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A comparative study between intravenous propofol and an equipotent dose of thiopentone for the incidence of sore throat after Laryngeal Mask Airway (LMA) insertion

Authors
Subrata Kumar Mandal, Moumita Ghosh Nandi, Shantanu Ghosh, Manoj Kumar Ray
Department of Anaesthesiology, North Bengal Medical College and Hospital, Siliguri, West Bengal, India
Corresponding Author
Dr Subrata Kumar Mandal
Associate Professor, Dept. of Anaesthesiology, North Bengal Medical College and Hospital, Siliguri, India

Abstract
Introduction: *The LMA (Laryngeal Mask Airway) is an excellent alternative method offering advantages of endotracheal intubation while avoiding the deleterious effects of succinylcholine. The present study was designed to draw a comparison as to which of the two induction agents, propofol and thiopentone sodium, caused less incidence of post-operative sore throat (POST) after LMA insertion.*
Materials and Methods: *Three hundred patients of either sex, ASA 1 and 2, aged 18 to 50 years undergoing minor elective surgeries under general anaesthesia were enrolled in this prospective, randomized, double blind study. Following premedication with midazolam (0.04 mg/kg) and fentanyl (1.5 µg/kg), patients were randomly allocated to be induced with propofol 2 mg/kg (group A, n=140) or thiopentone sodium 5 mg/kg (group B, n=140).*
Results: *The incidence of POST was statistically significantly greater in group B as compared to group A ($p<0.05$)*
Conclusion: *Propofol (2mg/kg) is a superior induction agent than thiopentone sodium (5mg/kg) for facilitating LMA insertion with lesser incidence of post-operative sore throat (POST).*
Keywords: *airway, laryngeal, mask, propofol, thiopentone, post-operative sore throat.*

Introduction

The Laryngeal Mask Airway (LMA) is a supra-glottic airway device designed by British anaesthesiologist, Dr.Archi Brain. It is being used as an excellent alternative to tracheal intubation in mainly minor surgeries where use of depolarizing muscle relaxant may or may not be necessary. This helps in avoiding succinylcholine induced muscle pain in day care cases where early ambulation is recommended. It has been successfully used to manage difficult airways as a rescue device in the "cannot intubate-cannot ventilate" situation[1,2] and incorporated in ASA difficult airway algorithm. Another major advantages of LMA over tracheal intubation is lesser incidence of post-operative sore throat (POST).[3,4] and post-operative pharyngeal discomfort.[5]

Various induction agents have been tried to facilitate smooth insertion of LMA with minimal side effects. Inadequate depth of anaesthesia may lead to serious complications like hyperactivity of the airway or physical injury to the patient.[6] On the other hand, excessive anaesthesia carries a risk for developing hypotension and bradycardia.[7]

Post-operative sore throat (POST) is a relatively minor but frequent post -operative complication[8,9] that is significant to the patient.[10] The incidence of POST varies largely[8] due to type of device incorporated, size, technique of insertion, lubricant type, cuff pressure, length of procedure, anaesthesia technique applied, methods of evaluation etc.

Hence the present study has been designed to compare the incidence of post-operative sore throat (POST) after insertion of LMA with the two most commonly used intravenous induction agents – propofol and thiopentone sodium.

Methods

After institutional review board approval and written informed consent, 300 healthy patients of either sex, aged 18 to 50 years, with American Society of Anaesthesiologists (ASA) physical status I or II, scheduled to undergo minor elective surgeries under general anaesthesia in general surgery, orthopaedics and obstetrics/gynaecology. On receiving the patients to operation theatre, they were asked to choose a sealed envelope. Group A received propofol as induction agent in a dose of 2 mg/kg body weight whereas Group B received thiopentone sodium in a dose of 5 mg/kg body weight. The person who was collecting data was kept completely unaware of the group of the patient. After random allocation of the patients into two groups, the patients were put on the OT table. An intravenous line was established and ringer lactate infusion was started. Patients were monitored with NIBP, continuous ECG, capnography and pulse-oximetry. Keeping all emergency drugs and equipments at hand, premedication was given with midazolam 0.01 mg/kg and fentanyl 1 mcg/kg. Pre-oxygenation was done for 3 minutes. Induction was performed with a covered syringe filled either with thiopentone sodium or propofol. All the drugs were prepared and given by a separate anaesthetist who was not involved in data collection and data analysis. The area of intravenous line was covered so that it was not visible to the anaesthetist who was collecting data. After induction, a deflated classic LMA of size according to the body weight of the patient was inserted after adequate relaxation of jaw and loss of eye reflexes. LMA insertion was done by the senior most anaesthetist of the unit .Incidence of laryngospasm, coughing and gagging were noted while inserting LMA. If LMA insertion was not successful in the first attempt, second attempt was to be taken. However, if second attempt proved unsuccessful, tracheal intubation using muscle relaxant was performed and the case was excluded out of our study. After LMA insertion, the cuff was inflated with air just enough to obtain a seal. The confirmation of adequate placement of LMA was done by bilateral chest auscultation and capnography. After confirmation, LMA was fixed in proper position and attached to anaesthesia machine through a breathing circuit. Maintenance was done with nitrous oxide, sevoflurane (1-2 MAC) and oxygen with a fresh gas flow rate of 6 litre/min. Spontaneous or assisted spontaneous breathing was maintained without the use of neuromuscular blocking agent. At the completion of the procedure, LMA was removed. 100% oxygen was given through face mask for 10 min and the patient was sent to post anaesthetic care unit. A single investigator, who was blinded for group allocation, visited the patients at 2,4,12, and 24 hours postoperatively. He enquired about the incidence of post-operative sore throat, nausea, vomiting and dysphonia. He also assessed patient's satisfaction with the anaesthesia care provided.

