DOI: https://doi.org/10.53350/pjmhs22164704

ORIGINAL ARTICLE

Comparison of Propofol Alone with Admixture of Propofol and Thiopentone Sodium for Laryngeal Mask Airway Insertion in Paediatric Elective Surgery

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ABSTRACT

Background: Laryngeal Mask Airway (LMA) is mostly used for the application of general anesthesia. Intravenous Propofol is still preferable for induction of anesthesia due to its favorable recovery profile and low incidence of side effects. Thiopentone sodium is also one of the most commonly used intravenous induction agent. Combination of Propofol and thiopentone sodium may be more is beneficial rather than propofol alone. So we conducted this study to find more effective method.

Objective: To compare the outcome of combination of Thiopentone sodium with Propofol versus Propofol alone for the Laryngeal mask airway insertion in pediatric patients.

Methodology: This "Randomized controlled trial" was done at the Department of Anesthesia, Jinnah Hospital, Lahore for 6 months i.e. from July 2021 to Dec 2021. 80 children were selected for surgery through Non-Probability, Consecutive Sampling. Randomization of patients into group A & B was done. Informed consent was obtained from parents. Intravenous induction agents were prepared, for Propofol group (A), propofol was mixed with lignocaine and for the combination group (B), Thiopentone was combined with propofol. A correct sized LMA was inserted. Excellent LMA insertion was assessed. Data was analyzed in SPSS. Excellent LMA insertion in both groups was analyzed using Chi Square test with p <0.05 as statistically significant.

Results: The mean age of patients in our study was 8.29±3.16 years. In Propofol group, there were 28 males and 12 were females while in combination group, 22 patients were male and 18 patients were females. In Propofol group, 15 cases had LMA score 1, 17 had LMA score 2 and 8 had LMA score 3. In combination group, 25 cases had LMA score 1 and 15 had LMA score 2 but no one had LMA score 3. The difference was significant (p<0.05). In Propofol group, 15 cases had excellent outcome while in 25 cases, excellent outcome could not be achieved. In combination group, 25 cases had excellent outcome while in 15 cases, excellent outcome could not be achieved. The difference was significant (p<0.05).

Conclusion: So it has been proved that combination of Propofol with thiopentone sodium is more effective for effective insertion of LMA in children instead of using porpofol alone.

Keywords: General Anesthesia, Laryngeal Mask Airway, Children, Propofol, Thiopentone Sodium

INTRODUCTION

The Laryngeal Mask Airway (LMA) is widely used to administer general anaesthesia to children because it keeps the airway clean while allowing the anesthesiologist to keep both hands free. When it comes to ventilation and oxygenation, LMA's airway is superior to a traditional mask and oropharyngeal airway[1].

Intravenous Propofol 1% is still the agent of choice for induction of anesthesia due to its favorable recovery profile and low incidence of side effects[2,3]. Insertion of LMA soon after induction of anesthesia is facilitated by the use of Propofol which depresses pharyngeal and laryngeal reactivity and decreased rate of adverse effects like "coughing, gagging or laryngospasm." But, the use administration of propofol may increase the cost of anesthesia, and can also cause intraoperative hypotension and also pain at injection site[4].

Thiopentone sodium is also one of the most commonly used intravenous induction agents throughout the world[5]. It is a comparatively cheaper drug that does not cause hypotension and is painless on injection. However it falls short in providing good cover from coughing, gagging and laryngospasm. The resulting lack of jaw relaxation can render insertion of tube impossible at times[2].

Admixture of 1:1 of 1.25% thiopentone and 0.5% Propofol are used different researchers for the successful induction of anesthesia in children and also for the insertion of LMA in adult population, and it is quite safe. This admixture theoretically provides summation of positive aspects of the two drugs like increased ease of insertion (avoiding gagging, coughing and laryngospasm) at a cheaper cost, with less dose related side effects like hypotension[3].

