Original Article

Topical and Intravenous Lignocaine Comparison on Laryngeal Mask Airway Insertion Conditions Quality

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ABSTRACT

Objective: To compare the insertion conditions of laryngeal mask airway using topical and intravenous lignocaine as premedication to propofol induction.

Study Design: Randomised control trial study.

Place and Duration of Study: This study was conducted at the Department of Anaesthesiology , ICU and Pain medicine Liaquat National Hospital, Karachi during July 2009 and August 2010.

Materials and Methods: This study included one hundred and fourteen ASA I and II,elective day care surgical patients in our hospital between July 2009 and August 2010. Patients were randomized into group I (intravenous lignocaine) and group T (topical lignocaine) .Laryngeal mask airway was inserted after inducing general anaesthesia with propofol . After one minute consultant anaesthetist inserted appropriate size deflated LMA. Conditions for LMA insertion i.e. gagging, coughing or laryngospasm was recorded. Acceptable conditions if no gagging, coughing or laryngospasm resulting in successful first pass placement and ventilation recorded.

Results: Fifty seven patients were randomly assigned to two groups, group I (intravenous lignocaine) and group T (topical lignocaine) .The mean age in group I was 30+/- 9 years and in group T it was 31+/- 10 years. There were 12 males in group I and 16 males in group T while 45 females in group I and 41 females in group T. Gagging was noted in 9 patients (16%) in I group while only 2 patients (3.5%) in T group was statistically significant (P<0.026) . Coughing and laryngospasm was more in group I in comparison to group T. In group I , acceptable insertion conditions was 89% while in group T 98%. Unacceptable insertion conditions were 11% in group I while only 1.8% in group T.(p = 0.05)

Conclusion: Topical lignocaine application to the posterior pharynx for laryngeal mask airway insertion improves the acceptable insertion conditionsin comparison to intravenous lignocaine without using any intravenous muscle relaxation agent.

Key Words: LMA, gagging, coughing, laryngospasm

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INTRODUCTION

The laryngeal mask airway (LMA) was described by A.I.Brain in 1983. LMA insertion conditions became prime interest for the investigators since it's inception. Different types of LMA and insertion techniques been developed.[1] Range of medications used to improve the insertion conditions of LMA.[2]Airway morbidity remained a vital concern in general anaesthesia.[3] LMA reduced overall complications in surgical patients undergoing general anaesthesia.[4]

Successful LMA insertion requires an adequate suppression of upper airway reflexes.[5] Propofol is most commonly used intravenous agent for LMA insertion in induction doses of 2-2.5 mg/kg. It may give rise to gagging (20%), coughing (2%), movement (7%) and even laryngospasm (3%) as reported by Scanlon and colleagues.[6] Other effects like hypotension and apnea are also reported.[7] Increasing dose of propofol alone doesn't completely control responses to LMA insertion.[8]

Lignocaine was studied with thiopentone using both intravenous and topical modes of administration.[9] Topical lignocaine provided better LMA insertion conditions (86%) than intravenous lignocaine (63%) when used with thiopentone.[10] Intravenous lignocaine can be effective for decreasing airway sensitivity (55%) to instrumentation by depressing airway reflexes and decreasing calcium flux in airway smooth muscles.[11,12] Intravenous and topical lignocaine has been used with variable success (40%) to blunt hemodynamic responses to tracheal intubation and extubation.[13,14] Use

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of intravenous lignocaine with propofol showed coughing (20%), gagging (56%) and laryngeal spasm(13%) during LMA insertion.[15]

The purpose of this study is to ascertain a better LMA insertion technique preventing adverse effects related with airway and smooth ventilation without using any muscle relaxant. Therefore, we hypothesized that topical lignocaine with propofol induction provides acceptable LMA insertion conditions than intravenous lignocaine with propofol in patients undergoing elective surgery under general anaesthesia.

MATERIALS AND METHODS

The study was conducted at the department of Anesthesia, Critical Care & Pain Management, Liaquat National Hospital, Karachi after approval from hospital Ethics Review Committee between July 2009 and August 2010. Informed written consent was taken from all study participants. Patients were randomly allocated into two groups of equal size. Randomization was done using simple sealed envelope technique prior to study initiation and opened prior to anaesthesia by the investigator who will give topical or intravenous lignocaine. One hundred and fourteen consecutive patients undergoing general surgery meeting the inclusion criteria ASA I & II (no or mild systemic disease over 18 years) were divided into two groups, group I (intravenous lignocaine group) and group T (topical lignocaine group) each with 57 patients. All patients for emergency cases, risk of gastric content aspiration, pregnant females, co-existing renal or liver disease, limited mouth opening, known allergy to study drugs, refusal to give consent were excluded.

