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Original Research Article

Comparison of Inhalational Induction with Halothane and Isoflurane in Children Premedicated with Rectal Thiopentone

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ABSTRACT

Inhalational induction is the preferred technique in paediatrics so as to ensure a pleasant induction, rapid recovery and minimal complications. Halothane has been used for this purpose for over four decades as the induction is pleasant and smooth. Isoflurane with the advantage of low blood solubility, stability of cardiac rhythm and reduced potential for organ toxicity is advantageous over halothane. However its association with increased airway problems and hypoxia during induction in unpremedicated children is deterrent .This may be prevented by rectal premedication by thiopentone (5%).

This study was carried out in a group of 20 peadiatric patients aged from 1-6 years posted for elective paediatric, plastic and orthopaedic surgical procedure, belonging to ASA grade I and II. Aim is to compare inhalational induction with halothane and isoflurane in children premedicated with rectal thiopentone. The parameters that were compared were preinduction deamanour, oxygen saturation preinduction with and without premedication, mean lowest oxygen saturation during induction, airway problems, post-operative recovery. Statistical analysis is done by paired t test.

The conclusion drawn was that rectal thiopentone premedication significantly reduces the incidence and severity of airway complications and quality of induction during inhalational induction with isoflurane and halothane There was significant fall in the preinduction pulse rate following rectal thiopentone premedication in both halothane and isoflurane group.

Key words: Inhalational Induction, Halothane, Isoflurane, Rectal Thiopentone.

INTRODUCTION

The present study was conducted on 20 children aged between 1-6 years. Most of the paediatric anaesthesiologists prefer the anesthetic technique of inhalational induction which is associated with pleasant induction, rapid recovery and with minimal complications.

Halothane has been used for this purpose for more than four decades as the induction is pleasant, smooth and rapid. However its use is associated with myocardial depression, reduction in cardiac output and dysrhythmia.[1]

Isoflurane with the advantage of low blood solubility, stability of cardiac rhythm and reduced potential for organ toxicity is

advantageous than halothane since in children cardiac output is mainly based on heart rate.[2] But isoflurane is associated with increased airway problems and hypoxia during induction in unpremedicated children .This may be prevented by rectal premedication by thiopentone.[3]

The present study was undertaken to evaluate the inhalational induction with isoflurane and halothane in children premedicated with rectal thiopentone.

MATERIALS AND METHODS

The study entitled was conducted between January 2012 - December 2012 on 20 paediatric patients in the age group of 1-6 years scheduled for elective paediatric, plastic and orthopaedic surgical procedure, belonging to ASA grade I and II.A written/informed consent was obtained from the parent /guardian for anaesthesia and surgery.

A thorough preanaesthetic evaluation was done and children with respiratory disorders, cardiovascular, metabolic, renal or neurological illnesses were excluded from the study. Necessary laboratory investigations were done as per the case. The children were advised to be kept nil per orally for 6 hours and parents were asked to ensure that the children pass stools on the morning of surgery.

The children were divided into two groups A and B.

Group A (n =10) Patients received 5% thiopentone 30 mg/kg body weight as rectal premedication 30 minutes prior induction with Halothane

Group B (n=10)- Patients received 5% thiopentone 30 mg/kg body weight as rectal premedication 30 minutes prior induction with Isoflurane.

The heart rate and room air saturation was recorded prior initiation of premedication and induction in group A and Group B.

Procedure of premedication: 5% thiopentone suspension was prepared by dissolving 1 gram of thiopentone in 20 ml of sterile water using 20 ml syringe. Child was made to lie in left lateral position in the preoperative room with flexion of both hip and knee joints. An infant feeding tube of appropriate size well lubricated with 2 % lignocaine was inserted 3-4 cms beyond the anal sphincter. The tube was stabilised in midline by holding both buttocks tightly with left hand while injecting 30mg/kg of 5% thiopentone suspension taken in a 20ml syringe. The infant feeding tube was then removed and buttocks were strapped tightly. Heart rate and saturation was monitored throughout premedication.

The child was then shifted to operating room and standard monitors like pulse oximeter, non invasive blood pressure, electrocardiogram were connected. Patients were induced with 60 % nitrous oxide in oxygen and Isoflurane or Halothane according to group using Mapelson F breathing system with fresh gas flow of 2.5-3 times the minute ventilation.

The concentration of inhalational agent was increased by 0.5% every 10 breaths with maximum concentration of 4%. Loss of consciousness, onset of regular breathing, centrally fixed eye balls and constricted pupils was used to assess adequate depth. An intravenous line was established and dextrose saline infusion started.