The admixture of Thiopentone and Propofol has proven to be a suitable alternative to propofol alone in adults for LMA insertion and is more economical as compared to propofol alone[6]. A previous study has reported excellent jaw relaxation and LMA insertion in 68% (17/25) with admixture, while this excellence could only be achieved in 52% (13/25) patients with Propofol alone but the difference was insignificant (P>0.05). The total cost in the admixture group was 24.64 ± 7.62 rupees and in the Propofol alone group it was 48.75 ± 23.25 rupees (P = 0.001). This showed that combination group has less cost than propofol alone[1]. LMA insertion was successful at the first attempt in 55 (93.2%) in children given propofol in a study by Hejazi et al[3].

Rational of this study was compare the outcome of admixture (1:1) of Thiopentone sodium (1.25%) and Propofol (0.5%) versus Propofol (1%) alone for Laryngeal mask airway insertion in pediatric patients. Literature has reported that combination of Thiopentone sodium and Propofol is more beneficial as compared to propofol alone as well as it cost less than propofol alone. But we cannot rely on results of the study quoted above as it conducted on very small sample size (50 cases). Moreover, no study has been done from this aspect of use of propofol (alone and in admixture) in local population. So this study is planned to be conducted in local population and will be conducted on large sample size to get more accurate results. If this will be proved through this study that combination of Thiopentone sodium and Propofol has better effect and more cost effective than propofol alone, then in future we will try to implement the use of combination of Thiopentone sodium and Propofol.

MATERIAL AND METHODS

Study Design: "Randomized controlled trial"
Setting: Department of Anesthesia, Jinnah Hospital, Lahore
Duration of Study: 6 months i.e. from July 2021 to Dec 2021.

Sample Size: By using the 80% power of study and 5% significance level and taking magnitude of mean cost i.e. 24.64 ± 7.62 rupees with combination of Thiopentone and Propofol and 48.75 ± 23.25 rupees with Propofol alone, the sample size will be 80 cases (40 in each group) for LMA insertion in pediatric patients.
Sampling Technique: "Non-Probability, Consecutive Sampling.
Inclusion criteria:

- Either sex
- Age between 3 – 15 years
- Patients of ASA I, II undergoing elective surgery

Exclusion Criteria:

- Known patients with risk for regurgitation determined by history.
- Known patients with allergy to either agents determined by history.
- Known patients with difficult airway determined on clinical examination (MallamPati Class III, IV) (Annexure III)

Data Collection Procedure: After taking approval from hospital ethical committee, 80 subjects those fulfilling the inclusion criteria were included from Pediatric Surgery ward, Jinnah Hospital, Lahore. Randomization of patients into group A & B was done by lottery method. Informed consent was obtained from parents. Demographic (name, age, sex, contact) were also obtained. After application of standard monitoring for blood pressure and heart rate, 0.1 mg/kg Nalbuphine injection was given over 120 seconds before induction. In group A, 1% Propofol was used for induction of anesthesia. In group B, 0.5% Propofol was mixed with 1.25% Thiopentone Sodium and then given for induction of anesthesia. An appropriate size LMA was inserted by an anesthesiologist having 7 years of experience who was blind to both the drugs and state of jaw relaxation was assessed and scored accordingly. Excellent LMA insertion was determined by as 1 (no adverse effect) on Scoring system of Jaw Relaxation and Ease of Laryngeal Mask Airway Insertion with score range of 1-3 after 30 seconds of injection the drug. All this information was recorded in a pre-designed Performa.
Statistical Analysis: Data was entered and analyzed in SPSS version 17.0. Quantitative variables like age were measured as mean and standard deviation. Qualitative variable like gender, excellent LMA insertion were presented as frequency and percentage. Excellent LMA insertion in both groups was analyzed using Chi Square test with p <0.05 as statistically significant.

