal intubation, Neurosurgery, Standard drug dose mixture, Fentanyl, Multimodal analgesia

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I. Introduction:

The use of opioid-free anesthesia (OFA) is gaining traction as part of Enhanced Recovery After Surgery (ERAS) protocols, particularly in neurosurgical procedures. Managing the hemodynamic stress response during laryngoscopy and tracheal intubation is crucial to minimize complications. While opioids like fentanyl are effective, they are associated with side effects such as postoperative nausea and vomiting (PONV) and shivering. This study examines the efficacy of a multimodal analgesic mixture of intravenous magnesium sulphate, lignocaine, paracetamol, and tramadol as an alternative to fentanyl.

Objective:

To compare the efficacy of the standard drug dose mixture versus fentanyl in attenuating the hemodynamic stress response during laryngoscopy and tracheal intubation in neurosurgery.

Study Population:

The study comprised 60 subjects, divided into two groups:

- 30 patients received the standard drug dose mixture.
- 30 patients received fentanyl.

Inclusion Criteria:

- Ages between 18 and 60 years.
- ASA Class I and Class II patients.
- Undergoing neurosurgery (cervical and lumbar discectomies) under general anesthesia with endotracheal intubation and mechanical ventilation.

Exclusion Criteria:

Patients with allergies to tramadol, lignocaine, magnesium, or paracetamol, those who were pregnant or breastfeeding, and patients with renal or hepatic failure, chronic opioid use, or other systemic conditions were excluded.

Standard Drug Dose Mixture:

- Magnesium sulphate: 1 gm
- Tramadol: 50 mg
- Paracetamol: 1 gm
- Lignocaine: 100 mg

II. Methods:

This Prospective study analyzed data from 60 patients divided into the two groups. Hemodynamic parameters—pulse rate, non-invasive blood pressure (NIBP), end-tidal carbon dioxide (ETCO₂), oxygen saturation (SpO₂), and electrocardiogram (ECG) changes—were recorded before induction, during intubation, and for five minutes post-intubation at one-minute intervals.

Demographic Data:

- Median age: 33 in the standard drug dose mixture group and 35 in the fentanyl group.
- Male-to-female ratio: 14:16 for the standard drug dose mixture group, 12:18 for the fentanyl group.
- No significant differences in surgical urgency, ASA grades, or pre-existing conditions were observed.

Demographic data	Standard drug dose mixture group (N = 30)	Fentanyl group (N = 30)
Median Age	33	35
Sex (Male : Female)	14 : 16	12 : 18
Type of surgery (Emergency : Elective)	3 : 27	4 : 26
ASA Grade (1 : 2)	26 : 4	23 : 7

III. Results:

Both groups demonstrated hemodynamic stability during laryngoscopy and intubation, with no significant differences in pulse rate or blood pressure. No ECG abnormalities were observed, and SpO₂ levels remained between 96% and 99%.

Heart Rate:

- Baseline: 92.26 bpm in the standard drug dose mixture group vs. 95.68 bpm in the fentanyl group (p=0.288).
- At the first minute post-intubation: 98.91 bpm in the standard drug dose mixture group vs. 99.68 bpm in the fentanyl group (p=0.232).

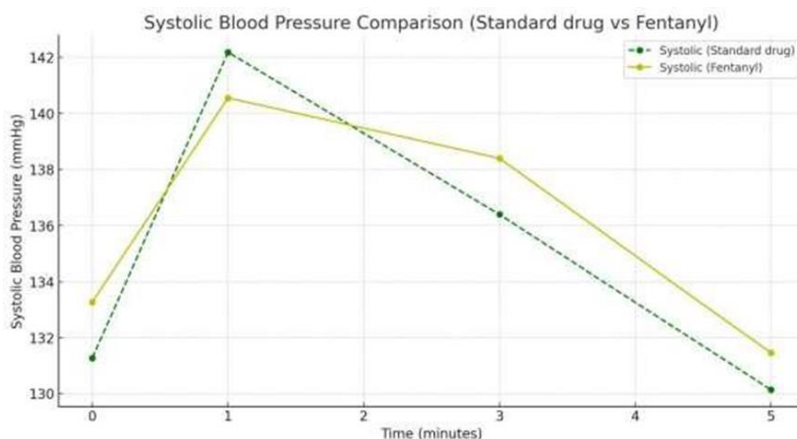
Heart Rate	Standard drug dose mixture	Fentanyl	P Value
At Baseline	92.26 +/- 18.3 bpm	95.68 +/- 16 bpm	0.288
At 1 Minute	98.91 +/- 15.6 bpm	99.68 +/- 15 bpm	0.232
At 3 Minute	94.7 +/- 15 bpm	97.41 +/- 14 bpm	0.362
At 5 Minute	91.25 +/- 15.3 bpm	92.84 +/- 14bpm	0.362

- No significant differences at subsequent time points.

