



ORIGINAL RESEARCH PAPER

Anaesthesiology

A PROSPECTIVE RANDOMISED STUDY ON COMPARISON OF INDUCTION AND RECOVERY CHARACTERISTICS OF PROPOFOL AND THIOPENTONE FOR SHORT DURATION ENT SURGICAL PROCEDURES IN CHILDREN OF AGE GROUP 6 – 10 YEARS

KEY WORDS:

Induction, Recovery, Propofol, Thiopentone, Short ENT procedures, Paediatric.

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ABSTRACT

Background and Aim : The aim of the study was to compare the induction and recovery characteristics of Thiopentone and Propofol in premedicated children in respect to

- 1.Smoothness of induction.
- 2.Hemodynamic changes during induction.
- 3.Recovery characteristics of the two drugs.

Materials and Methodology : In this prospective randomised study 50 paediatric patients in age group of 6 – 10 years belonging to ASA I and II scheduled to undergo elective tonsillectomy and adenoidectomy under general anaesthesia were included. The patients were randomly allocated to two groups as Group P and Group T of twenty five each. Group P received propofol and Group T received thiopentone as inducing agent. Induction time, Incidence of Pain during injection, Induction time, apnea seconds, Excitatory effects during induction, Hemodynamic variabilities, Quality of recovery were noted and compared.

Results : The total incidence of pain during injection in propofol group (20%) was greater than in the thiopentone group (8%). The mean induction time in propofol group was 31.84 seconds and in the thiopentone group was 30.36 seconds and the difference is not statistically significant. Mean duration of apnea following induction in propofol group is 11.96 seconds while in thiopentone group was 11.64 %. Apnea over 30 seconds in propofol group was 8% and in the thiopentone group was 16% which is statistically significant. Total incidence of excitatory effects in propofol group was 32% while in thiopentone group was 20% which is statistically significant. The fall in systolic, diastolic, mean arterial pressure is statistically significant in propofol group compared to thiopentone group. The mean decrease in pulse rate also significant in propofol group compared to thiopentone group. Post operative agitation, unco-operativeness and crying found to be more in thiopentone group compared to propofol group which is statistically significant.

Conclusion : The results of the study indicate that Propofol is safe and more effective anaesthetic agent compared to Thiopentone for short duration ENT procedures in fit children.

INTRODUCTION:

Propofol is a short acting intravenous anaesthetic agent with high lipid solubility and short elimination half time. Because of the pharmacokinetic properties rapid induction and recovery are possible with propofol induction. Even though the drug as an inducing agent studied extensively in adults its experience in children is limited. Thiopentone a commonly used and studied inducing agent has varied effects on apnea time, hemodynamic parameters, recovery time and recovery characteristics. In this study we intend to study the Induction, Hemodynamic changes and recovery characteristics of propofol and thiopentone for short duration ENT surgical procedures in children of 6 – 10 years.

MATERIAL AND METHODOLOGY:

This prospective randomised study was conducted at Government Stanley Hospital in 50 patients aged between 6 to 10 years undergoing Tonsillectomy and Adenoidectomy procedure lasting less than one hour. Approval from Hospital Ethical Committee for the study was obtained. Patients were randomly allocated Group P and Group T with 25 members in each group.

Inclusion criteria: Patients within age group 6 to 10 years, ASA I and II, undergoing Tonsillectomy and Adenoidectomy.

Exclusion criteria: Surgery more than one hour, Children with systemic illness, ASA III and IV, patients in whom barbiturates or propofol is contraindicated were excluded from the study.

Methodology: The patients were randomly allocated two groups of 25 each.

Patients were premedicated with Inj. pentazocine and atropine. Group P received propofol and group T received thiopentone as inducing agent. After induction, intubated facilitated with suxamethonium and patient maintained with gas oxygen mixture and Inj. atracurium. After end of surgery patient reversed with neostigmine and safely extubated.

Loss of verbal contact was taken as induction time in propofol and loss of eye lash reflex for thiopentone. In propofol induction cases if there is no spontaneous complaint within 10 seconds of commencement of injection, child was asked any pain at injection site was present. Intra operative hemodynamics was monitored. Appearance of any excitatory effects like spontaneous movement, hiccup, laryngospasm, bronchospasm, tremor were monitored.