RESULTS

In this study, we included 80 patients with mean age of 8.29±3.16 years. The mean age of patients in Propofol alone group was 8.23±3.29 years while mean age of patients in combination group was 8.35±3.07 years. In Propofol group, there were 28 males and 12 were females while in combination group, 22 patients were male and 18 patients were females. In Propofol group, the mean height, weight and BMI were 127.25±19.72cm, 27.53±10.93kg and 16.30±1.56kg/m2, respectively. In combination group, the mean height, weight and BMI were 127.90±18.38cm, 27.80±10.05kg and 16.401±1.42kg/m2, respectively. In group A, there were 16 (40.0%) cases who had ASA status I while 24 (60.0%) cases had ASA status II. In group B, there were 23 (57.5%) cases who had ASA status I while 17 (42.5%) cases had ASA status II. In group A, 8 (20.0%) cases underwent brain surgeries, 6 (15.0%) had colorectal surgeries, 17 (42.5%) cases had eye surgeries, 0 (0.0%) cases had hernia surgery, 9 (22.5%) cases had renal surgery while 0 (0.0%) case had vesicovaginal fistula surgery. In group B, 7 (17.5%) cases underwent brain surgeries, 7 (17.5%) had colorectal surgeries, 12 (30.0%) cases had eye surgeries, 2 (5.0%) cases had hernia surgery, 11 (27.5%) cases had renal surgery while 1 (2.5%) case had vesicovaginal fistula surgery. Table 1.

The mean LMA score in Propofol group was 1.83 ± 0.75 while in combination group, the mean LMA score was 1.38 ± 0.49. There was significant difference observed between both groups (p-value < 0.05) and Propofol group showed high LMA score as compared to combination group. In Propofol group, 15 (37.5%) cases had LMA score 1, 17 (42.5%) had LMA score 2 and 8 (20.0%) had LMA score 3. In combination group, 25 (62.5%) cases had LMA score 1 and 15 (37.5%) had LMA score 2 but no one had LMA score 3. The difference was significant (p-value < 0.05). In Propofol group, 15 (37.5%) cases had excellent outcome while in 25 (62.5%) cases, excellent outcome could not be achieved. In combination group, 25 (62.5%) cases had excellent outcome while in 15 (37.5%) cases, excellent outcome could not be achieved. The difference was significant (p<0.05). Table 2

Table 1: Baseline characteristics of patients

	Groups	
	Propofol	Propofol + Thiopentone
n	40	40
Age (years)	8.23 ± 3.29	8.35 ± 3.07
Sex		
Male	28 (70.0%)	22 (55.0%)
Female	12 (30.0%)	18 (45.0%)
Anthropometric assessment		
Height (cm)	127.25±19.72	127.90±18.38
Weight (kg)	27.53±10.93	27.80±10.05
BMI (kg/m2)	16.30±1.56	16.401±1.42
ASA		
I	16 (40.0%)	23 (57.5%)
II	24 (60.0%)	17 (42.5%)
Type of surgery		
Brain	8 (20.0%)	7 (17.5%)
Colorectal	6 (15.0%)	7 (17.5%)
Eye	17 (42.5%)	12 (30.0%)
Hernia	0 (0.0%)	2 (5.0%)
Renal	9 (22.5%)	11 (27.5%)
Vesicovaginal fistula	0 (0.0%)	1 (2.5%)

Table 2: Comparison of outcome in both groups

	Groups		p-value
	Propofol	Propofol + Thiopentone	
n	40	40	
LMA score	1.83 ± 0.75	1.38 ± 0.49	0.002
LMA grade			
1	15 (37.5%)	25 (62.5%)	0.005
2	17 (42.5%)	15 (37.5%)	
3	8 (20.0%)	0 (0.0%)	
Excellent outcome			
Yes	15 (37.5%)	25 (62.5%)	0.025
No	25 (62.5%)	15 (37.5%)	

DISCUSSION

The LMA connects directly to the tracheal airway, eliminating the need for laryngoscopy and tracheal intubation, and it reduces the incidence of arterial oxygen desaturation, reduces airway stimulation, and frees up the anaesthesiologist to do other duties[7]. Intraocular pressure changes are also lessened when LMA is used instead of endotracheal intubation[8].

When using inhalation or intravenous drugs to inhibit the pharyngeal and laryngeal reflexes, an appropriate depth of anaesthesia is required for successful LMA placement.1 In this randomized trial, the mean age of children was 8.29±3.16 years. The mean age of children in Propofol alone group was 8.23±3.29 years while mean age of children in combination group was 8.35±3.07 years.

