

Comparison of Intravenous Tramadol vs Intravenous Morphine in Attenuation of Hemodynamic Stress Response to Laryngoscopy and Endotracheal Intubation in Laparoscopic Cholecystectomy

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ABSTRACT

Objective: To compare the efficacy of intravenous Tramadol and intravenous Morphine in attenuation of hemodynamic stress response to laryngoscopy and endotracheal intubation in laparoscopic cholecystectomy.

Study Design: Quasi-experimental study

Place and Duration: Department of Anesthesia, Combined Military Hospital, Mardan Pakistan, from Jun 2021 to Jun 2022.

Methodology: A total of 136 patients were involved in the research. These patients were divided via a lottery method into two groups i.e., Group-T (Tramadol) and Group-M (Morphine) with 68 patients in each group. Patients aged 20-50 years planned for laparoscopic cholecystectomy with American Society of Anesthesiologists (ASA) Grade I or Grade II were included in the study.

Results: Out of a total of 136 patients with equal distribution of 68(50%) patients in each group. Patients with ASA- I Grade from Group-T and Group-M were 52(76.5%) and 41(60.1%), respectively; however, ASA-II Grade patients were 16(23.5%) from Group-T and 27(39.7%) from Group-M. In this study, intravenous Tramadol was effective in 48(70.5%) out of 68 patients, while intravenous Morphine was effective in 60(88.24%) patients, with a p-value of 0.01.

Conclusion: This study concluded that intravenous Morphine is more effective in attenuating hemodynamic stress response to laryngoscopy and endotracheal intubation in laparoscopic cholecystectomy than intravenous Tramadol.

Keywords: Hemodynamic stress response, Intravenous morphine, Tracheal intubation.

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INTRODUCTION

Laryngoscopy requires experienced hands as it allows one to visualise the airway and helps intubate the trachea during general anaesthesia or resuscitation.¹ This procedure can be done in any setting in a hospital in case of emergency; however, this is frequently employed in operation theatres and intensive care units.² Laryngoscopy is a painful procedure which cannot be performed on a patient who is awake and conscious.³ Additionally, this procedure can lead to the sympathetic system's activation, leading to a catecholamine surge. Such activation can cause harmful effects on blood pressure, heart rate, and intracranial cerebrospinal fluid pressure leading to increased morbidity and mortality.⁴

For surgical procedures, adequate muscle relaxation and ensuring the patient is pain-free are compulsory. Patients presenting for surgical procedures are premedicated with painkillers and antiemetics followed by administering induction agents and muscle

relaxants.⁵ Once the anaesthesia and analgesia are adequate, laryngoscopy and tracheal intubation is done. Failed unsuccessful intubations have been largely reported as contributing to morbidity and mortality.⁶

Adequate mouth opening with adequate neck mobility and a distance measured from the thyroid to the mentum, sternum to mentum, and hyoid to mentum is usually performed during airway assessment in preoperative clinics to predict a difficult airway and intubation before induction of general anaesthesia.^{7,8}

Patients with the inadequate cardiopulmonary reserve are prone to serious cardiac effects during laryngoscopy and intubation, which might result in grave consequences.⁹ Several techniques have been employed to decrease the patients' sympathetic stimulation and stress response, including the administration of pharmacological agents, e.g. beta-blockers, magnesium, lignocaine, Morphine and other intravenous agents but no single drug to date has been considered as a gold standard.¹⁰ The rationale of our study is to compare the effectivity of intravenous

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Morphine and Tramadol in attenuating the stress response to laryngoscopy and endotracheal intubation.

METHODOLOGY

The quasi experimental study was conducted at the Department of Anesthesia, Combined Military Hospital Mardan, from June 2021 to June 2022, after receiving permission from the Hospital Ethical Committee (ERC num 2010/Estb/EC/1/2022). The WHO sample size calculator was used for the calculation of sample size taking the effectivity of Morphine in attenuation of hemodynamic stress response as 88.14%, and 71.08 when Tramadol was used.¹¹

Inclusion criteria: Patients of either gender, aged 20-50 years planned for laparoscopic cholecystectomy with American Society of Anesthesiologists (ASA) Grade I or Grade II were included in the study.

Exclusion criteria: Exclusion of patients was done if they had an allergy to Morphine or Tramadol, pre-existing hypertension, ischemic heart disease, arrhythmia, pregnancy on ultrasound or who could not be intubated in less than 1 minute during induction of anaesthesia.

According to hospital guidelines, the preanaesthesia assessment was done, and all the parameters, including clinical, laboratory and radiological findings, were assessed before the procedure. These patients were divided via lottery method into groups, i.e. Group-T (Tramadol) and Group-M (Morphine), with 68 patients in each group.

Patients were shifted to the operation theatre on the day of surgery, and all the baseline vitals and demographics were recorded. Per our hospital's protocol, noninvasive monitoring involving pulse oximetry, electrocardiography, noninvasive blood pressure cuff, and temperature probe were attached to each patient. The group assigned to each patient was premedicated with nalbuphine 0.1mg/kg, Inj dexamethasone 0.1mg/kg and opioids, including either Injection Tramadol 2mg/kg or Injection Morphine 0.1mg/kg. Prior to the induction of anaesthesia, all patients received an Injection Lignocaine plan in a dose of 1.5mg/kg. This was followed by induction of anaesthesia using intravenous Propofol 2mg/kg and checking the adequacy of ventilation. Using Atracurium 0.5 mg/kg, muscle relaxation was after the confirmation of ventilation and ventilation was done using 100% O₂ for the next 03 mins. After ventilating for 3mins, Direct Laryngoscopy was done using an appropriate size Macintosh blade Laryngoscope.

