DOI: https://doi.org/10.53350/pjmhs2022161115

ORIGINAL ARTICLE

Role of Preemptive Nebulized Lignocaine in Endotracheal Tube Tolerance during General Anesthetic induction and emergence

RAFIA KOUSAR[1], MUHAMMAD ABDUL AZIZ[2], MEHREEN AKRAM[3], HAQ DAD DURRANI[4], JAI KUMAR[5]
[1]*Assistant Professor Anesthesia, Sahara Medical College Narowal.*
[2]*Associate Professor Anesthesia, Sahara Medical College Narowal.*
[3]*Senior Registrar Anesthesia, The Children's Hospital and University of Child Health Sciences Lahore.*
[4]*Professor of Anesthesia, Pain and intensive care Gambat medical college, Gambat. Khairpur Mirs*
[5]*Assistant Professor Anesthesia, Gambat Medical College, Gambat, Khairpur Mirs*
Correspondence to Dr. Rafia Kousar, Email: drrafi2010@ymail.com. Mobile no. 03468789572.

ABSTRACT

Background: General anesthesia is an essential component of anesthesia and endotracheal intubation is a basic step to secure the airway in patients undergoing any surgical procedure. Airway manipulation causes mucosal inflammation resulting in coughing, straining, bucking and subsequent distress to the patient.
Aim: To find out whether preemptive use of nebulized lignocaine has some role in endotracheal tube tolerance during General anesthetic induction and emergence.
Study design: Randomized control trial
Methodology: The randomized controlled study was done on 68 patients scheduled for general surgical procedures**.**Patients were allocated intoGroup A and Group Bby closed envelope method with 34 patients in each group. In Group A lignocaine 2% (1.5-2mg/kg) with normalsaline 0.9% to prepare total of 5 ml solution, was used to nebulize the patients with face mask connected with O_2 at 7L/min and in Group B5ml normal saline 0.9% was used to nebulize the patients for 15minutes. The endotracheal tube tolerance was noted at both intubation and extubation.
Results: Endotracheal tube tolerancein Group A was markedly significant than in Group B both during intubation and extubation. In Group A, 32/34(94.12%) patients reflected tolerance to endotracheal tube both during intubation and extubation while in Group B only 06/34(17.65%) reflected tolerance to endotracheal tube both during intubation and extubation.
Conclusion: Preemptive nebulized lignocaine suppresses the airway reflexes and significantly improves the endotracheal tube tolerance.
Keywords: Endotracheal intubation, extubation, nebulization, lignocaine.

INTRODUCTION

General anesthesia is an essential component of anesthesia and intubation is a basic step to secure the airway in patients undergoing any surgical procedure. Airway manipulation causes mucosal inflammation resulting in coughing, straining, bucking and subsequent distress to the patient. Sore throat and cough are common after endotracheal intubation.[1]The incidence ranges from 5.7-90%[2].

Physiological responses to intubation and extubation comprise of undesirable airway and circulatory reflexes resulting in bronchospasm, laryngospasm, tachycardia, hypertension and coughing[3].

Nebulization is one way of administrating drug to the patient. It has many advantages like ease of administrating the inhalationaldrug, advantage of drug entering the lower airway, need of less volume of drug, patient cooperation and no aspiration.[4]It produces lower serum levels of drug and hence decreased adverse effects[5].

Lignocaine is an amide local anesthetic having anti-inflammatory and analgesic properties by reducing the excitation of sensory c fibers and release of sensory neuropeptides.[6]Lignocaine blunts the physiological responses to tracheal intubation, extubation and emergence including bronchospasm, coughing, laryngospasm, hypertension and tachycardia.Lignocaine can be given via various routes which include intravenously[7,8,9], topically, laryngotracheal instillation, via endotracheal tube cuff [10, 11] and inhalation.

Rationale: Various studies declared that nebulization with lidocaine is very efficacious in preventing coughing during emergence**.**Someclinical trials showed that topical lignocaine sprayed before induction of anesthesia to be moreefficacious than sprayed after induction in tolerating endotracheal tube[12].

Lignocaine has been given by inhalationand intravenously for the attenuation of the pressor response to intubation and laryngoscopy. The role of lignocaine nebulizationin improving

Received on 14-06-2022
Accepted on 27-10-2022

tolerance to endotracheal tube is controversial.After nebulization lignocaine is absorbed and its extent and rate of absorption depends on concentration and total dose[3]. In order to support /contradict the controversial role of lignocaine in improving tube tolerance and preventing coughing, bucking on emergence, we conducted this study.

The purpose of this study was to find out the role of preemptive nebulized lignocaine in endotracheal tube tolerance during General anesthetic induction and emergence.

