

## A Comparative Study between Propofol and Thiopentone as Induction Agents for Obstetric Anesthesia

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**Article History**

Received: 30.05.2018

Accepted: 10.06.2018

Published: 30.06.2018

**DOI:**

10.21276/sjm.2018.3.6.3



**Abstract:** Intravenous induction agents Propofol and Thiopentone are commonly used in obstetric anesthesia. We in the present study tried to compare the effects of Propofol and thiopentone on hemodynamics, Heart rate in the pregnant ladies undergoing Cesarean sections. Methods A total of 60 patients were included in the study. They were randomly divided into two groups. Propofol group (n=30) and Thiopentone group (n=30). The dosage was calculated to body weight 5mg/Kg for thiopentone and 2.5mg/Kg for Propofol. The mean induction time in Propofol group was 20.95 seconds and Thiopentone group as 26.5 seconds. There was smooth induction in 86.67% of the patients of Propofol group and 13.33% had disturbed induction. In the Thiopentone group, 76.67% had smooth induction and 23.33% had disturbed induction. No induction failure was encountered in this study and all patients were unconscious after 45 seconds. The total duration of surgery in propofol group was  $70 \pm 20$  minutes and in thiopentone group was  $85 \pm 27$ . The time to extubation in Propofol group was  $8.5 \pm 2.60$  and Thiopentone group was  $7.0 \pm 3.56$ . The Arterial Blood gas analysis after surgery shows average values of PaO<sub>2</sub> in Propofol group and  $87.5 \pm 2.1$  and thiopentone group  $88.6 \pm 1.8$  and PaCO<sub>2</sub> in propofol group  $38.6 \pm 2.05$  and thiopentone  $38.4 \pm 2.5$  mmHg. The mean SBP at the baseline of Propofol group was  $124.05 \pm 10.5$  mmHg, while for Thiopentone group it was  $124.05 \pm 10.5$  mmHg. The mean DBP at the baseline in propofol group was  $76.5 \pm 10.2$  and thiopentone group was  $78.8 \pm 6.8$ . The heart rates were  $80.5 \pm 7.8$  beats/min and  $83.5 \pm 8.8$  beats/min in propofol and thiopentone group. The mean changes at the time of induction in heart rate of propofol group were 18 beats/min and the mean change of heart in thiopentone group was 23 beats/min. The mean SBP change during induction in Propofol group was -2.8mmHg and DBP change was -2.0 mmHg. In thiopentone group SBP change was -2.55mmHg and DBP change was -1.3 mmHg. Conclusion: Propofol has rapid actions and does not have any adverse effects on the CVS. The amount of pain produced due to propofol was also lesser compared to the thiopentone group and the induction was smooth in propofol group compared to thiopentone group and overall outcomes of Propofol were better than the Thiopentone group. Therefore propofol appears to better induction agent than thiopentone for obstetric anesthesia.

**Keywords:** Thiopentone, Propofol, Obstetric anesthesia.

### INTRODUCTION

Caesarian sections are usually performed by Regional Anesthesia because of their advantages to the mother and newborns. However in cases where regional anesthesia is not suitable because of coagulopathy, infection in the area of regional anesthesia administration, hypovolemia, severe fetal distress, or rejection of the regional anesthesia by patient then General Anesthesia is used [1]. The conventional methods of inducing general anesthesia with inhalation agents takes a long time for induction and recovery it also leads to postoperative sickness [2]. Intravenous induction of anesthesia has advantages like rapidity of onset, smooth induction and without irritation to the respiratory tract [3]. Thiopentone sodium has been used in obstetric anesthesia since 1936 and is regarded as the

standard induction agent. Thiopentone sodium is a good intravenous induction agent but has some disadvantages like Cardiovascular and Respiratory depression, tolerance and cumulation [4]. Some investigators used larger doses and Hellman *et al.*, [5] showed that considerable quantities were transferred to the infant. To overcome the disadvantages of newer intravenous anesthetic drugs like propofol were introduced. Propofol being highly lipophilic compound is extensively bound to plasma proteins [6, 7] Propofol has properties that are the useful alternative to thiopentone. The suspension has pH of 7.0 which makes it less likely to cause local tissue and vascular complications. The cardiovascular response to tracheal intubation is less with propofol than with thiopentone. Propofol is rapidly metabolized and thiopentone and

hangover after the anesthetic are also reduced [8]. We compared propofol with thiopentone for induction of anesthesia in elective Caesarean section in the present study. Particular attention was paid to induction characteristics and cardiovascular responses.