In analysing the data the Mean and Standard Deviation are calculated for the variables in the two groups. The confidence limits of the values obtained are calculated. The probability value (p-value) was calculated using Pearson's Chi square test. Chi square test with Yates correction, Fisher's exact test [2-tail], Mann-whitney -u test and Student's independent 't' test as required.

Observation and Results :

The study was a prospective and randomised one conducted on a total of 50 patients and they were grouped as Group P receiving propofol and Group T receiving thiopentone for induction of anaesthesia. The patients demographic details were statistically comparable between the groups.

Incidence of pain on injection

The total incidence of Pain in propofol group was greater (20%) than in the thiopentone group(8%).Two patient in propofol group had severe pain while no patient in thiopentone had severe pain.The difference is statistically significant.

Induction time :

Time(sec)	20-24	25-29	30-34	35-39	40-44	45-49	Total
Propofol	6 (24%)	4(16%)	4(16%)	6(24%)	3(12%)	2(8%)	25
Thiopentone	3(12%)	5(20%)	14(56%)	3(12%)	-	-	25

The mean induction time following thiopentone administration was 29 ± 3.44 seconds and with propofol was 31 ± 7.90 seconds and the difference is statistically not significant.

Apnea seconds :

Mean duration of apnea in Propofol group was 11.96 seconds and 11.64 seconds in Thiopentone group.Both means are equal.Apnea over 30 seconds was 8 % in propofol group and 16 % in thiopentone group and the difference is statistically significant.

Excitatory effects during induction:

Group	Nil	Hypertonic movement	Hiccough	Bronchospasm	Tremor	Total
Propofol	17	8	-	-	-	25
Thiopentone	20	3	1	1	-	25

The total incidence of excitatory effects in propofol group was 8(32%) and in thiopentone group was 5(20%) and the difference is statistically significant.

Mean values for systolic,diastolic,mean arterial pressures and pulse rate after induction with propofol or thiopentone :

Before Induction:

Time (min)	Systolic pressure		Diastolic pressure		Mean arterial pressure		Pulse rate	
	P	T	P	T	P	T	P	T
0	112	112	70	73	84	86	116	

After Induction:

Time (min)	Systolic pressure		Diastolic pressure		Mean arterial pressure		Pulse rate	
	P	T	P	T	P	T	P	T
2	102	107	65	69	77	81	108	118
4	99	105	63	67	75	79	106	111
6	96	103	61	65	72	78	105	108
8	93	100	59	64	71	76	101	100
10	91	99	58	62	69	74	100	100

In the thiopentone group mean systolic pressre reduced from 112 ± 4.8 mmHg to 107 ± 4.2 mmHg during the second minute and 99 ± 3.2 mmHg at the tenth minute.

In the propofol group mean systolic pressre reduced from 112 ± 4.8 mmHg to 102 ± 4.4 mmHg during the second minute and 91 ± 2.8 mmHg at the tenth minute and the reduction is statistically significant ($P=0.01$).In the thiopentone group mean diastolic pressure reduced from 73 ± 4.7 mmHg to 69 ± 4.3 mmHg during the second minute and 62 ± 3.2 mmHg at the tenth minute.

In the propofol group mean diastolic pressre reduced from 70 ± 4.6 mmHg to 66 ± 4.8 mmHg during the second minute and 58 ± 2.2 mmHg at the tenth minute and the reduction is statistically significant ($P > 0.001$).In the thiopentone group mean arterial pressure reduced from 86 ± 4.7 mmHg to 81 ± 4.6 mmHg during the second minute.

In the propofol group mean arterial pressure reduced from $84 \pm$

4.6 mmHg to 77 ± 5.2 mmHg during the second minute.The fall in mean arterial pressure was greater in the propofol group and the reduction is statistically significant($P > 0.001$).The mean pulse rate inthe propofol group reduced from 116 ± 4.2 per minute to 108 ± 4.6 per minute in the second minute and gradually reached 100 ± 4.4 per minute.

The mean pulse rate inthe thiopentone group increased from 110 ± 4.2 per minute to 112 ± 4.4 per minute,went downward from fourth minute onwards to reach 100 ± 43.2 per minute during tenth minute.The mean decrease in pulse rate propofol group was greater compared to the thiopentone group and it is statistically significant ($P=0.01$).

