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EFFICACY OF KETAMINE COINDUCTION WITH PROPOFOL FOR LARYNGEAL MASK AIRWAY INSERTION IN CHILDREN OF AGE 5-12 YEARS FOR INFRAUMBILICAL SURGERIES IN A TERTIARY CARE HOSPITAL, A PROSPECTIVE RANDOMISED DOUBLE-BLINDED CONTROL STUDY.

Dr Korsipati Praveena	Anaesthesiology Resident, PES Medical college, Kuppam,
Dr Dudi Venkata Sai Teja*	Senior Resident, Dept of Anaesthesiology, PES Medical college, Kuppam*Corresponding Author
Dr Ugranam Sravani	Anaesthesiology Resident, PES Medical college, Kuppam,
Dr Zainab Attar	Assistant Professor, Dept of Anaesthesiology, PES Medical college, Kuppam

ABSTRACT **Aims And Objectives:** To study the efficacy of ketamine co-induction with propofol for laryngeal mask airway insertion in children of 5 -12 years age range for infra-umbilical surgeries in a tertiary care hospital, a prospective randomized controlled study. 1. To study the ease of laryngeal mask airway insertion with propofol alone and propofol in combination with ketamine.2. To study the comparison of hemodynamic changes with propofol alone and propofol in combination with ketamine.3. To study the comparison of duration of recovery with propofol alone and propofol in combination with ketamine. **Materials And Methods:** A Tertiary care hospital based Prospective, Randomized Controlled study. The study will recruit children between the age of 5-12 years who belong to ASA-I and ASA-II patients of both sexes presenting for elective surgeries at PESIMSR KUPPAM hospital. The study will be carried out on 60 patients, scheduled for various elective surgical procedures under general anaesthesia belonging to ASA-I and ASA-II.

Inclusion Criteria:

1) Children belonging to ASA I and II
2) Children between ages 5 and 12
3) Child undergoing general (Infra umbilical) and urogenital surgeries lasting for 45 to 60 mins.

Exclusion Criteria:

1. Children belonging to ASA 3 and 4
2. Difficult airway with mallampati grades 3 and 4.
3. Sepsis.
4. Hyperreactive airway disease.
5. Obese individuals.
6. Features of raised intracranial tension.
7. Patients allergic to eggs.

Results: In comparison to propofol alone (0/30), ketamine co-induction with propofol created comparable better conditions for LMA placement (3/ 30) but statistically insignificant. It considerably lowered the induction dose of propofol by consuming a 3.40 mg/kg dose of Propofol alone compared to the 2.85mg/kg dose of Propofol in co-induction with ketamine for LMA insertion [p 0.005] and reduced the related side effects. **Conclusion:** This study found that co-induction with ketamine before propofol induction for LMA insertion in children reduces the total dose of propofol necessary for induction, although this benefit comes at the cost of a longer recovery time. Ketamine co-induction with propofol improved hemodynamic stability significantly.

KEYWORDS : Propofol, Ketamine, Laryngeal Mask Airway,

INTRODUCTION

Propofol is one of the most widely utilised induction agents for the placement of a laryngeal mask airway in children1,2. When used as a sole anaesthetic agent, children require a larger dose of propofol for LMA insertion than adults3,4. Hypotension, bradycardia, apnea, and hypoventilation are all possible side effects of such a high induction dose 5,6,7 to which youngsters are particularly susceptible. Ketamine is well-known for its ability to maintain airway reflexes active and as a sympathetic cardiorespiratory stimulant, reducing cardiorespiratory depression. When ketamine is used with propofol, it produces an additive effect of propofol's GABA agonism and Ketamine's NMDA Receptor antagonism, allowing us to use lower doses of propofol for induction while reducing the incidence of hypotension and respiratory depression8,9,10. Because the medications' actions complement one another, there will be fewer side effects.

Co-induction is the practice of delivering a minor dose of a sedative or other anaesthetic agent to minimise the overall dose of the induction agent. It has been used successfully in adults, but with mixed results on recovery9,10. Many investigations have been carried out using ketamine and propofol in sedative concentrations. These investigations were able to demonstrate the benefit of combining propofol with low-dose ketamine in terms of maintaining hemodynamic parameters while reducing recovery time. The goal of this study was to see how the combination of ketamine and propofol affects the LMA insertion qualities, hemodynamic alterations, and recovery in children undergoing daycare surgery.

