



Original Research Article

## Effect of Rectal Thiopentone as Premedication for Inhalational Induction with Isoflurane in Children

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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. 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 40 paediatric patients aged from 1-8 years posted for elective paediatric, plastic and orthopaedic surgical procedure, belonging to ASA grade I and II. Aim is to determine the effectiveness of rectal thiopentone as premedication for inhalational induction with isoflurane. The parameters that were compared were preinduction deamantour, 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. There was significant fall in the preinduction pulse rate following rectal thiopentone premedication.

**Keywords:** Isoflurane, rectal thiopentone, premedication

### INTRODUCTION

The present study was conducted on 40 children aged between 1-8 years. Because of their unique route of administration, inhalational anaesthetics have useful pharmacological properties not shared by other anaesthetic agents. Inhalational induction of anesthesia is suitable in paediatric patients in whom venous access may be difficult and also

avoids the psychological trauma of a needle prick.

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. <sup>[1]</sup> But isoflurane is associated with increased airway problems and hypoxia during induction in unpremedicated children

.This may be prevented by rectal premedication by thiopentone. [2]

The present study was undertaken to evaluate the effectiveness of premedication with rectal thiopentone in reducing the incidence and severity of airway problems and hypoxic episodes in paediatric patients induced with isoflurane for surgery.

## **MATERIALS AND METHODS**

The study was conducted between February 2012 - December 2012 on 40 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.

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 =20) –Patients received Isoflurane as inhalational inducing agent without premedication.

Group B (n=20)- 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 in group B 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 pulseoximeter, non invasive blood pressure, electrocardiogram were connected. Patients were induced with 60 % nitrous oxide in oxygen and Isoflurane 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.

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 in comparison to 80% in the non premedicated group which came crying. Mean oxygen saturation preinduction was 98.55±0.05 in non premedicated group and 97.85 ±0.89 in group which received premedication. 40% patients in unpremedicated group had oxygen saturation <96 % as compared to 10% of premedicated group which was statistically significant.

The mean pulse rate after premedication was 129.8 beats per minute in comparison to 144.45 without premedication. This fall in preinduction pulse rate was statistically highly significant.

70% of patients in group A had laryngospasm as compared to 10 % in group B. Incidence of coughing and breathholding was 60 % and 30 % in group A when compared to 10 % each in group B. These differences were found to be statistically significant. Statistical evaluation of post operative airway problems was insignificant.

## **DISCUSSION**

The study was conducted on 40 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.

The children were divided into two groups A in which patients received Isoflurane as inhalational inducing agent without premedication and B in which patients received 5% thiopentone 30 mg/kg body weight as rectal premedication 30 minutes prior induction with Isoflurane. As regards the age, sex, weight and ASA grading were comparable.

Airway problems and hypoxic episodes have been reported with the inhalational induction of anaesthesia using isoflurane in unpremeditated children reported that premedication with rectal thiopentone in the dose of 30mg/kg has reduced the incidence and severity of hypoxic episodes and airway problems during isoflurane induction in their study which correlated well with the study, where the incidence and severity of airway problems and hypoxic episodes were reduced during inhalational induction with isoflurane following premedication with rectal thiopentone (5%) in the dose 30mg/kg.<sup>[3, 2, 1]</sup> The preinduction demeanour was better in the premedicated children as compared to unpremedicated children as shown in Table 1.

Table 1. Preinduction demeanour

Preinduction demeanour	Group A	Group B
Crying	16	4
Cooperative/drowsy	4	16

### **Effect of Premedication on Oxygen Saturation**

In the study premedication had negligible effect on oxygen saturation. In the unpremedicated children the preinduction saturation was more than or equal to 98%.

After premedication with rectal thiopentone it did not fall below 97%.

However Raftery S and Warde.D (1990) reported that while all the unpremedicated children had an initial oxygen saturation of 97% or greater,10% of the premedicated children had an oxygen saturation of <97%.They requested that patients should be carefully observed after premedication because of borderline hypoxia.<sup>[2]</sup> In our study although the incidence of hypoxia and airway problems were decreased by premedication but there was no hypoxia in the premedicated group during preinduction period as seen in Figure 1.The absence of hypoxia in our study can possibly be due to lower concentration of thiopentone (5%) as compared to (40%) of thiopentone used in the above study.

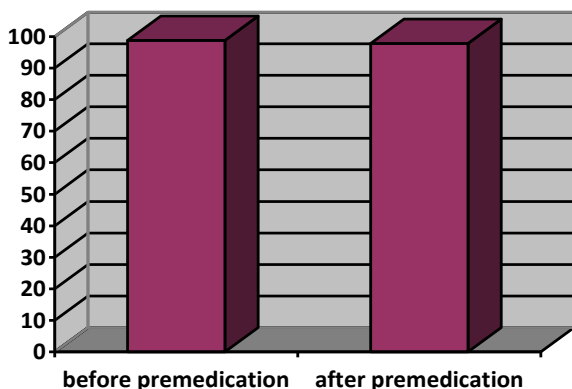


Figure 1. Mean oxygen saturation before and after premedication

### ***Oxygen Saturation during Induction***

In our study reduction in oxygen saturation less than 96% occurred during induction of anaesthesia in 40% of the unpremedicated patients with slow inhalational induction using Isoflurane as shown in Table 2 .Noticeable finding in the study was that the premedication with rectal thiopentone did reduce the incidence of hypoxic episodes from 40 % to 10% during inhalational induction with isoflurane. Our