## MATERIALS AND METHODS

The study was conducted in the Department of Anesthesia and Department of Obstetrics and Gynecology, Prathima Institute of Medical Sciences, Nagunur, Karimnagar. The study was approved by the Institutional Ethical committee and informed consent was given by all the patients. Sixty patients (n=30) ASA I with uncomplicated pregnancies with elective cesarean section were allocated randomly to receive either propofol (n=30) or thiopentone (n=30) for induction of anesthesia. The indications for Caesarean section were the breech presentation, cephalo-pelvic disproportion or previous Caesarean section. Patients were excluded if there was any evidence of intrauterine growth retardation or other fetal abnormality. Preanesthetic medication included ranitidine 150mg given the night before and on the morning of surgery with sodium citrate 0.3 m/lit 30 ml given 15 min before the operation. Routine monitoring included end-tidal carbon dioxide and volatile agent concentration was monitored. The automatic cardiovascular monitor was used to record the blood pressure.

Patients underwent preoxygenation for 3 minutes before rapid sequence induction of anesthesia with thiopentone 5mg/Kg and 2.5mg/Kg for Propofol in 5 seconds followed by suxamethonium 1.5mg/kg. Laryngoscopy was performed after the 1-min. Anesthesia was maintained with an end-tidal concentration of 50% nitrous oxide and 0.5% isoflurane in oxygen. Incremental doses of the induction agents were given as required during the surgical procedure. Hartmann's solution 500 ml was infused for first 10

minutes. The induction to delivery time and uterine incision to delivery times were recorded by stopwatch. At the end of the procedure the nitrous oxide was discontinued and oxygen 100% was given by mask for 5 minutes and kept for spontaneous ventilation at room air. The patients were kept in the recovery area for two hours and discharged. Before the discharge the patient consciousness, orientation, vital data and allergic manifestation if any were observed.

## RESULTS

A total of 60 patients were included in the study and randomly allotted in two groups Propofol group (n=30) and Thiopentone group (n=30). The dosage was calculated to body weight 5mg/Kg for thiopentone and 2.5mg/Kg for Propofol. Both the induction agents were given intravenously (IV) over a period of 10 seconds.

The mean induction time in Propofol group was 20.95 and Thiopentone group as 26.5 seconds. There was smooth induction in 86.67% of the patients of Propofol group and 13.33% had disturbed induction. In the Thiopentone group, 76.67% had smooth induction and 23.33% had disturbed induction. No induction failure was encountered in this study and all patients were unconscious after 45 seconds. Pain on injection was noted in 36.67% of the Thiopentone group and 6.67% of patients in Propofol group. The total duration of surgery in propofol group was  $70 \pm 20$  minutes and in thiopentone group was  $85 \pm 27$ . The time to extubation in Propofol group was  $8.5 \pm 2.60$  and Thiopentone group was  $7.0 \pm 3.56$ . The Arterial Blood gas analysis after surgery shows average values of PaO<sub>2</sub> in Propofol group and  $87.5 \pm 2.1$  and thiopentone group  $88.6 \pm 1.8$  and PaCO<sub>2</sub> in propofol group  $38.6 \pm 2.05$  and thiopentone  $38.4 \pm 2.5$  mmHg respectively shown in Table-1.