All patients had a running intravenous cannula and standard monitors (non invasive blood pressure, pulse oximeter and ECG) before starting. A baseline heart rate and blood pressure were recorded. Group I received intravenous lignocaine 1.5 mg/kg followed by pre-oxygenation for three minutes. Group T received 5 ml of 4% lignocaine spray to the posterior pharynx in sitting position after depressing the tongue with a tongue depressor. The patients were turned supine immediately followed by pre-oxygenation for 3 minutes. After 3 minutes pre-oxygenation in both groups, intravenous nalbuphine 150 mcg/kg followed by 2mg/kg propofol over 15 seconds were injected. The LMA was inserted 60 seconds after completion of propofol injection after loss of consciousness and eye lash reflex. In case , eye lash reflex was still intact further boluses of 0.5mg/kg propofol iv were used. Classic LMA size 4 were used for males and size 3 for females. All LMA insertions were doneusing method described by Dr. Archie Brain. Water based jelly will be applied on the posterior surface of the LMA and pressed along the hard plate using the index finger . It is finally pushed further down till resistance is felt. Cuff will be inflated with prescribed air in according to LMA size. Proper LMA placement will be confirmed with bilateral equally audible breath sounds, chest movements and capnography.The LMA insertion conditions shall be graded as acceptable providedno gagging, coughing or laryngospasm on first attempt of LMA insertion and unacceptable if there is gagging, coughing or larynogospasm that prevents ventilation on LMA insertion. LMA removed either by patient self or on full awakening of patient. Oxygen will be continued using facemask until full recovery and then the patient will be moved to PACU.

Data were fed and analyzed by using statistical software SPSS-version 10. Frequency and percentages were computed for the categorical variables like age groups, gender, ASA grades and condition of LMA insertion. Mean, standard deviation, 95% confidence interval, median with IQR were computed for quantitative variables like age and weight. Chi-Square test and fisher exact test was applied to observed rate of LMA insertion conditions between groups. Independent t-test and Mann Whitney test were used to compare mean difference between groups for age and weight and which is presented on box and whisker plots. $P<0.05$ was considered significant.

RESULTS

Fifty seven patients were randomly assigned to two groups, group I (intravenous lignocaine) and group T (topical lignocaine).The mean age in group I was 30+/- 9 years and in group T it was 31+/- 10 years. (fig. 1 and 2). The mean weight in group I was 57 +/- 7 kgs. and in group T it was 58 +/- 6 kgs. (fig. 3) There were 12 males in group I and 16 males in group T while 45 females in group I and 41 females in group T . (fig. 4)ASA I patients were 47 in group I while 41 in group T. ASA II patients were 10 in group I while 16 in group T. (table 1) Gagging was noted in 9 patients (16%) in I group while only 2 patients (3.5%) in T group was found to be statistically significant ($p <0.026$).

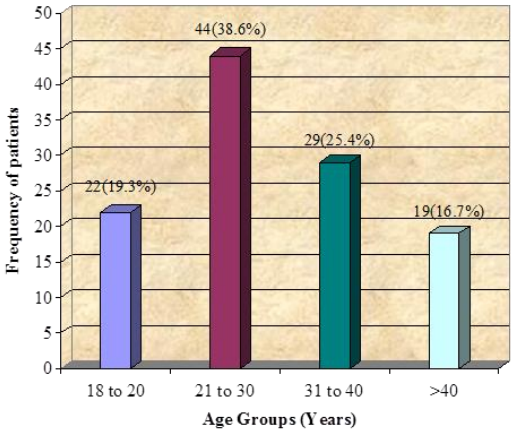
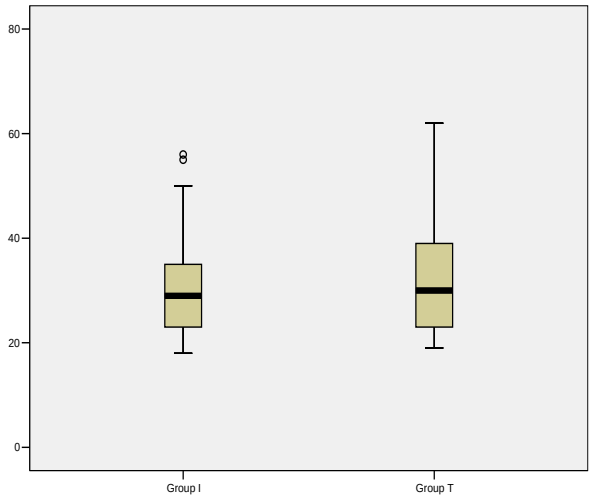