findings correlate well with that of Raftery S and Warde.D (1990).In their study they reported unpredictable fall of oxygen saturation of less than 90% in 32% of unpremeditated children and 12.5% of children who received rectal thiopentone premedication during inhalational induction with isoflurane. <sup>[2]</sup> The reduction in incidence of hypoxic episodes with rectal thiopentone premedication during inhalational induction with isoflurane was statistically significant in our study.

Table 2. Mean Preinduction And Mean Lowest Oxygen Saturation During Induction

Oxygen Saturation %	GROUP A	GROUP B
Mean Preinduction	98.8	98.1
Oxygen Saturation	SD 10.3	SD 0.73

### ***Airway Complications during Induction***

In the present study slow inhalational induction was used. The major finding was that premedication with rectal thiopentone (5%) reduced the incidence of airway problems from 80% to 20%.Breath holding ,coughing, laryngospasm were observed in 60%,30%,70% of cases respectively in unpremedicated induced with isoflurane ,where as it was only 10% each in premeditated isoflurane group as depicted in Table 3.

Our results are comparable with those of Raftery S and Warde. D (1990) who in their study reported the incidence of coughing and laryngospasm as 4 % and 28 % in unpremeditated compared to 4% and 8 % in premedicated group.<sup>[2]</sup> However the incidence of airway complication in unpremeditated patients of isoflurane group was less in their study as compared to our study.

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]

Table 3. Airway Reflex Response

Airway reflexes	GROUP A	GROUP B
Breath holding	12 (60%)	2 (10%)
Coughing	6 (30%)	2 (10%)
Laryngospasm	14 (70%)	2 (10%)

**Induction Time**

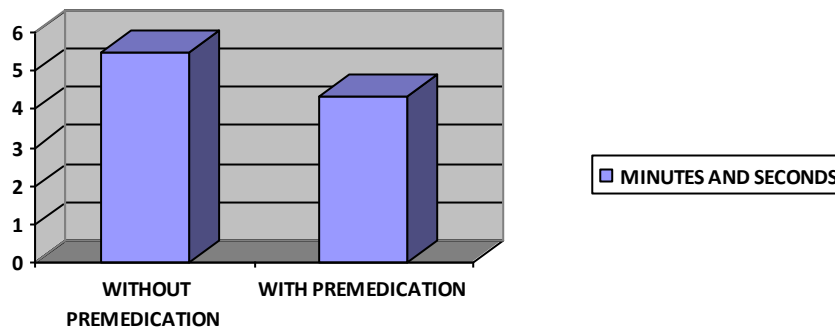


Figure 2. Mean Induction Time

**Pulse Rate Before and During Induction**

The mean pulse rate after premedication was 129.8± 58 in comparison to 144.45 ± 60 without premedication. This fall in preinduction pulse rate was statistically highly significant as shown in Table 4.

Table 4. Mean Preinduction Pulse Rates Before and After Premedication

Mean pulse rate in beats per minute	Before premedication	after premedication
	144.45 ±60	129.8±58

**Airway Problems during Recovery**

In this study airway problems were negligible during recovery period except for coughing in 4 patients in unpremeditated group. This is comparable to the finding of McAteer et al (1986) who also reported

The shortest mean induction time in unpremeditated group was 5 min 47 sec and in premeditated group was 4 min 33 sec as shown in Figure 2. Raftery S and Warde.D (1990) reported the shortest mean induction time in unpremeditated group as 10.25 min and 6.75 min in premeditated group which is comparable to our study. [2] Premedication with rectal thiopentone reduced induction time but this was not statistically significant in our study due to small sample size.

coughing in 22.5% of patients belonging to unpremeditated isoflurane group. [5]

**CONCLUSION**

The study was done to determine the effect of premedication with rectal thiopentone on inhalational induction with isoflurane in children. Comparison was done in relation to oxygen saturations, airway reflex actions, induction time, pulse rate. The following observations were made:

- A. Rectal thiopentone premedication did not have any effect on oxygen saturation.
- B. There was fall in mean pulse rate after premedication from 144.45 ± 60 to 129.8± 58.
- C. Rectal thiopentone reduced the fall in oxygen saturation from 40 % to 10 %.

- D. Laryngospasm was seen in 70 % of unpremedicated and 10 % of premedicated patients.
- E. Premedication reduced induction time from 5 min 47 sec to 4 min 33 sec.
- F. In the recovery group except for 4 patients no airway problems occurred.

Conclusions are

- 1. Quality of induction significantly improves with premedication
- 2. Premedication with 5% rectal thiopentone does not produce hypoxia and can be safely given before inhalational induction.
- 3. Rectal thiopentone premedication does reduce the incidence and severity of airway complications

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