Trachea was intubated with a 7-8 size endotracheal tube. The endotracheal tube placement was confirmed using end-tidal co₂ and auscultation of the breath sounds. This was followed by maintenance of anaesthesia using Isoflurane 1.5-2 minimum alveolar concentration and further boluses of Atracurium 0.1 mg/kg. Hemodynamic parameters were recorded before and after intubation, followed by three and 5 minutes post-intubation. At recovery, an intravenous Lignocaine plan 1.5mg/kg was given, and reversal was done by Neopyrolate intravenously, Neostigmine 2.5mg+Glycopyrrolate 0.5mg. Efficacy from both groups was noted as if systolic blood pressure and heart rate remained within 20% of baseline between 1 minute to 5 minutes after endotracheal intubation and noted on especially designed proforma.

Data were analysed using a statistical package for the Social Sciences version 23. First, qualitative variables like gender, ASA score and efficacy frequencies and percentages were calculated, while quantitative variables like age and weight were computed by calculating Mean and standard deviation. Finally, the chi-square test was applied to compare efficacy in both groups, with p-value of ≤ 0.05 as significant.

RESULTS

Out of a total of 136 patients with equal distribution of 68(50%) patients in each group. Patients with ASA-I Grade from Group-T and Group-M were 52(76.5%) and 41(60.1%), respectively; however, ASA-II Grade patients were 16(23.5%) from Group-T and 27(39.7%) from Group-M (Table-I). In this study, intravenous Tramadol was effective in 48(70.5%) out of 68 patients, while intravenous Morphine was effective in 60(88.24%) patients, with a p-value of 0.01, as shown in Table-II.

Table-I: American Society of Anesthesiologists (ASA) Grades Distribution of patients (n=136)

Groups	ASA Grade		Total
	ASA-I	ASA-II	
Group-T (Tramadol)	52(76.47%)	16(23.25%)	68
Group-M (Morphine)	41(60.2%)	27(39.7%)	68

Table-III: Comparison of Efficacy of Drugs between Study Groups (n=136)

Efficacy	Group-T (Tramadol) (n=68)	Group-M (Morphine) (n=68)	p-value
Yes	48(70.59%)	60(88.24%)	0.01
No	20(29.41%)	08(11.7%)	

DISCUSSION

In our study, we compared the effectiveness of intravenous Tramadol and Morphine in attenuating the stress response to laryngoscopy and endotracheal intubation. Results of our study proved a superior effect of intravenous Morphine compared to Tramadol (88.24% vs 70.59%) in the modulation of the neuroendocrine response to laryngoscopy and endotracheal intubation.

Like our study, intravenous Morphine had a more beneficial role in attenuating stress response in patients when compared with Tramadol in the study done by Hoda et al. In their study, patients with effective stress attenuation were 71% when Tramadol was used, compared to 89% when Morphine was used intravenously. 8 Another study compared lignocaine and local nitroglycerine spray to attenuate heart rate and blood pressure after laryngoscopy and endotracheal intubation. The study suggested a superior role of nitroglycerine as compared to lignocaine spray.^{11,12}

Melatonin is a methoxy tryptamine agonist used in sleep disorders and has an anxiolytic effect. It was compared with an alpha blocker clonidine which exhibits a central sympatholytic effect. The study showed that both drugs effectively decreased catecholamine release after laryngoscopy and endotracheal intubation, but the role of melatonin was condescending.¹³

An alpha 2 receptor agonist, a wonder drug, has been used as an adjunct to total intravenous and spinal anaesthesia. Recent advances showed that when it was used in the dose of 0.75 micrograms per kg as an adjunct to general anaesthesia, it reduced the requirement for analgesia and the episodes of hypertension and tachycardia after laryngoscopy making it a useful therapy for minimising stress-induced tachycardia and hypertension after airway manipulation.¹⁴

Novel airway adjuncts are the recent advances in the field of anaesthesia. Using a king video laryngoscope or a glide scope, hemodynamic alteration after laryngoscopy and intubation were studied, and both were found effective in attenuating the stress response.¹⁵ In a similar study, a single-time use video laryngoscope was compared with a Macintosh laryngoscope as in our study. The hemodynamic stability following laryngoscopy and endotracheal intubation was more pronounced when AirTran was used than Macintosh.¹⁶ One study used the acupuncture technique in their study to minimise the stress response to intubation. The patients who received acupuncture showed better hemodynamic stability with low

plasma levels of catecholamines after endotracheal intubation.¹⁷

Similarly, other modalities like nerve blocks and other drugs have been used to attenuate the stress response to laryngoscopy and endotracheal intubation.^{18,19} However, many techniques have yet to be demonstrated as a gold standard for the said purpose.²⁰

Our study proves that Morphine is more beneficial when it is used to modulate neuroendocrine response to laryngoscopy and intubation.

CONCLUSION

This study concluded that intravenous Morphine is more effective in attenuating hemodynamic stress response to laryngoscopy and endotracheal intubation in laparoscopic cholecystectomy than intravenous Tramadol. So, we recommend that intravenous Morphine be used routinely in every patient undergoing laryngoscopy and endotracheal intubation to achieve a better hemodynamic response.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

BMK & FA: Data acquisition, critical review, approval of the final version to be published.

SS & SKN: Conception, study design, drafting the manuscript, approval of the final version to be published.

UH & JZ: Data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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