Figure No.1: Age distribution of the patients N=114

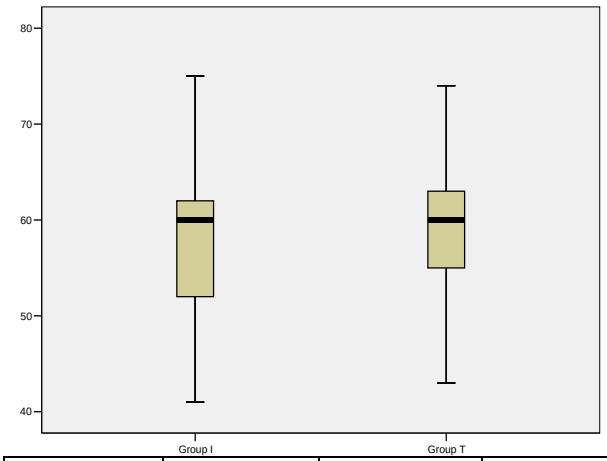
Coughing and laryngospasm was more in group I in comparison to group T.(table 2)) Average propofol and nalbuphine requirement were comparable in the two groups (table 3).



Statistics	Group 1	Group T	P-Value
Mean ± SD	30.7±9.68	31.54±10.44	
Median(IQR)	29(14)	30(17)	0.73

Mann-Whitney U applied instead of t test after violation of normality

Figure No.2: Comparison of age between groups



Statistics	Group 1	Group T	P-Value
Mean ± SD	57.68±7.26	58.54±6.93	0.52
Median(IQR)	60(10.5)	60(8.5)	

Independent sample t test

Figure No.3: Comparison of weight between groups

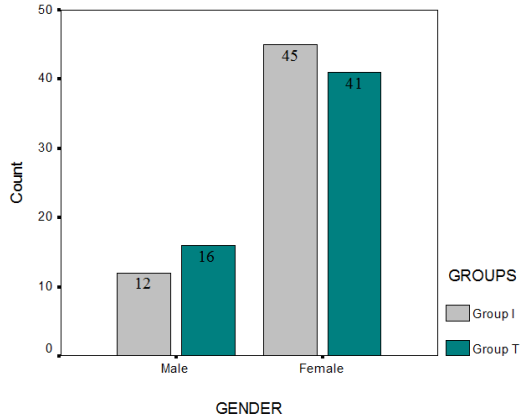


Figure No.4: Comparison of gender between groups

In group I, acceptable insertion conditions was 89% while in group T 98%. Unacceptable insertion conditions were 11% in group I while only 1.8% in group T.(p = 0.05). (table 4).

Table No. 1: Comparison of asa grade between groups

ASA	Group I n=57	Group T n=57	Total n=114
I	47(82.5%)	41(71.9%)	88(77.2%)
II	10(17.5%)	16(28.1%)	26(22.8%)

Chi-Square = 1.79; p=0.18

Table No. 2: Problems at LMA insertion

	Group I n=57	Group T n=57	Total n=114	P-Values
Gagging	9(15.78%)	2(3.5%)	11(9.65%)	0.026
Coughing	6(10.52%)	1(1.8%)	7(6.14%)	0.11
Laryngos-pasm	2(3.5%)	0(0%)	2(1.75%)	0.49

Table No.3: Propofol and nalbuphine requirement

	Group I n=57	Group T n=57	P-Values
Total Propofol Dose (mg)	115.37±14.53	117.09±13.86	0.51
Nalbuphine Dose (mg)	8.65±1.09	8.77±1.04	0.52

