Original Research Article

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A Comparative Study of Intubating Conditions between Propofol-Fentanyl-Midazolam and Propofol-Fentanyl-Lignocaine Groups without Neuromuscular Blocking Agents

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Abstract

Introduction: Tracheal Intubation without the use of neuromuscular blocking drugs was used to assess the airway by laryngoscopy. We compared the effect of midazolam and lignocaine on intubating conditions along with propofol and fentanyl for intubating without neuromuscular blockers. *Aim:* To compare the intubating conditions and cardiovascular changes (post induction) between fentanyl, midazolam, propofol and fentanyl, lignocaine, propofol groups without using neuromuscular blocking agents. *Materials and Methods:* It is a prospective double blind randomized controlled study. After getting the ethical committee approval and informed written consent hundred patients undergoing elective surgical procedure under general anaesthesia with endotracheal intubation were selected. Group (M) received propofol 2.5mg/kg, fentanyl 2µg/kg, midazolam 0.03mg/kg. Group (L) received propofol 2.5mg/kg, fentanyl 2µg/kg, lidocaine 1.5mg/. Laryngoscopy was done 40 s after propofol administration. The patient's trachea was intubated with an appropriate size cuffed tracheal tube. *Results:* There is no statistical significance in patient characteristics and mallampatti and Cormack–lehane grading between these two groups.The statistical significance less time for laryngoscopy duration and Intubation attempt was successful in all (100%) patients in the M group than in the L group 43 out of 50 patients (86%). Changes in Mean arterial pressure was less with midazolam group than lignocaine group. *Conclusion:* We conclude that the propofol–fentanyl – midazolam combination is better compared to propofol– fentanyl– lignocaine combination in providing clinically acceptable conditions for intubation without significant cardiovascular changes without the use of neuromuscular blocking agents

Keywords: Midazolam; Lignocaine; Propofol; Layrngoscopy.

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Introduction

Tracheal Intubation without the use of neuromuscular blocking drugs was used to assess the airway by laryngoscopy and be useful in both predicted and unexpected difficult intubation and also in cases where neuromuscular blocking agents are either contraindicated or not required. The cardiovascular response to laryngoscopy and endotracheal intubation peaks at 1-2 minutes and returns to normal within 5-10 minutes.Though these sympatho adrenal responses are probably of little consequence in healthy individuals, it is hazardous to those patients with systemic diseases.

Aim: To compare the intubating conditions and cardiovascular changes (post induction) between

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fentanyl, midazolam, propofol and fentanyl, lignocaine, propofol groups without using neuromuscular blocking agents.

Materials and Methods

It is a prospective double blind randomized controlled study. The study was approved by the ethical Committee.

After getting the informed written consent hundred patients undergoing elective general surgical procedure under general anaesthesia with endotracheal intubation were selected and randomly divided into two equal groups.

Group (M): Fifty patients received propofol 2.5mg/kg, fentanyl 2µg/kg, midazolam 0.03mg/kg.

Group (L): Fifty patients received propofol 2.5mg/kg, fentanyl 2µg/kg, lidocaine 1.5mg/kg.

Inclusion Criteria

ASA I & II

Age 20-50yrs

All cases requiring GA

Exclusion Criteria

ASA III and IV

difficult airways Patients with

Patients posted for emergency surgery

Allergy to drugs

Randomization was done by draw of lots.The anaesthetist performing and scoring the laryngoscopy grading and tracheal intubation was blinded to the randomization group and the rest of the study was conducted by investigator who was blinded to the drug injected.

Patients shifted to operating table after 45 minutes. Intravenous access established with 18 gauges cannula and intravenous fluids started. Pre-oxygenation was done with 100% oxygen for 5 minutes.

M Group received propofol 2.5mg/kg, fentanyl 2 µg/kg, midazolam 0.03 mg/kg

L group received propofol 2.5mg/kg, fentanyl 2 µg/kg, lignocaine 1.5 mg/kg. Fentanyl and midazolam were administered 5min and lignocaine 20s before induction of anaesthesia with propofol.

Laryngoscopy was done 40s after propofol administration. The patient's trachea was intubated with an appropriate size cuffed tracheal tube and the cuff was inflated. Anaesthesia was maintained with 66% nitrous oxide in oxygen and 0.6% isoflurane using a carbondioxide absorption circuit. After intubation the haemodynamic measurements were obtained up to 5mins of post intubation period.