In Propofol group, there were 28 males and 12 were females while in combination group, 22 patients were male and 18 patients were females. In Propofol group, the mean height, weight and BMI were 127.25±19.72cm, 27.53±10.93kg and 16.30±1.56kg/m2, respectively. In combination group, the mean height, weight and BMI were 127.90±18.38cm, 27.80±10.05kg and 16.401±1.42kg/m2, respectively.

There were 39 (48.75%) cases who had ASA status I while 41 (51.25%) cases had ASA status II. In our trial, 15 (18.75%) cases underwent brain surgeries, 13 (16.25%) had colorectal surgeries, 29 (36.25%) cases had eye surgeries, 2 (2.5%) cases

had hernia surgery, 20 (25%) cases had renal surgery while 1 (1.25%) case had vesicovaginal fistula surgery.

In our study, the mean LMA score in Propofol group was 1.83±0.75 while in combination group, the mean LMA score was 1.38±0.49. There was significant difference observed between both groups (p<0.05) and Propofol group showed high LMA score as compared to combination group. In Propofol group, 15 cases had LMA score 1, 17 had LMA score 2 and 8 had LMA score 3. In combination group, 25 cases had LMA score 1 and 15 had LMA score 2 but no one had LMA score 3. The difference was significant (p<0.05).

In out trial, with Propofol alone, 15 cases had excellent outcome while in 25 with combination, 25 cases had excellent outcome. The difference was significant (p<0.05). The admixture of Thiopentone and Propofol has proven to be a suitable alternative to propofol alone in adults for LMA insertion and is more economical as compared to propofol alone.6 But one trial negate our results, and showed that the excellent jaw relaxation and LMA insertion in 68% (17/25) with admixture, while this excellence could only be achieved in 52% (13/25) patients with Propofol alone but the difference was insignificant (P>0.05)[1].

Using Thiopentone alone during LMA insertion might induce coughing, choking, and laryngospasm because to its inability to relax the jaw and produce good hypotension.9 It's been utilised with previous topical lignocaine spray to the posterior pharyngeal wall or co-induction with intravenous midazolam for LMA placement in adults[10].

Despite the presence of nutrients in the admixture, thiopentone and propofol are compatible and persistent in their bactericidal effects, since they do not encourage the growth of microorganisms.11-14 when used to induce anaesthesia, this combination has a synergistic effect that doesn't lengthen recovery time and may even lower the likelihood of convulsions[15].

Because it can be used for 24 hours at operating room temperature (21–23°C) and therefore reduce medication wastage while also being more cost efficient, Cherin and Smiler presented this combination as an example of cost management. Adults were successfully put to sleep using this combination[16].

Another study found that propofol made it simpler to insert LMA, while the difficulty of inserting LMA was higher in the thiopentone group, which was statistically significant (P-value <0.05).17 According to the results of Acalovschi et al., propofol was statistically much easier to inject than thiopentone during LMA insertion.18 Similar findings were also made by Nishiyama & Hanaoka, Nakazawa et al., and Talwar et al[19-21].

The amount of research done on the subject is insufficient and no new evidence has been discovered in the literature. However, we've discovered that combining Propofol with thiopentone sodium makes LMA insertion significantly easier in pediatrics.

CONCLUSION

So it has been proved that combination of Propofol with thiopentone sodium is more effective for effective insertion of LMA in children instead of using porpofol alone. Now we have got local evidence and are able to implement the use of combination of thiopentone sodium with porpofol in children undergo surgeries under general anesthesia.