MATERIAL AND METHODOLOGY

The randomized controlled trial was done in Anesthesia department of Sughra Shafi Medical Complex /Sahara Medical College Narowal after obtaining consent from ethical committee ofhospital and from patients. The study was doneon patients with 12 -50 years of age of both sex, having ASA I and II class and who were scheduled for General surgical operations. The patients which were excluded are:

1. Patients having allergy to study drugs
2. Patients with psychiatric illness
3. Patients with any cardiac, respiratory, renal or hepatic disease
4. Uncooperative patients

Preoperative evaluation was conducted a day before the surgery.Patients were allocated into Group A and Group B by closed envelope method with 34in each group on operation day. (Sample size was calculated by clinclac sample size calculatorby considering tube tolerance between two groups (26.7% in group A and 60% in group B) of our sample study).[13] In Group A (Lignocaine Group) lignocaine 2% (1.5-2mg/kg) with normal saline 0.9% to prepare total of 5 ml solution, was used to nebulize the patients with face mask connected with O_2 at 7L/minand in Group B 5ml saline 0.9% was used to nebulize the patientsfor 15minutes. Vital monitoring was done in operation theatre before

operation.After giving oxygen for 3 minutes patients of both groups were induced by intravenous 0.1 miligram/kg Nelbuphine, 2 miligram/kg Propofol, 0.5 miligram/kg Atracurium. ETT of appropriate size was passed and anesthesia was maintained with40% oxygen, 60% nitrous oxide and 1-2%Isoflurane.When the surgery was completed muscle paralysis was reversed with 0.04 miligram/kg neostigmine and 0.02 miligram/kg atropine. Patients were shifted to recovery room after fulfilling the criteria of shifting.
Outcome was to find the endotracheal tube tolerance grade at both intubation and extubation. Grade 0 = tube well tolerated, no straining. Grade 1= tube mildly tolerated, mild straining. Grade 2= tube is intolerable, coughing, straining and bucking.
The sample size was calculated by using clinical sample size calculator by considering tube tolerance between two groups (26.7% in group A and 60% in group B) of our sample study[13] keeping power of test 80% and level of significance 0.05. calculated sample sizewas 34 in each group and total sample size was 68.

Statistical analysis: Data collected wasentered to SPSS version 20 and was analyzed. Tables were used to represent the results. The quantitative variable like age was described as mean ± standard deviation.The qualitative variable like gender and ASA grading was compared by chi square test.P-valve <0.05 was considered statistically significant.

RESULTS

Patients' demographics showed no significant difference across all groups in terms of age, gender and ASA physical status (Table 1). Group A patients showed very significant tolerance to endotracheal tube than group B, during both intubation and extubation (Table 2). In Group A, 32/34(94.12%) patients reflected tolerance to endotracheal tube both during intubation and extubation while in Group B only 06/34(17.65%) reflected tolerance to endotracheal tube both during intubation and extubation (Table 3).

Table 1: Demographic characteristics

	Group A	Group B	Test	P value
Age (Yrs)	31.32±14.41	30.85±13.89	Independent sample t test	0.891
Male	16(51.6%)	15(48.4%)	Chi- square test	0.808
Female	18(48.6%)	19(51.4%)		
ASA !I	26(49.1%)	27(50.9%)	Chi- square test	0.770
ASA II	8(53.3%)	7(46.7%)		

Table 2: Tube tolerance (mean and standard deviation)

	Group A	Group B	Test	P value
Intubation grade	0.0588±0.24	0.82±0.39	Independent sample t test	0.000
Extubation grade	0.059±0.24	0.82±0.39	Independent sample t test	0.000

Table 3: Tube tolerance grades (as frequency and percentage)

	Grade	Group A Frequency%	Group B Frequency%
Intubation Grade	Grade -0	32/34(94.12%)	06/34 (17.65%)
	Grade-1	02/34(5.88%)	28/34 (82.35%)
Extubation grade	Grade- 0	32/34(94.12%)	06/34 (17.65%)
	Grade- 1	02/34(5.88%)	28/34 (82.35%)

DISCUSSION

We conducted the randomized controlled study to find the role of lignocaine as a good substitute than routinely used medications for endotracheal tube tolerance. Laryngoscopy and intubation cause sympathetic and adrenal surge aggravating cardiovascular events like tachycardia, hypertension and dysrhythmias[13].

Lignocaine is an amide local anesthetic which was discovered in 1946. It has both anti inflammatory and analgesic properties. It can be given via various routes which include intravenously[7,8,9], topically, laryngotracheal instillation via endotracheal tube cuff [10,11] and inhalation. Lignocaine given by nebulization inhibit the excitatory sensory C fibers in the airway. It regulates the sodium entry beyond the cell membrane, decreases the action potential and prevent conduction of impulses[6]. Hence can be used to suppress the hemodynamic response to tracheal intubation and tolerance, to reduce the incidence of postoperative sore throat, inhibit the cough related to lung biopsy, bronchoscopy and for awake intubation[5].

Nebulization is one way of administrating drug to the patient. To insure the efficacious spread of the drug in the respiratory tract, to avoid the side effects of other routes, to avoid large volume and rapid run of drug into pharynx nebulization was used despite other routes like gargles, intranasal and insufflation[5].
Our results showed that the patients of Group A had highly significant better endotracheal tube tolerance than Group B both during intubation and extubation. This is in line with El Hamid et al who found that lignocaine nebulizer blunts airway reflexes during induction and emergence and also the tube tolerance[13].