Statistical Analysis

All recorded data were entered SPSS 16.0V Software for determining the statistical significance. Mean and standard deviation for continuous variable and Percentages are given for categorical variables. Student's t test was used to compare the two groups on mean values of various parameters. Chisquare test was used to compare the two groups for categorical variables. P value taken for significance is <0.05.

Results

There is no statistical significance in patient characteristics and mallampatti and Cormack – lehane grading between these two groups.The statistical significance less time for laryngoscopy duration (p value is 0.00). In midazolam group compared to the lignocaine group.Mask ventilation was easy in all patients. Intubation attempt was successful in all (100%) patients in the M group and in the L group 43 out of 50 patients (86%) had successful intubation. There is no rocuronium requirement in the M group and in the L group seven patients required rocuronium (p value 0.01). Patients who are all received rocuronium were intubated successfully.

Overall clinically acceptable intubating conditions was 40 out of 50 patients (80%) in the compared to 28 out of 40 patients (56%) in L group. This difference was statistically significant (p value 0.01) (Table 1 and 2).

Laryngoscopy was easy in all patients in the M group. Laryngoscopy was difficult in 18 (36%) out of 50 patients in the L group (p value 0.00). seven patients in the L group had closed vocal cords requiring administration of rocuronium before intubation (p value 0.01).

Twenty two patients (44%) in the L group had sustained coughing (> 10 s) on intubation compared with the M group 5(10%) although this is statistically significant (p value is 0.00).

Table 1:

Group Duration Laryngoscopy (S)	N	Mean±Std. Deviation (S)	Minimum Duration (S)	Maximum Duration (S)	P value
M	50	13.62±1.652	11	17	0.00
L	50	15.4±2.1	12	19	

Group Laryngoscopy (S)	Grade	Frequency (N)	Percentage (%)	P value
M	Easy	50	100	0.00
	Easy	32	64	
L	Difficult	18	36	

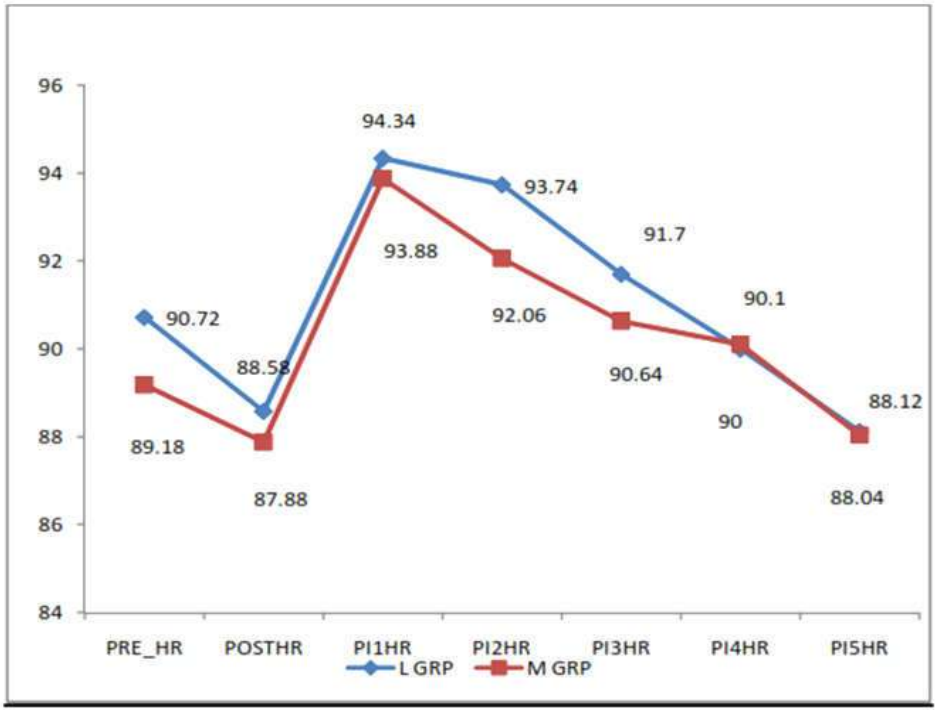

Fig. 1: Heart rate (per minute)

Table 2:

Group	Vocal cord Position	Frequency (N)	Percentage (%)	Rocuronium Requirement	P Value
M	Abduct	50	100	0	0.006
L	Abduct	43	86	0	
	Closed	7	14	7	