AIMS AND OBJECTIVES:

To study the efficacy of ketamine co-induction with propofol for laryngeal \mask airway insertion in children of 5 -12 year age range for infra-umbilical surgeries in a tertiary care hospital, a prospective randomized controlled study.

1. To study the ease of laryngeal mask airway insertion with propofol alone and propofol in combination with ketamine.
2. To study the comparison of hemodynamic changes with propofol alone and propofol in combination with ketamine.
3. To study the comparison of duration of recovery with propofol alone and propofol in combination with ketamine

MATERIALS AND METHODS:

A prospective randomized controlled study was done in children of age 5 -12 years for infra umbilical surgeries in a tertiary care hospital. The study will recruit children between the age of 5-12 years who belong to ASA-I and ASA-II patients of both sexes presenting for elective surgeries at PESIMSR KUPPAM hospital. The study will be carried out on 60 patients, scheduled for various elective surgical procedures under general anaesthesia belonging to ASA-I and ASA-II. Normal saline and Ketamine 0.5mg/kg were given 2 minutes before the induction dosage of propofol in the P (propofol) and PK (propofol-ketamine) groups, respectively. Induction with propofol 2.5 mg/kg was given to groups (P and PK), LMA was inserted 60 seconds later, and insertion conditions were examined. Heart rate and blood pressure were measured immediately after the propofol bolus, then every

minute until the LMA was inserted up to 2 minutes afterwards for every 5 min till the end of surgery. Steward's score was used to gauge recovery.

INCLUSION CRITERIA:

1) Children belonging to ASA I and II
2) Children between ages 5 and 12
3) Child undergoing general (Infra umbilical) and urogenital surgeries lasting for 45 to 60 mins.

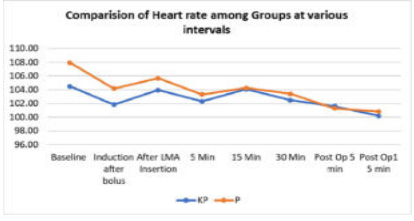
EXCLUSION CRITERIA:

1. Children belonging to ASA 3 and 4
2. Difficult airway with mallampati grades 3 and 4.
3. Sepsis.
4. Hyperreactive airway disease.
5. Obese individuals.
6. Features of raised intracranial tension.
7. Patients allergic to eggs.

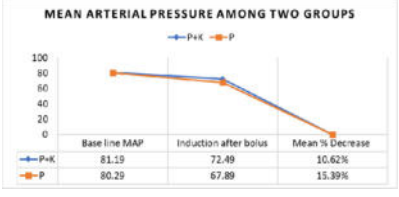
OBSERVATION AND RESULTS

The two groups were similar in age, gender, weight, duration of procedure and types of surgical procedures performed.

In this study, HR, NIBP, ECG, SpO2, and ETCO2 were all monitored intraoperatively in the children. The heart rate and blood pressure were measured immediately after the propofol bolus, then every minute until 2 minutes after the LMA was inserted, and then every 5 minutes throughout the procedure.

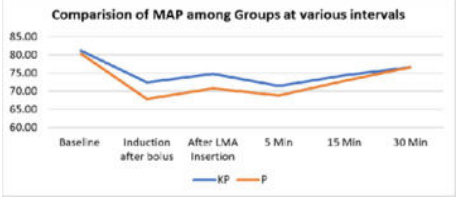


Graph 1: Shows the comparison of Mean heart rate among two groups P and PK groups at baseline and time intervals of 1 min (Induction), 2 min (After LMA insertion), 5 min, 15 min, 30 min intraoperatively and 5 and 30 min Postoperatively.From graph 1, preoperatively there is no significant difference between heart rate in P and PK groups with P value of 0.07.



Graph 2: Shows the comparison of Mean Arterial Pressure (MAP) at baseline and after induction and the percentage of decrease in MAP between the two groups P and PK groups

From graph 2, preoperatively there is a significant difference in baseline MAP is noted in both P and PK groups, but after induction, there is a significant decrease in MAP with a Mean % of decrease of 15.39 % in the P group when compared to the PK group with Mean % of decrease of 10.62%. This emphasizes the stable hemodynamic condition in the PK group compared with the P group



Graph 3: Shows the comparison of Mean Arterial Pressure (MAP) among two groups P and PK groups at baseline and time intervals of 1 min (Induction), 2 min (After LMA insertion), 5 min, 15 min, 30 min intraoperatively

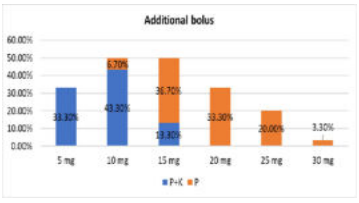
At all measurement times, MAP was higher in Group PK than in Group P, indicating that the PK group had stronger hemodynamic stability. When compared to baseline values, HR values in both groups were well maintained at all measurement intervals, with a modest increase following LMA implantation in both groups. Between Groups P and PK, there was no statistically significant difference in HR.