Statistical Analysis

The results of our study were tabulated and subjected to statistical analysis (SPSS version 12.0 for windows, Chicago, IL, Inc). All continuous

data are presented in the tables as mean ± SD. Discrete categorical data are presented as absolute values or relative number of patients, as appropriate. Comparisons for each demographic and clinical variable between the two groups were performed by Independent sample t test for normally distributed variables and Pearson Chi-square test for categorical variables. The level of significance was set as $P < 0.05$.

Results

In our study, we have compared two widely used intravenous induction agents for incidence of postoperative complications. . We found that post-operative sore throat (POST) is significantly higher in group B ($P<0.05$) lasting upto 24 hours. Simultaneously, patients who experienced dysphonia and PONV were significantly higher in group B ($p<0.05$) during the early post-operative period at 2 hours. However, there was no significant difference in both the groups at 4, 12 and 24 hours ($p>0.05$). Patient's satisfaction with anaesthesia care was significantly higher in group A at 24 hour postoperatively. We also concluded that propofol was better than thiopentone as an induction agent.

Table 1: Demographic parameters

Demographic Data	Group A (n=140)	Group B (n=140)	P value
Age (Years)	30.82±5.47	30.77±5.07	0.94
Weight (kgs)	62.63±9.92	62.04±9.01	0.6
Sex (M/F)*	55/85	58/82	0.6
Data expressed as mean ± SD. Tests done: Independent samples t test. *Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant).			

Table1 shows that there are no statistically significant differences between the groups in respect to patient's age, sex, weight ($P > 0.05$). Statistical analysis revealed no significant difference of sex distribution between the two groups (Chi-square test) ($P > 0.05$). So both the groups were comparable in terms of demographic parameters.

Table 2: Patient characteristics and base line parameters

	Group A (n=140)	Group B (n=140)	P value
ASA(I/II)*	98/42	104/36	0.25
Heart rate	77.08±7.60	77.41±8.51	0.73
MAP (mm of Hg)	94.76±7.56	94.91±8.21	0.87
Resp. Rate	14.02±0.75	14.16±2.00	0.45
SpO2	99.22±.84	99.06±0.98	0.15
Data expressed as mean ± SD. Tests done: Independent samples t test. *Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant			

Table2: shows that there are no statistically significant differences between the groups in respect to ASA class and base line parameters ($P > 0.05$). Statistical analysis revealed no significant difference of ASA class between the two groups (Chi-square test) ($P > 0.05$). Both the groups were comparable in terms of base line parameters.

Table 3: Intraoperative parameters and response to Laryngeal Mask Airway insertion

	Group A (n=140)	Group B (n=140)	P value
Surgery Duration(mins)	39.53±9.84	40.96±9.78	0.2218
Attempts(1/2)	125/15	115/25	0.6048
Gagging(no/yes)*	115/25	113/27	0.6683
Coughing(no/yes)*	125/15	122/18	0.4488
Laryngoscopy(no/yes)	133/7	134/6	0.6765
Data expressed as mean ± SD. Tests done: Independent samples t test. *Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant)			

Table 4: Incidence of post-operative sore throat (POST)

POST	Group A (n=140)	Group B (n=140)	P value
2hrs	20(14.28%)	35(25%)	0.0034
4hrs	12(8.57%)	25(17.86%)	0.0041
12hrs	7(5%))	19(13.57%)	0.0031
24hrs	3(2.14%)	14(10%)	0.0019
Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant).			

Table 4: Shows that there are statistically significant differences between the groups in respect to the post-operative sore throat(POST) at all the four recordings upto 24 hrs post-operatively (P <0.05).

Table 5: Incidence of post-operative dysphonia

Dysphonia	Group A (n=140)	Group B (n=140)	P value
2hrs	3(2.14%)	14(10%)	0.0019
4hrs	2(1.43%)	5(3.57%)	0.1719
12hrs	1(0.71%)	3(2.14%)	0.2431
24hrs	1(0.71%)	2(1.43%)	0.4763
Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant).			