Group	Intubating conditions	Frequency (n)	Percentage (%)	Total	Rocuronium Requirement	P value
	CA	40	80	50		
M	C-UA	10	20	100	0	0.01
	CA	28	56	50		
L	C-UA	22	44	100	7	

CA – Clinically acceptable C-UA – Clinically unacceptable

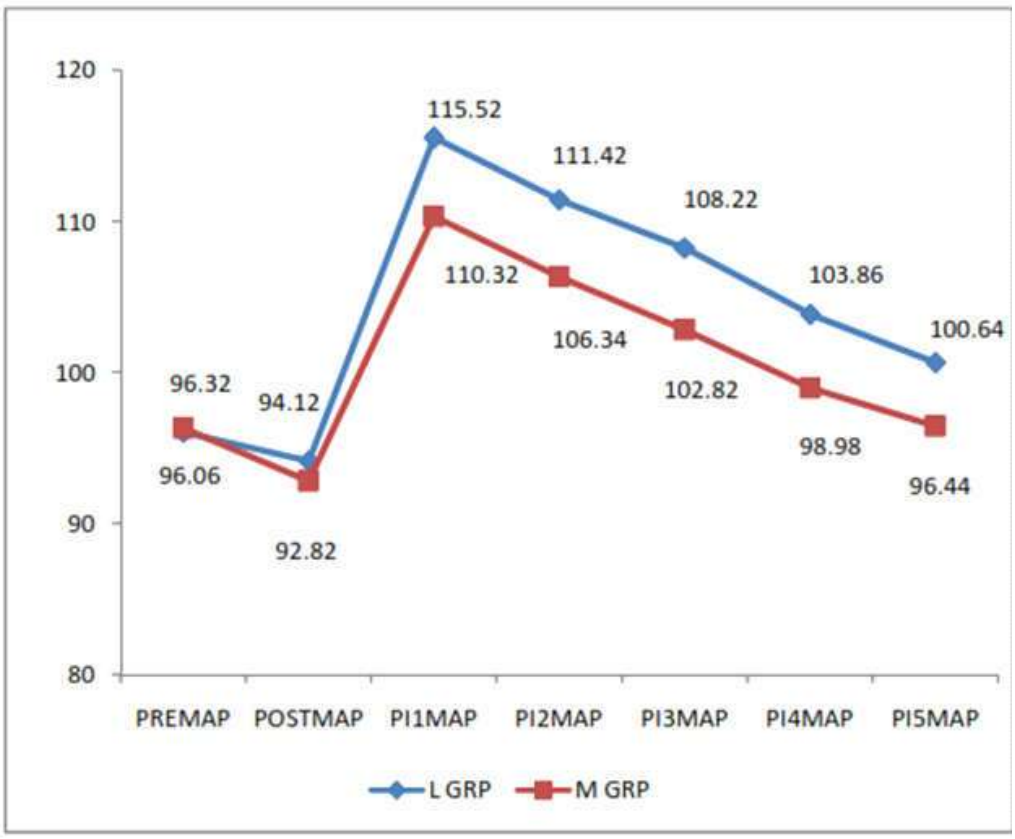

Fig. 2: Mean Arterial Pressure (mmhg)

In the L group 18 patients (36%) had vigorous limb movement compared with no limb movement in the M group (p value is 0.00).

Cardiovascular responses to induction and intubation are compared in both groups. There is no significant difference in heart rate of both groups. Statistical significance is not observed between the two groups up to induction (p value more than 0.05). After induction there is significant difference on mean arterial pressure between these two groups till the end of the study (p value less than 0.00). Between these two groups better hemodynamic stability was observed in M group. (Figure 1 and 2).

Oxygen saturation was maintained between 96% - 100% before as well as after induction of anaesthesia and tracheal intubation. There were no episodes of laryngospasm, bronchospasm, masseter spasm, or generalized rigidity were observed.

Discussion

Demographic profile

The two groups were comparable with respect to age, sex, height and weight in our study and are correlating with study done by prakash et al. [20] whose study also shows no statistical difference in patient characters.

Mallampatti grading

Airways of both group were compared and 44 patients (88%) in the M group, 45 patients (90%) in the L group comes under MPC grade – I, 6 patients (12%) in the M group , 5 patients(10%) in the L group comes under MPC grade –II. There is no statistical significance between these two groups. Prakash et al. [20] his study also showed no statistical difference between two groups in Mallampatti grading. Cormack and lehane laryngoscopy grading

Laryngoscopy view of both groups were compared and 45 patients (90%) in the M group, 47 patients (94%) in the L group comes under CLG grade–I, 5 patients (10%) in the M group, 3 patients (6%) in the L group comes under MPC grade–II. Thus the two groups did not differ statistically with respect to laryngoscopic view.