REFERNCES

1. Sinha R, Shende D, Garg R. Comparison of propofol (1%) with admixture (1: 1) of thiopentone (1.25%) and propofol (0.5%) for laryngeal mask airway insertion in children undergoing elective eye surgery: Double-masked randomized clinical trial. Indian journal of anaesthesia 2010;54(2):104.
2. Shah ZA, Parveen S, Ommid M, Buchh V, Dar A, Qazi S. A Randomized Double Blind Comparison Between the use of Sodium Thiopentone/Propofol Admixture & Propofol alone for LMA Insertion. JK-Practitioner 2011;16(1-2):35-8.
3. Seyedhejazi M, Eydi M, Ghojazadeh M, Nejati A, Ghabili K, Golzari SE, et al. Propofol for laryngeal mask airway insertion in children: Effect of two different doses. Saudi journal of anaesthesia 2013;7(3):266.
4. Safaee M, Sepidkar A, Eftekharian H. Hemodynamic variation following induction and tracheal intubation--thiopental vs propofol. Middle East journal of anaesthesiology 2007;19(3):603-10.
5. Saleem S, Board DI, Naaman K. An interventional comparative study of haemodynamic effects of induction doses of propofolthiopentone and propofol-ketamine combinations. Anaesthesia, Pain & Intensive Care 2010;14(2).
6. Williams C, Leuwer M. Neuromuscular Blocking agents and Skeletal muscle relaxant. In: Aronson JK, editor. Side effects of drugs annual 34. 1st ed. Oxford UK: Elsevier; 2012: p. 211.
7. Brain AI, McGhee TD, McAteer EJ, Thomas A, Abu-Saad MA, Bushman JA. The laryngeal mask airway. Development and preliminary trials of a new type of airway. Anaesthesia 1985 Apr;40(4):356-61.
8. Watcha MF, White PF, Tychsen L, Stevens JL. Comparative effects of laryngeal mask airway and endotracheal tube insertion on intraocular pressure in children. Anesth Analg 1992 Sep;75(3):355-60.
9. Scanlon P, Carey M, Power M, Kirby F. Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone. Can J Anaesth 1993 Sep;40(9):816-8.
10. Bapat P, Joshi RN, Young E, Jago RH. Comparison of propofol versus thiopentone with midazolam or lidocaine to facilitate laryngeal mask insertion. Can J Anaesth 1996 Jun;43(6):564-8.
11. Chernin EL, Stewart JT, Smiler B. Stability of thiopental sodium and propofol in polypropylene syringes at 23 and 4 degrees C. Am J Health Syst Pharm 1996 Jul 1;53(13):1576-9.
12. Prankerd RJ, Jones RD. Physicochemical compatibility of propofol with thiopental sodium. Am J Health Syst Pharm 1996 Nov 1;53(21):2606-10.
13. Lazar ER, Jolly DT, Tam YK, Hrazdil J, Tawfik SR, Clanachan AS. Propofol and thiopental in a 1:1 volume mixture is chemically stable. Anesth Analg 1998 Feb;86(2):422-6.
14. Crowther J, Hrazdil J, Jolly DT, Galbraith JC, Greacen M, Grace M. Growth of microorganisms in propofol, thiopental, and a 1:1 mixture of propofol and thiopental. Anesth Analg 1996 Mar;82(3):475-8.
15. Naguib M, Sari-Kouzel A. Thiopentone-propofol hypnotic synergism in patients. Br J Anaesth 1991 Jul;67(1):4-6.
16. Cherin EL, Smiler B. Propofol – thiopentone admixture: Implication for cost savings and clinical use. Am J Anesthesiol 1997;24:251-3.
17. Sengupta J, Sengupta M, Nag T. Agents for facilitation of laryngeal mask airway insertion: A comparative study between thiopentone sodium and propofol. Ann Afr Med 2014;13(3):124-9.
18. Acalovschi I, Miclescu A, Bugov L. The effects of propofol on laryngeal reactivity and the haemodynamic response to laryngeal mask insertion. European journal of anaesthesiology 1995;12(4):351-6.
19. Nishiyama T, Hanaoka K. [Anesthesia induction for laryngeal mask insertion--comparison of propofol with midazolam and propofol with thiopental]. Masui The Japanese journal of anesthesiology 1997;46(2):188-92.
20. Nakazawa K, Hikawa Y, Maeda M, Tanaka N, Ishikawa S, Makita K, et al. Laryngeal mask airway insertion using propofol without muscle relaxants: a comparative study of pretreatment with midazolam or fentanyl. European journal of anaesthesiology 1999;16(8):550-5.
21. Talwar V, Pattanayak R, Bansal S. Comparison of propofol versus thiopentone for facilitation of laryngeal mask insertion. J Anaesth Clin Pharmacol 2004;20(1):33-8.