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Ideal induction agent for LMA insertion: A comparative study between Thiopental Sodium and Propofol

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KEYWORDS : LMA, Thiopental, Propofol

Mrunalini Parasa

(Associate professor) Department of Anaesthesiology, NRI Medical College, Chinnakakani, Guntur district, Andhra Pradesh

ABSTRACT

Adequate depth of anaesthesia and supression of airway reflexes is essential to facilitate insertion of laryngeal mask airway (LMA). This study was performed to evaluate the conditions for LMA insertion, the incidence of undesirable side effects and hemodynamics using Propofol or Thiopentone for LMA insertion. 60 ASA physical status I/ II patients of age 20-50 years were enrolled in the study. Patients were randomly allocated into Group 1 (Propofol) /Group 2 (Thiopental). After standard premedication, both the groups were induced with either 3mg/kg Propofol or 6mg/kg Thiopental. The study revealed statistically significant difference in jaw relaxation (p 0.02) and in the incidence of undesirable effects (gagging (p 0.03), cough (p 0.02) and patient movements (p 0.05) between Propofol and Thiopental groups with better conditions for LMA insertion in Propofol group.

Conclusion: Propofol is an ideal induction agent for LMA insertion

Introduction

LMA is a supra glottic airway device designed by Dr. A.I.Brain in 19811. Though not a definitive airway device, it revolutionised the anaesthetic practice by its ease of insertion, maintaining excellent airway patency without the requirement of jaw thrust and hemodynamic stability2. Obtundation of airway reflexes is essential for LMA insertion and hence requires either intravenous or inhalational induction agent that supresses the airway reflexes. Propofol provides greater supression of laryngeal reflexes than thiopental3. It is associated with less postoperative pharyngeal morbidity than thiopental with LMA insertion4. This study is a randomised double blind comparision of Propofol and Thiopental for LMA insertion.

Materials and Methods

After obtaining institutional ethical committee approval and written informed consent, 60 ASA physical status I/ II patients of age 20-50 years scheduled to receive general anaesthesia for elective surgical procedures of 1 hour duration were enrolled in the study. Patients with history of airway hyperreactivity, risk of aspiration, emergency surgeries, morbid obesity and allergy to study drugs were excluded from the study.

It is a prospective randomised double blind study. Study population was randomly allocated in to two groups of 30 each with computer generated table of random digits. Group1(Propofol) and Group 2 (Thiopental). All the patients received oral alprazolam 0.25 mgs the night before surgery. After placement of standard monitors and recording baseline hemodynamic parameters, an intravenous access was established. All the patients were preoxygenated with 100% Oxygen for 3 minutes. Following glycopyrrolate 0.05 mg/kg, anaesthesia was induced with 2µg/kg of fentanyl and either 3mg/kg of propofol in group 1 or 6mg/kg of thiopental in group 2. The syringe containing the induction agent was covered inorder to blind both the patient and the person administering the study drug to group assigned. Induction time was the time from administration of an induction agent to the loss of verbal contact in group 1 and loss of eye lash reflex in group 2. Apnoea time was the time from insertion of LMA to the return of spontaneous breathing. The size of LMA was based on the patient's body weight as suggested by the manufacturer's instruction manual. A blinded investigator inserted the LMA ninety seconds after administration of the study drug using the technique recommended by Brain5. During LMA insertion, conditions for LMA insertion (jaw relaxation, number of attempts, requirement of additional dose of induction agent) and adverse events during LMA insertion (gagging, coughing, limb and head movements, bronchospasm and laryngospasm) were documented based on a 3 point scale for each parameter (Table 1). Proper positioning of LMA was assessed by chest expansion and capnography during spontaneous or assisted breathing. An additionl dose of 20mg propofol in group 1 and 50mg of thiopental in group 2 was administered if jaw relaxation was not adequate for LMA insertion. Jaw relaxation was graded only at first attempt. If LMA could not be properly placed after two attempts, airway was secured with an endotracheal tube. Anaesthesia was maintained with 33% oxygen in nitrous oxide and 2% sevoflurane. Ventilation was assisted until the return of spontaneous breathing. Heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) were documented before administration of the induction agent, after administration of the induction agent , 1minute and 3 minutes after LMA insertion.

Statistical analysis

Descriptive statistics proportions, mean and standard deviation were used to summarise the data. t-test of difference between two independant means was used to analyse the difference in averages of different parameters under study.z-test of difference between two proportions was used to analyse the differences in different parameters under the study. in-silico project support for life sciences online calculators were used to analyse the data. A p valve of < 0.05 was considered statistically significant.

Results

There was no statistically significant difference between the two groups in terms of demographic data. There is a statistically significant difference in the average induction time (p 0.039) and average apnoea time (p 0.002) between the two groups with more rapid induction and longer apnoea time in Propofol group. Both the groups exhibited a statistically significant difference in proportion of jaw relaxation (p 0.02) with better jaw relaxation in propofol group, number of attempts for LMA insertion (p 0.03) with more attempts in Thiopentone group and number of additional doses of induction agent required(p 0.02) with more additional dose requirements in Propofol group (Table 1).There was a statistically significant difference in proportion of adverse effects like gagging (p0.03), coughing (p 0.02) , limb and head movements (p 0.05) during LMA insertion with higher incidence in Thiopental group (Table 1). There was no bronchospasm or laryngospasm in patients from either groups. There was no statistically significant difference between the average preinduction HR, SBP,DBP. There is more decrease in HR, SBP and DBP in Propofol group, than in Thiopentone group after administration of induction agent and 1minute and 3 minutes after LMA insertion (Table 2).