Prakash et al. [20] study which also no statistical difference between two groups in mallampatti grading.

Laryngoscopic duration

Duration of the laryngoscopy is defined as the time from start of laryngoscopy until tracheal intubation and removal of laryngoscope blade from the mouth. Laryngoscopy was performed 40 sec after propofol administration, maximum laryngoscopy duration in M group duration was 17sec, and L group it is 19 sec, minimum laryngoscopy duration of both groups are respectively 11secs (M), 12secs (L). Mean laryngoscopy duration of both groups are respectively 13.62secs (M), 15.4secs (L). Laryngoscopy duration was statistically significant between these two groups.

Prakash et al. [20] showed no statistical difference between two groups in laryngoscopy duration.

Laryngoscopy

In M group laryngoscopy was easy in all patients (100%) whereas in L group 32 (64%) had easy laryngoscopy, 18 (36%) had difficult laryngoscopy. It is statistically significant. In M group laryngoscopy was better than L group.

Prakash et al. [20] study showed Laryngoscopy was easy in all patients in the M group but difficult in two out of 40 patients in the L group

Lewis et al. [16] (1948) also showed in his study that there was difficulty in performing laryngoscopy in six patients. He used thiopental sodium as the sole agent to facilitate tracheal intubation without using neuromuscular blocking agents

Vocal cord position

It is abducted in 50 out of 50 patients in M group, 43 out of 50 patients in L group. In the L (lidocaine) group seven patients had closed vocal cords requiring rocuronium for intubation. It is statistically significant (p value 0.01). This is in concurrence with prakash et al. [20] study which showed five patients in the L (lidocaine) group had closed vocal cords and so these patients required rocuronium for intubation.

Coughing

In our study twenty two patients (44%) in the L (lidocaine1.5 mg/kg) group had sustained coughing (> 10 s) on intubation compared with five patients (10%) in the M (midazolam) group. This is statistically significant. p value is 0.00.

Prakash et al. [20] study showed sustained coughing (> 10 s) in the L group (17 patients) during intubation compared with the M group (10 patients).

Davidson et al. [5](1993) studied tracheal intubation with propofol, alfentanil and with or without intravenous lignocaine. His study showed better cough suppressant effect in lignocaine.

Houlton et al. [19] (1979) study showed equal cough suppressant effect in lidocaine compared to bronchodilators.

Yukiola et al. [32] (1985) study showed decreased incidence of cough when 2 mg/kg of intravenous lidocaine was given one to five minutes before intubation.

Hiller et al. [10] (1993) study showed lignocaine 1 mg/kg not enough to suppress the cough. He concluded that higher dose of lignocaine was required to suppress the cough reflex with propofol induction.

In the L group 18 patients (36%) had vigorous limb movement compared with no limb movement in the M group (p value is 0.00). This is in concurrence with Prakash et al. [20] study which showed that six patients in the L (lidocaine) group had slight limb movement compared with no limb movement observed in the M group.

Intubating conditions

In our study M group shows better intubating conditions in 40 out of 50 patients (80%), compared to 28 out of 50 patients (56%) in L Group. Clinically unacceptable intubating conditions in both groups was respectively 10 (20%) in M (g), 22(44%) in L (g). This difference was statistically significant (P value 0.01). There is no rocuronium requirement in M group. In L group seven patients required rocuronium, and over all intubating conditions were better in M group.

Prakash et al. [20] study showed better intubating conditions in midazolam group compared to lignocaine group.

Lewis et al. [16] (1948) studied after administration of thiopentone sodium 500-750 mg in 200 patients for oral intubation or blind nasal intubation without muscle relaxants. There were two failures in the blind nasal group.

Keaveny et al. [13] (1988) in his study used propofol 3 mg/kg and showed better intubating conditions.

Barker et al. [2] (1992) study showed lower incidence of laryngospasm and vocal cord movements following propofol induction compared to thiopentone induction, and is due to greater depression of laryngeal reflexes by propofol.

Grant et al. [7] (1998) study showed better intubating conditions with propofol 2 mg/kg and pre treatment with remifentanil 2 μg/kg. This dose was equal to 4 μg/kg of fentanyl.

Mulholland et al. [17] (1991) study showed no significant difference was found in the intubating conditions with intravenous pre-treatment with lignocaine 1.5 mg/kg.