Quality of Recovery:

Activity	Propofol group	Thiopentone group
Agitated,un co-operative crying	2(8%)	15(60%)
Nausea,Vomiting	-	7(28%)
Cough	-	7(28%)
Laryngospasm	-	-
Bronchospasm	-	1(4%)
Flush or Rashes	-	-
Venous phlebitis	2(8%)	1(4%)
Need for post-op analgesics	-	5(20%)

Post operative agitation,unco-operativeness and crying found to be more in thiopentone group compared to propofol group which is statistically significant.

DISCUSSION:

It has been suggested that propofol might be a suitable agent for induction of anaesthesia because of its rapid metabolism,resulting in speedy recovery and proving to be a suitable alternative to thiopentone especially in day care surgery and if this to be substantiated there must be a direct comparisonbetween the two drugs.The result of the study shows propofol to be a satisfactory induction agent and equal to and superior to thiopentone in some respects.

Propofol is comparable to thiopentone with respect to mean induction time.

H.Jan Manschot and colleagues 1 have found that children were asleep with loss of verbal contact and acceptance of face mask without gross movement with an induction dose of 2.5 mg/kg.

According to A.Borgreat ,V.Popvic and co-workers 2 – 3mg/kg of propofol produced rapid and smooth induction of anaesthesia in all children.

In our study it was found that 3 mg/kg of propofol produced depth of anaesthesia with acceptance of face mask.In our study ,the incidence of hypertonic movements who received propofol was higher than the thiopentone group.The incidence of true excitatory effects like spontaneous movements,tremors hiccough was higher in propofol group.

Hannallah and co workers3 have shown that propofol induction produces 14.4% reduction in systolic pressure and thiopentone produced only a 0.7% reduction in systolic pressure.But in our study propofol produced 17.8% fall in systolic pressure and thiopentone produced 115% fall in systolic pressure in the first 10 minutes after induction.

Jones and co workers4 observed greater reduction in diastolic blood pressure 15.38% with propofol and 10.38% with thiopentone induction.In our study propofol produced a 9.9 % fall in diastolic pressure and thiopentone produced a 9.3% fall in diastolic pressure in the first 10 minutes after induction.Saarnivara and co workers5 have observed higher

incidence of bradycardia after propofol induction when compared with barbiturates. The present study also gives a similar result. During induction with thiopentone there was a rise in pulse rate during the first two minutes and then the pulse rate started coming down. But with propofol this phenomenon was not observed and the pulse rate came down from the beginning. The fall in the heart rate 13.7% with propofol and 9% with thiopentone during tenth minute. This can be explained by the fact that propofol resets the baroreceptor reflex in response to a fall in blood pressure.

All children in propofol group except two children who cried were quiet, well oriented, co-ordinated and co-operative in the recovery room - whereas 60% of the patient in the thiopentone group were crying, agitated, unco-ordinated and unco-operative during first twenty minutes of recovery.

Pain, nausea and vomiting were less frequent during the initial post operative hours in propofol group - 28% of children developed nausea, vomiting, cough in the thiopentone group. 20% of the children needed analgesia within six hours of post operative period.

The quality of recovery was excellent in all children in propofol group except two children who cried. In the thiopentone group 60% of the patient were agitated, unco-operative and crying.

Although there was no significant difference in the incidence of thrombophlebitis between thiopentone and propofol, patient were only examined at 24 hours after injection whilst, it is generally agreed that the maximum incidence of venous sequelae occurs at ten to fourteen days. The number of patients studied is too small to draw any useful conclusion and the same applies to the fact that there was no anaphylactic reaction.

Summary: The following are the inferences of this prospective randomised study using intravenous induction doses of propofol and thiopentone.

1. Induction is smooth with thiopentone compared to propofol because of reduced incidence of excitatory effects in the thiopentone group.
2. Incidence of pain on injection and apnea was less with thiopentone than with propofol.
3. Propofol produced greater fall in pulse rate and arterial pressure following induction than compared with thiopentone.
4. The rapidity and quality of awakening after propofol is superior to that observed after thiopentone.
5. Post operative agitation, unco-operativeness and crying is more in thiopentone than compared with propofol.
6. Post operative nausea, vomiting are less with propofol compared to thiopentone.
7. Need for post operative analgesia is less with propofol compared to thiopentone.
8. Propofol is not anti analgesic compared to thiopentone.

CONCLUSION:

The result of this study indicate that propofol is safe and more effective intravenous anaesthetic agent than thiopentone for short duration ENT procedures in children of age group 6-10 years.

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Conflict of interest: There are no conflict of interest.

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