Table 5: Shows that there is statistically significant differences between the groups in respect to the post operative dysphonia at 2hrs post-operatively (p<0.05) and statistically insignificant difference between the groups in respect to post operative dysphonia at 4,12 and 24 hrs post-operatively(p>0.05).

Table 6: Incidence of post-operative nausea and vomiting(PONV)

PONV	Group A (n=140)	Group B (n=140)	P value
2hrs	28(20%)	40(28.57%)	0.0248
4hrs	23(16.43%)	28(20%)	0.2908
12hrs	11(7.86%)	17(12.14%)	0.1205
24hrs	9(6.43%)	13(9.28%)	0.2441
Data expressed in numbers. Pearson Chi-square test. (P < 0.05 considered significant).			

Table 6: Shows that there is statistically significant differences between the groups in respect to the post operative nausea and vomiting (PONV) at 2hrs post-operatively (p<0.05) and statistically insignificant difference between the groups in respect to post-operative nausea and vomiting (PONV) at 4,12 and 24 hrs post-operatively (p>0.05).

Table 7: Patient's satisfaction with anaesthesia care at 24 hour post-operative

	Group A (n=140)	Group B (n=140)
Not satisfied	10	28
Satisfied	23	22
Very satisfied	107	90
Data expressed in numbers. Pearson Chi-square test (p=0.0006).		

Table 7: Shows that there is statistically significant differences between the groups in respect to patient's satisfaction at 24hrs post-operatively (p<0.05).

Discussion

The increasing emphasis on day care anaesthesia has led to the greater use of laryngeal mask airway (LMA) as an alternative to tracheal intubation for securing airway. Use of LMA is associated with less airway handling, less hemodynamic changes, and less post-operative complication like

pharyngeal discomfort and post-operative sore throat (POST)[1,2] than tracheal intubation. Various induction agent have been tried for LMA insertion. In this study, we have compared two i.v induction agents; propofol and thiopentone sodium with respect to the incidence of post-operative complications after LMA insertion in short surgical procedures lasting for less than 1 hour where use of muscle relaxant was not required. It was found that patients who received propofol for induction of anaesthesia to facilitate the insertion of LMA had a lower incidence of postoperative sore throat. Scannlon et al compared the response to LMA insertion after either propofol (2.5 mg/kg) or thiopentone (5 mg/kg). They showed that thiopentone was associated with higher incidence of adverse responses (76%) than propofol (26%).

Similar studies conducted by Gunjan et al and Sengupta et al concluded that propofol at the dose of 2.5 mg/kg was superior to thiopentone at the dose of 5 mg/kg as an induction agent for insertion of the laryngeal mask airway.

Taha et al obtained excellent relaxation for intubation in 84% of patients belonging to the group using propofol as an induction agent as compared to 50% of patients using thiopentone sodium($p<0.05$). In our present study, co-induction was done with midazolam (0.01 mg/kg), fentanyl (1 mcg/kg) and either propofol (2 mg/kg) i.e group A or thiopentone sodium (5 mg/kg) i.e group B, to attenuate airway reflexes while ensuring rapid recovery and early ambulation. We found no significant difference in respect to number of attempts, coughing, gagging or laryngospasm in both the groups. ($p>0.05$) Hashimoto et al[61] concluded that succinylcholine (0.5 mg/kg) provided satisfactory relaxation for LMA insertion with thiopentone. Bhandariet al[62] observed that application of topical lidocaine on posterior pharyngeal wall before thiopentone induction had significantly fewer adverse responses to LMA insertion ($p<0.05$). Figueredo et al. found that postoperative discomfort was related to type of ventilation (spontaneous breathing or mechanical ventilation)[55],use of neuromuscular blocking drugs, method of insertion,[56] and number of attempts. Yuan- Yi Chia et al compared postoperative complications between groups receiving propofol and thiopentone. They found less sore throat in propofol group at 2 and 12 hrs ($p<0.05$). Similarly, our study found that there is statistically significant difference in the incidence of sore throat upto 24 hours in the postoperative period. We observed that the incidence of dysphonia and PONV was statistically significantly different in two groups in immediate (2 hours) post-operative period. However, there was no significant difference at 4, 12 and 24 hours postoperatively.

One of the limitations of our study was that the use of analgesics in post-operative period was not taken into account. It could alter the incidence of sore throat.

Following unsuccessful insertion of LMA in the first attempt, second attempt was made without giving supplementary dose of induction agent. This could have eventually changed our results.

Another limitation of our study was that history of smoking was excluded while selecting the sample size.

Conclusion

Administration of propofol (2 mg/kg i.v) for induction of anaesthesia to facilitate the insertion of a LMA had a lower incidence of post operative sore throat than thiopentone sodium (5 mg/kg). In addition, the incidence of dysphonia and PONV was significantly less in patients receiving propofol during the immediate postoperative period.

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Conflicts of Interest: There are no conflicts of interest.

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