Grange et al. [6] (1993) observed no significant difference in the quality of intubating conditions with intravenous pre-treatment with lignocaine or alfentanil.

Klemola et al. [15] (2000) study showed better intubating conditions was observed in remifentanil 4μg/kg –propofol 2.5 mg/kg comination.

Trabold et al. [29] (2004) study showed better intubating conditions was observed when remifentanil 1μg/kg was given after propofol 2.5 mg/kg with midazolam 0.03 mg/kg.

Heart Rate

In our study cardiovascular responses to induction and endo tracheal intubation were compared with midazolam and lidocaine groups. In both groups no difference in heart rate was found. (p value more than 0.05). This is in concurrence with prakash et al. [20] study that showed that there is no statistical significance in heart rate between two groups.

Mulholland et al. [17] (1991) study showed no difference in the heart rate to intubation with propofol (2.5 mg/kg) induction with pre-treatment with lignocaine 1.5 mg/kg.

Mean arterial pressure

In our study there was significant difference in mean arterial pressure after induction between these two groups till the end of the study. (P value less than 0.00). Between these two groups better cardiovascular stability was observed in M group. This is in concurrence with Prakash et al. [20] study that showed that there was statistical significance in mean arterial pressue between two groups. In his study better cardiovascular stability was observed in M group compared to L group.

Saarnivaara et al. [26] (1991) study showed better cardiovascular stability in propofol 2.5 mg/kg with alfentanil 30 μg/kg pretreatment Mulholland et al. [17] (1991) study showed no difference in the mean arterial pressure to intubation with propofol (2.5 mg/kg) induction with pre-treatment with lignocaine 1.5 mg/kg.

Klemola et al. [15] (2000) study showed better cardiovascular stability was observed in remifentanil 4μg/kg with propofol 2.5 mg/kg combination.

Trabold et al. [29] (2004) study showed better cardiovascular stability was observed in remifentanil 1μg/kg was given after s 2.5 mg/kg with midazolam 0.03 mg/kg.

Side Effects

In our study there were no episodes of laryngospasm, bronchospasm, masseter spasm, or generalized rigidity. This is in concurrence with Lewis et al. [16] study which showed that problems like coughing, laryngospasm occur during thiopentone induction alone without using neuromuscular blocking agents.

The propofol (2.5 mg/kg) induction has greater depression of laryngeal reflexes than an equipotent dose of thiopentone. The incidence of laryngospasm was lower with propofol compared to thiopentone [13].

The addition of fentanyl and midazolam potentiate the effects of propofol and reduce the dose requirement of propofol. Both propofol and midazolam has synergestic action due to interaction at GABA-A receptors in the central nervous system. The propofol dose was reduced by 52% in the presence of midazolam Midazolam has synergistic action with fentanyl for induction of anaesthesia. This synergistic effect is due to potentiation between opioids and benzodiazepines [1].

The cough suppressant effect of intravenous lignocaine is due to brain stem depression [11]. Lignocaine may act by anaesthetizing peripheral cough receptors in the trachea and hypopharynx [19] or by increasing the depth of general anaesthesia [8].

Endotracheal intubation is a stronger stimulus than laryngoscopy. Propofol with fentanyl combination was able to suppress motor and hemodynamic reactions to various noxious stimuli. Laryngoscopy was easier in most of the patients with either technique [14].

The tracheal intubation without neuromuscular blocking agents are not advised in patients with a full stomach, elderly patients and those with cardiovascular or cerebrovascular disease and in those patients undergoing neurosurgery or ophthalmic procedures.

The potentially serious and undesirable side-effects of succinylcholine are avoided and side effects such as anaphylaxis that can occur with the use of non-depolarizing drugs are avoided. The short acting opioids, such as remifentanil and alfentanil, when used in combination with propofol for

tracheal intubation are more advantageous in the aspect of good depth of anaesthesia and also stable hemodynamic profile [31]. In our study we used fentanyl as a opioid in combination with midazolam, propofol and lidocaine. Midazolam has synergestic action with fentanyl and propofol. So, the intubating condions and cardiovascular responses were better in propofol, midazolam and fentanyl group patients [32].

Conclusion

We conclude that the propofol–fentanyl–midazolam combination is better compared to propofol–fentanyl–lignocaine combination in providing clinically acceptable conditions for intubation without significant cardiovascular changes without the use of neuromuscular blocking agents.

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Conflict of Interest: Nil

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