Table 1: Parameters recorded during LMA insertion

Description	Grades	Group 1	Group 2	P value
Jaw relaxation	Complete	30	25	0.02
	Partial	0	5	
	No	0	0	

Number of attempts	1	28	22	0.03
	2	2	8	
	Inability to insert	0	0	
Number of cases requiring additional dose of induction agent	0	30	25	0.02
	1	0	5	
Gagging	Absent	28	22	0.03
	Mild	1	7	
	Severe	1	1	
Coughing	Absent	29	23	0.02
	Mild	1	5	
	Severe	0	2	
Limb and Head movements	Absent	27	21	0.05
	Mild	3	9	
	Severe	0	0	
Bronchospasm	Absent	30	30	0
	Mild	0	0	
	Severe	0	0	
Laryngospasm	Absent	30	30	0
	Mild	0	0	
	Severe	0	0	

P < 0.05 is considered statistically significant.

Table:2 Hemodynamic parameters during LMA insertion

Description		HR		SBP		DBP	
Group		P	T	P	T	P	I
Base-Line	Mean	81.67	85.87	123.8	122.67	79.00	80.2
	SD	10.05	19.97	11.46	11.89	6.16	8.06
			p-value 0.30155		p-value 0.74024		p-value 0.52734
Post induction	Mean	76.70	85.97	107.67	113.80	69.73	77.67
	SD	7.10	9.44	11.11	15.14	7.61	8.93
			p-value 0.00029		p-value 0.05776		p-value 0.00124
1minutes after LMA insertion	Mean	76.33	86.27	108.73	117	71.53	78.80
	SD	7.12	10.03	9.34	14.14	6.47	11.41
			p-value 0.00014		p-value 0.00501		p-value 0.01038
3minutes after LMA insertion	Mean	77.90	89.17	109.13	122.47	73.23	83.93
	SD	8.17	12.73	10.00	14.29	6.30	8.20
			p-value 0.00012		p-value 0.00002		p-value 0.00001

HR-heart rate, SBP-systolic blood pressure, DBP- diastolic blood pressure, P- propofol group,T- thiopental group, SD- standard deviation, LMA- laryngeal mask airway. p- value < 0.05 is considered statistically significant.

Discussion

Sufficient depth of anaesthesia is essential to provide optimal conditions of insertion, to prevent adverse effects like gagging, coughing, involuntary movements, laryngospasm and bronchospasm and to maintain haemodynamic stability during insertion of LMA. Traumatic LMA insertion also increases postoperative pharyngeal morbidity4.

In this study we compared the conditions for insertion and adverse effects and hemodynamics during LMA insertion using Thiopental or Propofol for induction.

A study done by Sengupta, et al comparing 2mg/kg Propofol or 5mg/kg Thiopental for LMA insertion showed Propofol to be a better induction agent for LMA insertion but there was no statistical significance between jaw relaxation and adverse effects between the two groups6. A similar study was done by Parhaizgar Khan, et al in day case anaesthesia comparing 2.5 mg/kg of Propofol or 5mg/kg Thiopental for LMA insertion and concluded that Propofol is superior to Thiopental for LMA insertion7. No patients in our study had laryngospasm probably because of the higher induction dose used in our study.

A study done by Zahoor A Shah, et al comparing Sodium Thiopentone admixture with Propofol alone as an induction agent for LMA insertion showed less incidence of hypotension in admixture group with no statistically significant difference in gagging, coughing, jaw relaxation and laryngospasm8. A similar study was done by Renu Sinha, et al in children and concluded that admixture of Propofol and Thiopental is an acceptable alternative to Propofol for LMA insertion9.

A study done by Kalpana.S.Vora comparing Sevoflurane and Propofol for induction and maintenance of anaesthesia in children with laryngeal mask airway showed that Sevoflurane provided shorter LMA insertion, removal and recovery times than Propofol with comparable perioperative complications10.

A study by E.W. S Cheam and P.t. Chui showed that addition of either fentanyl or low dose mivacurium to Propofol improved the conditions for LMA insertion11.

HR, SBP and diastolic blood pressure showed a significant fall in Propofol group compared to Thiopental group due to profound vasodilatation due to reduced sympathetic activity12. An induction dose of 2-2.5 mg/kg produces a 25-40% reduction in systolic blood pressure. Propofol may either reset or inhibit the baroreflex, reducing the tachycardic response to hypotension12. Duration of apnoea is > 30 seconds with Propofol induction and increases with use of an opioid12.

Conclusion

In conclusion, induction with 3mg/kg of Propofol was associated with better conditions for LMA insertion and lesser adverse effects like gagging, coughing, head and limb movements than with 6mg/kg Thiopental.

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