Distribution of study population according to additional bolus given

Table 1 – shows the distribution of the study population according to the amount of additional bolus of Propofol given between both P and PK groups.

Additional Bolus dosage	P+K	P	p-value
5 mg	10	0	0.001*
	33.3%	0.0%	
10 mg	13	2	
	43.3%	6.7%	
15 mg	4	11	
	13.3%	36.7%	
20 mg	0	10	
	0.0%	33.3%	
25 mg	0	6	
	0.0%	20.0%	
30 mg	0	1	
	0.0%	3.3%	
Nil	3	0	
	10.0%	0.0%	
Total	30	30	
	100.0%	100.0%	

*p value=<0.05



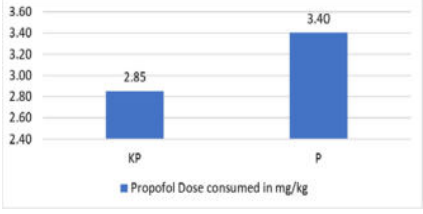
Graph 4: Shows the Comparison of the distribution of the study population according to the amount of additional bolus of Propofol given between both P and PK groups.

Table 1 and graph 4 show the Comparison of the distribution of the study population according to the amount of additional bolus of Propofol given between both P and PK groups, emphasizing the need for more additional bolus dose of propofol in propofol alone P group when compared to PK group which is a statistically significant difference with P value 0.001.

Distribution of the study population according to Propofol Dose consumed in mg/kg and total dose of Propofol used

Table 2 Shows the distribution of the study population according to the Propofol Dose consumed in mg/kg.

	Group	Mean	SD	p-value
Propofol Dose consumed in mg/kg	PK	2.85	0.15	0.0001
	P	3.40	0.23	



Graph 5: Shows the Comparison of the distribution of the study population according to the Propofol Dose consumed in mg/kg.

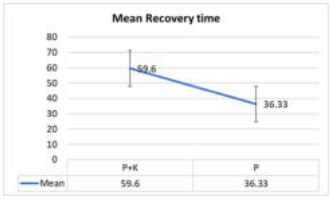
Table 2 and graph 5 shows the Propofol Dose consumed in mg/kg is 3.40 mg/kg in the P Group compared to 2.85 mg/kg in the PK group with a statistically significant P value of 0.0001.

Distribution of the study population according to the recovery score at the end of surgery

Graph 6: Shows the comparison of the distribution of the study population according to the recovery score at the end of surgery between two groups P and PK

Graph 6 depicts that there is no significant difference in recovery score at the end of surgery between the 2 groups with a P value of <0.15.

Distribution of study population according to Mean Recovery time



Graph 7: Shows the comparison of Mean Recovery time after surgery according to the Steward score between the two groups P and PK groups

Graph 7 depicts the information that in this study, the PK group takes a longer duration of time for recovery after the surgery with a mean of 59.6 min in comparison with early recovery in propofol with 36.33 min, the difference is statistically significant with a P value of 0.001

RESULTS:

In comparison to propofol alone (0/30), ketamine co-induction with propofol created comparable better conditions for LMA placement (3/30) but statistically insignificant. It considerably lowered the induction dose of propofol by consuming a 3.40 mg/kg dose of Propofol alone compared to the 2.85 mg/kg dose of Propofol in co-induction with ketamine for LMA insertion [p 0.005] and reduced the related side effects.

In comparison to pre-induction, the heart rate values decreased in both groups after the induction except after LMA insertion where there is a slight increase in HR between the 2 groups but not above baseline. The difference in the decrease of HR between the 2 groups is not statistically significant.

In comparison to pre-induction MAP, after induction, there is a significant decrease in MAP with a Mean % of decrease of 15.39 % in the P group when compared to the PK group with a Mean % of decrease of 10.62%.

In comparison to pre-induction MAP, after induction, there is a decrease in MAP in both groups. There is a significant difference in the decrease of MAP with the P group showing a greater decrease in MAP in comparison to the PK group with a P value of <0.001 up to 30 minutes after induction. But the hemodynamic stability is at the expense of recovery time with the PK group with a mean of 59.6 min taking a significantly longer recovery time compared to the P group with a mean of 36.33 min with a P value <0.001.