Various studies have found that lignocaine is efficacious in blocking the pressor response to endotracheal tube intubation and tolerance.[5] Mostafa and his colleagues in their study found that the lignocaine sprayed just before induction of general anesthesia was more efficacious than after induction in alleviating the pressor response which was same as our study[5].
Ellatif and his associates determined that nebulization with lignocaine before general anesthetic induction is more effective following endoscopic nasal surgeries which is in accordance to our study[5].

Rao et al wrote in their study that therapeutic lignocaine nebulization was highly compatible and more effective therapy for postoperative sore throat which is inconsistent with our study[14].
Kalani. S et al found that preoperative nebulization with lignocaine and magnesium sulphate reduces the perioperative morbidity and mortality attributes to hemodynamic stability[1].

A limitation of our study is that the plasma levels of lignocaine were not measured and we could not find out the systemic effects of lignocaine. No side effects were noted after drug administration because the drug dose which was used in this study was very less as compared to those causing adverse effects. So, we suggest plasma lignocaine levels and also comparing different doses for future studies
The results of the study were conclusive but big sample size would have been more informative.

CONCLUSION

Preemptive nebulized lignocaine suppresses the airway reflexes and significantly improves the endotracheal tube tolerance.
Recommendation: Multicenter clinical trials on large number of patients should be performed to provide evidence for further recommendations.
Ethics approval and consent to participate: Ethical approval was taken from hospital ethical committee Sugrah Shafi Medical Complex Narowal and written informed consent was taken from participants.
Conflict of interest: No conflict of interest was declared by authors.
Funding: None to declare.
Authors' contributions: Kousar R designed the study. Akram M collected the data. Aziz MA provided the study content and patient information. Durrani HD interpreted the analysis and results of the

data. Kumar J wrote the manuscript. All authors went through the study and approved its final manuscript.

REFERENCES

1. Kalani S, Khedialal C, Sharma G. Comparative study of magnesium sulphate nebulization and lignocaine nebulization in prevention of postoperative sore throat. Indian J AnesthAnalg2020; 7(1):114-23.
2. Satria A, Nasution A, Lubis A. Comparison of the patients postoperative sore sthroat with General Anesthesia on the use of lidocaine nebulizer and ketamine nebulizer in Haj Adam Malik Hospital Medan. International journal of innovative science and research technology2019; 4(7):245-51.
3. DaelimJee, So Young Park. Lidocaine sprayed down the endotracheal tube attenuates the airway circulatory reflexes by local anesthesia during emergence and extubation. Anaethesia and Analgesia2003;96:293-97.
4. Ranjana, Sharma A, Singh M, Rajitha J. Comparison of incidence of postoperative sore throat after nebulization with ketamine, lignocaine and magnesium sulphate- A Randomised controlled trial. Journal of clinical and diagnostic research 2020;14(6):UC01-05.
5. Ellatif SE, Mowafy S. Pre-emptive nebulized ketamine versus nebulized lidocaine for endoscopic nasal surgeries. Research and opinion in Anesthesia and intensive care 2019; 6(4):408-417
6. Kamel AF, Nasrallah MA. Comparing the efficacy of preoperative nebulized ketamine, magnesium sulfate and lidocaine in attenuating postoperative sore throat after endotracheal intubation. Res opinAnesth Intensive care 2021;8:95-101.
7. Bidwai AV, Bidwai VA, Rogers CR, Stanley TH. Blood-pressure and pulse-rate responses to endotracheal extubation with and without prior injection of lidocaine. Anesthesiology 1979; 51: 171–3.
8. Mikawa K, Nishina K, Takao Y, Shiga M, Maekawa N, Obara H. Attenuation of cardiovascular responses to tracheal extubation: comparison of verapamil, lidocaine, and verapamil-lidocaine combination. AnesthAnalg 1997; 85: 1005–10.
9. Fujii Y, Saitoh Y, Takahashi S, Toyooka H. Combined diltiazem and lidocaine reduces cardiovascular responses to tracheal extubation and anesthesia emergence in hypertensive patients. Can J Anaesth 1999; 46: 952–6.
10. Fagan C, Frizelle HP, Laffey J, Hannon V, Carey M.The effects of intracufflidocaine on endotracheal-tube-induced emergence phenomena after general anesthesia. AnesthAnalg 2000; 91: 201–5.
11. Altintas F, Bozkurt P, Kaya G, Akkan G. Lidocaine 10% in the endotracheal tube cuff: blood concentrations, haemodynamic and clinical effects. Eur J Anaesthesiol 2000; 17: 436–42.
12. Mostafa SM, Murthy BVS, Barrett PJ, McHughP. Comparison of the effects of topical Lignocaine spray applied before or afterinduction of anaesthesia on pressor response to direct laryngoscopy and intubation. Europ. J.Anaesthesiology 1999; 16:7-10.
13. Hamid A, Hasan A, Fattah H, Shehata A. Lidocaine Nebulizer reduce response to endotracheal intubation and the need for postoperative analgesia after nasal operations. J American science2013; 9(12):287-91.
14. Rao TR, Subrahnanyam C, Parmar A, Patil S. Effect of nebulized lignocaine for the treatment of postoperative sore throat. Int J Sci Study 2015;3:10-13.