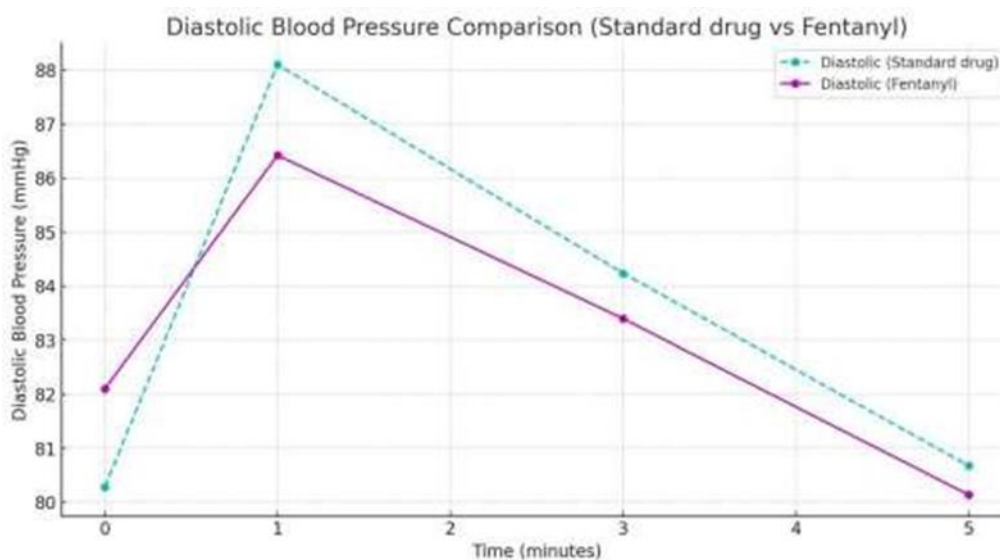
Blood Pressure:

- Baseline systolic and diastolic pressures were similar in both groups.
- First minute: Systolic pressure of 142.18 mmHg in the standard drug dose mixture group vs.

140.55 mmHg in the fentanyl group (p=0.364).
 - No significant differences in blood pressure at any time point.



Blood Pressure	Standard drug dose mixture	Fentanyl	P value
At Base line	Systolic : 131.28 +/- 13.50	133.28 +/- 12.50	0.664
	Diastolic : 80.28 +/- 9.38	82.10 +/- 10.21	0.619
At 1 Minute	Systolic : 142.18 +/- 10.50	140.55 +/- 12.80	0.364
	Diastolic : 88.10 +/- 10.10	86.42 +/- 9.50	
At 3 Minute	Systolic : 136.40 +/- 8.50	138.40 +/- 6.84	0.238
	Diastolic : 84.24 +/- 10.20	83.40 +/- 6.88	
At 5 Minute	Systolic : 130.14 +/- 12.14	131.46 +/- 8.14	0.623
	Diastolic : 80.68 +/- 8.94	80.14 +/- 9.54	0.822



IV. Discussion:

The study reveals that the standard drug dose mixture provides comparable attenuation of the hemodynamic stress response to fentanyl during laryngoscopy and tracheal intubation. Additionally, the standard drug dose mixture resulted in fewer side effects such as PONV and shivering, which are commonly associated with fentanyl. These findings are consistent with prior research by Imran Ahmed Khan et al. (2020) and Kothari et al. (2022), which highlighted the efficacy of opioid-free analgesic strategies in different surgical settings. The main cause of haemodynamic instability during laryngoscope and tracheal intubation is increase of reflex sympathetic activity and release of adrenaline and noradrenaline. The sudden increase of neurotransmitter activity leads to increase in blood pressure, heart rate and tachyarrhythmias.

In normal patients this response can be tolerated, but in sick patients this may lead to cardiovascular

disease, cerebrovascular accident, left ventricular hypertrophy and myocardial infarction. Hence due to availability of blunting drugs Paracetamol, Magnesium Sulphate, Lignocaine, Tramadol commonly available in our operation theatre room. These drugs have been used individually in attenuation of stress response to laryngoscopy and intubation by experienced Anaesthesiologist. Hence with this hypothesis, the summative effects of all four drugs will provide stable haemodynamic variable and better control in surgical- neurosurgical cases when compared to opioids in my study.

V. Conclusion:

The standard drug dose mixture consisting of magnesium sulphate, tramadol, paracetamol, and lignocaine is a safe and effective alternative to fentanyl for managing the hemodynamic stress response during laryngoscopy and tracheal intubation. This opioid-free approach offers the added benefit of minimizing side effects like PONV and shivering, making it a viable option for neurosurgical procedures. Further randomized controlled trials are warranted to substantiate these findings and further explore the role of opioid-free anesthesia in clinical practice.

References:

- [1] Imran Ahmed Khan, Shiv Kumar Singh. Efficacy, Safety, And Patient Satisfaction Of A Simple Combination Of Readily Available Medications (Shiv-Mix) For Perioperative Analgesia, Hemodynamic Stability, And Postoperative Recovery Profile. *Journal Of Anaesthesia And Critical Care Case Reports*. 2020; 6(1):13-18.
- [2] Kothari D, Bansal A, Sunny SA. Effect Of Pre-Emptive Intravenous Paracetamol, Magnesium Sulfate, And Lignocaine On Hemodynamic Variables During Perioperative Period In Preeclampsia Patients Scheduled For Lower Segment Cesarean Section Under General Anesthesia: A Prospective Randomized Study. *Asian J Med Sci*. 2022; 13(12):29-36.