CONCLUSION

This study found that co-induction with ketamine before propofol induction for LMA insertion in children reduces the total dose of propofol necessary for induction, although this benefit comes at the cost of a longer recovery time. Ketamine co-induction with propofol improved hemodynamic stability significantly.

DISCUSSION

The use of LMA in children is becoming more widespread in recent times, especially in ambulatory surgeries. Obtundation of airway reflexes is required for smooth LMA insertion to avoid coughing, gagging, head and limb movements, or laryngospasm. Achieve adequate mouth opening, necessitates the requirement of sufficient depth of anaesthesia.

Propofol is the best induction agent for ambulatory procedures (6th Miller) because of its rapid elimination, quick recovery, and lower risk of postoperative nausea and vomiting. When Propofol is administered alone, however, greater doses are needed to suppress pharyngeal and laryngeal reflexes, which might lead to cardiac depression and make LMA insertion conditions undesirable. Various medication combinations have been explored, including propofol-fentanyl, propofol-ketamine, and propofol- midazolam which will reduce the dosage of propofol and the related side effects.

In the study conducted by Okuyama, K., Inomata et al11, they have noticed in women, pre-treatment with a low dose of ketamine reduces the estimated effect site concentration of propofol required for loss of consciousness and placement of a laryngeal mask airway. They found that pre-treatment with ketamine 0.2 mg/kg lowered the propofol concentration necessary for both loss of consciousness and LMA insertion in women by 22% and 33%, respectively.

Erdogan., Begec Z et al12 in their study reported that ketamine + propofol generated LMA insertion settings similar to propofol, but with a reduced requirement of propofol dose for induction.

In a study by S. Goel et al13, none of the patients in co-induction groups PK (Propofol and ketamine) and PM (Propofol and Midazolam) required an additional bolus dose of propofol for LMA insertion in comparison to 22% of patients requiring an extra bolus dose in propofol alone group.

REFERENCES:

1. Co-induction of anaesthesia: day-case surgery. [Eur J Anaesthesiol Suppl. 1995].
2. Morton NS, Wee M, Christie G et al. Propofol for induction of anaesthesia in children: a comparison with thiopentone and halothane inhalational induction. Anaesthesia 1988; 43: 350–355.
3. Martlew RA, Meakin G, Wadsworth R et al. Dose of propofol for laryngeal mask airway insertion in children: effect of premedication with midazolam. Br J Anaesth 1996; 76: 308–309.
4. Allsop E, Innes P, Jackson M et al. Dose of propofol required to insert the laryngeal mask airway in children. Paediatr Anaesth 1995; 5: 47–51.
5. Short SM, Aun CS. Haemodynamic effects of propofol in children. Anaesthesia 1991; 46: 783–785.
6. Claeys MA, Gepts E, Camu F. Haemodynamic changes during anaesthesia induced and maintained with propofol. Br J Anaesth 1988; 60: 3–9.
7. Purcell Jones G, Yates A, Baker JR et al. Comparison of the induction characteristics of thiopentone and propofol in children. Br J Anaesth 1987; 59: 1431–1436.
8. Goel S, Bhardwaj N, Jain K. Efficacy of ketamine and midazolam as co-induction agents with propofol for laryngeal mask insertion in children. Pediatric Anesthesia. 2008 Jul;18(7):628-34.
9. Srivastava, Sharma, Kumar, Saxena: small dose propofol or ketamine vs midazolam as co-induction to propofol. Indian J. Anaesth. 2006; 50 (2): 112 – 114.
10. Hui TW, Short TG, Hong W et al 1995: Additive interactions between propofol and ketamine when used for anaesthesia induction in female patients. Anesthesiology 1995; 82: 641–648.
11. Okuyama K., Inomata S., Okubo N., Watanabe I. "Pre treatment with small-dose ketamine reduces predicted effect-site concentration of propofol required for loss of consciousness and laryngeal mask airway insertion in women. "J ClinAnesth. 2011;23:113–118.
12. Erdogan M.A., Begec Z., Aydogan M.S. "Comparison of effects of propofol and ketamine-propofol mixture on laryngeal mask airway insertion conditions and hemodynamics inpatients: a randomized, prospective, double-blind trial." J Anesth.2013;27:12–17.
13. 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 J Anaesth 2013; 7:266-9.