Table No.4: LMA insertion conditions

LMA Insertion	Group I n=57	Group T n=57	Total n=114
Acceptable	51(89.4%)	56(98.2%)	107(93.9%)
Unacceptable	6(10.5%)	1(1.8%)	7(6.1%)

Chi-Square = 3.805; p=0.05

DISCUSSION

In developing countries, day care surgeries are of utmost importance to reduce costs.[16]Classic laryngeal mask airway is a first generation, reusable supraglottic airway device commonly used in developing countries because of cost constraints. Lesser complications and airway morbidity noted with use of laryngeal mask airway making early discharges and shorter hospital stays.[4]The successful insertion of LMA requires adequate suppression of upper airway reflexes. Our study showed that LMA insertion conditions can be achieved with minimal complications by using topical lignocaine spray to posterior pharynx with propofol as an intravenous induction agent .

Kanazawa studied the effect of increasing doses of propofol on LMA insertion conditions in sixty patients and found that even high dose propofol (3mg/kg) cannot protect against laryngospasm.[8] Moreover, higher propofol dose can lead to greater haemodynamic changes mostly hypotension and bradycardia . In our study, laryngospasm in observed in two patients, both

in intravenous lignocaine group while no patient developed larygospasm when topical lignocaine used. Cook et al studied ninety patients and compared two different intravenous lignocaine doses (0.5mg/kg and 1.5mg/kg) vs topical lignocaine 10% but using thiopentone as an intravenous induction agent.[9] They obtained acceptable LMA insertion conditions in 86% (topical lignocaine group) and 63% (iv lignocaine group) which are both lower than our success rate (98.2% and 89.4%). This may be attributable to better airway reflex obtundation and deeper plane of anaesthesia by propofol as compared to thiopentone.

Our data comparatively reported a lower incidence of gagging, coughing and laryngospasm than that reported by Stoneham and colleagues using propofol infusion for induction and iv lignocaine bolus for airway reflexes suppression.[14] This may be attributable to the use of propofol as a bolus in our study that can achieve transient higher plasma propofol concentrations thus leading to a better suppression of airway reflexes. Propofol and nalbuphine synergistically induced a deeper plane of anaesthesia which allowed better conditions for placement of laryngeal mask airway.[21] Seavell et al compared propofol 2.5mg/kg with thiopental plus topical lignocaine in ninety patients.[15] They reported comparable LMA insertion conditions between the two groups (88.6% vs 91%) .

Changchien and colleagues studied ninety patients divided into three groups.[17] Group one received topical lignocaine 40 mg followed by propofol 2mg/kg. Other two groups received topical sprays of normal saline followed either by propofol 2mg/kg or 3mg/kg. Adverse responses like body movements, gagging and laryngospasm in topical lignocaine group were less as compared to propofol 3mg/kg group with topical normal saline spray. They reported optimal insertion conditions in 67%, 37% and 73% respectively.Jain and colleagues studied 60 patients using intravenous and topical lignocaine with propofol.[20] They used Vecuronium in dose of 0.1mg/kg. We have not used any muscle relaxation in our study.

The higher success rate that we obtained may have been due to several reasons. We used nalbuphine at induction and this may have improved the LMA insertion conditions by synergistically acting with profol providing a deeper plane of anaesthesia and attenuation of upper airway reflexes. In this study, we use dose of topical lignocaine 200 mg vs 40 mgas mostly reported in previous studies to effectively block upper airway reflexes. We used topical lignocaine close to 4mg/kg much lower than guidelines of British thoracic society of 8.2mg/kg and Williams and colleagues safely used it upto 9mg/kg.[22] In our study , three minutes after each lidocaine spray to provide adequate penetration of local anesthetic into the airway mucosa for maximal effect.[18,19]This helped us achieving ideal conditions for LMA insertion with minimal airway complications.

CONCLUSION

This study shows that the use of topical lignocaine spray over posterior pharynx provides acceptable LMA insertion conditions as compared to intravenous lignocaine when using propofol induction in patients undergoing elective surgery during general anaesthesia without any use of muscle relaxants.

Author's Contribution:

Concept & Design of Study:	Muhammad Shazad
Drafting:	Syed Muhammad Nadeem
Data Analysis:	Syed Muhammad Nadeem
Revisiting Critically:	Muhammad Shazad, Syed Muhammad Nadeem
Final Approval of version:	Muhammad Shazad

Conflict of Interest: The study has no conflict of interest to declare by any author.

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