Events like breath holding, laryngospasm and time taken for induction was recorded. Trachea was intubated following Intravenous succinyl choline 1.5-2 mg/kg .Lungs were ventilated with nitrous oxide and oxygen in ratio of 3:2 at a flow 2-3 times the minute ventilation with a minimum flow 3 litres. Anaesthesia was maintained with vecuronium in the dose 0.08mg/kg and 0.6-1% Isoflurane and Halothane in Group B and A respectively

Half of the total maintenance fluid was administered at 2-3 ml/kg along with intraoperative replacement of third space loss at the end of the procedure. At the end of procedure Isoflurane and nitrous oxide were stopped and neuromuscular blockade was reversed using intravenous neostigmine 0.05 mg/kg and atropine 0.02 mg/kg. Post operative monitoring of vitals was done.

Statistical Methods

Analysis was determined by

Paired t test p values < 0.05 significant and <0.01 is highly significant.

Kruskal Wallis one way Analysis of Variance with p value >0.05

Fischer exact test and Yates corrected chi square test was used to find possible associations.

RESULTS

There was no significant difference among the groups in terms of mean age, mean weight, ASA grading and sex. In the group that received premedication 80% of children came to the operating room in a drowsy or cooperative state.

The mean preinduction oxygen saturation and mean lowest oxygen saturation during induction was 97.6 and 97.6 in Group A; 98.1 and 98.1 in Group B respectively.

There was a fall of more than 30 beats per min pulse rate in 30% of patients in Group B as compared to 10% of patients in Group A following premedication. There was an increased incidence of breath holding, coughing and sneezing, laryngospasm in Group B as compared to Group A. This difference was found to be statistically significant.

The average dose of thiopentone required in both the groups was statistically comparable with no significant difference.

DISCUSSION

The study was conducted between January 2012 - December 2012 on 20 paediatric patients in the age group of 1-8 years scheduled for elective paediatric, plastic and orthopaedic surgical procedure, belonging to ASA grade I and II.A written/informed consent was obtained from the parent /guardian for anaesthesia and surgery. As regards the age, sex, weight and ASA grading were comparable.

The average dose of rectal thiopentone used for premedication was comparable in both the groups as shown in Table 1.

Table 1. Average dose of rectal thiopentone.

	Group A	Group B
Average dose of rectal thiopentone per patient in mg	407.5 SD 69.7	425 SD 124.7

Airway Complications during Induction

Induction score of 9 was observed in 90% and 80 % of premedicated halothane and isoflurane groups. These were as comparable with those of Pandit U.A et al. (1985).Wren et al. (1985) reported a low incidence of airway problems with the use of premedication during isoflurane induction.[5] It was also observed that there was a significant differences in incidence and severity of airway problems during isoflurane induction as compared to halothane. Wren et al (1985) reported a low incidence of airway problems with the use of premedication during isoflurane induction which correlates well with our study wherein there was significant reduction in airway complications with rectal thiopentone premedication during isoflurane induction.[4]

Mean Oxygen Saturation

Table 2 compares the mean oxygen saturation in the groups before and after premedication which was statistically insignificant.

Table 2. Comparison of mean oxygen saturation in the groups before and after premedication.

	Before Premedication Group A+B	After premedication Group A + B
Mean oxygen saturation%	98.85 SD 0.5	97.85 SD 0.89

Mean Preinduction Pulse Rates Before and After Premedication

Table 3 shows significant fall in preinduction pulse rate before and after preinduction.

Table 3. Fall in preinduction pulse rate.

	Before Premedication Group A+B	After premedication Group A + B
Mean pulse rate in beats per minute	144.45 ±60	129.8± 58

Induction Time

The shortest mean induction time in group A was 3 min 42 sec and that in Group B 4 min 33 sec. These results were comparable with those of Kingston H.G.G (1986) who observed that in spontaneously breathing children the induction time was less for halothane as compared to isoflurane. The slow uptake of isoflurane was attributed to its airway irritant effects like breath holding and coughing. Mean induction time as per[3] was 5.5min and 6.75 min each in premedicated children induced with Halothane and isoflurane respectively which is comparable to our study.

Induction scoring was 9 in group A and 8 in Group B.

Table 4. Induction scoring.

Airway reflex response	Worst 1	Fair 2	Best 3
Breath holding	Persistent	Temporary	None
Coughing	Persistent	Self limiting	None
Laryngospasm	No air entry	Partial air entry	None

Induction quality	Induction score
Perfect	9
Acceptable	8
Inferior	6-7
Poor	<=5

CONCLUSIONS

1. Rectal thiopentone did not have any effect on oxygen saturation.
2. There was fall in the pulse rate from 144.45 ±60 to 129.8± 58 after premedication. Pulse rate is well maintained with both halothane and isoflurane but significant fall in pulse rate is seen with Rectal thiopentone premedication.
3. Airway complications were 3.8 times more with isoflurane as compared to Halothane.
4. Premedication with 5 % rectal thiopentone does not produce hypoxia and can be safely given before inhalational induction with both halothane and isoflurane.
5. Quality of induction significantly improves with premedication.
6. Rectal thiopentone reduces the mean induction time of halothane and isoflurane.

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