**Table-1: Showing the peri-operative patients data**

Observed parameters	Propofol (n=30)	Thiopentone (n=30)
Mean induction time (seconds)	20.95 ± 3.5	26.5 ± 5.5
Duration of surgery (min)	70 ± 20	85 ± 27
Duration of anesthesia (min)	80 ± 30.5	90 ± 25.5
Extubation (min)	8.5 ± 2.60	7.0 ± 3.56
<b>ABG 0.5 H AFTER SURGERY</b>		
Pao <sub>2</sub> (mmHg) (SD)	87.5 ± 2.1	88.6 ± 1.8
Paco <sub>2</sub> (mmHg) (SD)	38.6 ± 2.05	38.4 ± 2.5
Fio <sub>2</sub>	0.4	0.4

The mean SBP at the baseline of Propofol group was  $124.05 \pm 10.5$  mmHg, while for Thiopentone group it was  $124.05 \pm 10.5$  mmHg. The mean DBP at the baseline in propofol group was  $76.5 \pm 10.2$  and thiopentone group was  $78.8 \pm 6.8$ . The heart rates were  $80.5 \pm 7.8$  beats/min and  $83.5 \pm 8.8$  beats/min in propofol and thiopentone group. The mean change at the time of induction in heart rate of propofol group was

18 beats/min and the mean change of heart in thiopentone group was 23 beats/min. The mean SBP change during induction in Propofol group was -2.8mmHg and DBP change was -2.0 mmHg. In thiopentone group SBP change was -2.55mmHg and DBP change was -1.3 mmHg. Similarly, the values at intubation and 10 minutes after delivery were recorded given in Table-2.

**Table-2: showing the baseline value of SBP, DBP and Heart Rate in both groups**

Variables	Propofol group (n = 30)	Thiopentone group (n=30)	P values
Baseline values			
SBP mmHg	$122.8 \pm 12.8$	$124.05 \pm 10.5$	> 0.5
DBP mmHg	$76.5 \pm 10.2$	$78.8 \pm 6.8$	> 0.5
HR BPM	$80.5 \pm 7.8$	$83.5 \pm 8.8$	> 0.5
After Induction			
SBP mmHg	$120.5 \pm 9.8$	$121.5 \pm 8.8$	> 0.5
DBP mmHg	$74.5 \pm 5.6$	$77.5 \pm 4.5$	> 0.5
HR BPM	$98.5 \pm 8.5$	$106.5 \pm 10.8$	<0.05*
At Intubation			
SBP mmHg	$136.6 \pm 12.5$	$138.5 \pm 15.5$	> 0.5
DBP mmHg	$86.5 \pm 6.4$	$92.2 \pm 8.5$	<0.05*
HR BPM	$124.5 \pm 13.8$	$110.7 \pm 12.5$	<0.05*
10 minutes after delivery			
SBP mmHg	$126.6 \pm 10.8$	$127.2 \pm 11.5$	> 0.5
DBP mmHg	$73.5 \pm 4.6$	$76.6 \pm 5.5$	<0.05*
HR BPM	$81.5 \pm 3.5$	$96.5 \pm 9.5$	<0.05*

\* Significant

## DISCUSSION

Administration of general anesthesia requires use of certain interventions to prevent adverse outcomes. Rapid sequence induction is an intervention that is used in the first phase of general anesthesia to prevent aspiration this is the basis of conduction of the present study. IV induction of general anesthesia is the common technique employed in both adult as well as pediatric population. This is done by administering an IV induction agent such as Thiopental, Propofol, Ketamine, or Etomidate. Maintenance of anesthesia is accomplished with a face mask, placement of a laryngeal mask airway, or placement of an endotracheal tube for airway management. In the present study it was found that use of propofol in anesthesia induction suppressed hemodynamic response to intubation better and provided better hemodynamic stability and depth of anesthesia and recovery was rapid as compared to thiopentone group shown in table-1. This study also shows that the mean induction time of propofol group was  $20.95 \pm 3.5$  sec and thiopentone group was  $26.5 \pm 5.5$  seconds the injection time was 5 seconds. Rolly and co-workers have shown that there was significantly shorter induction time of 21.5 seconds when injection time was 5 seconds agreeing with the results of the present study [9]. Mean induction time was increased to 50.5 seconds when injection time was changed to 60 seconds. Thus showing the rate of injection time had

influence on induction time [10]. Moore *et al.*, [11] investigating the effects of propofol and thiopental on mothers hemodynamics reported that blood pressure values were lower from induction until delivery by using propofol. Valtonen *et al.*, [12] that the use of propofol 2.5mg/Kg and thiopental 5mg/Kg in caesarean sections display similar effects on intraoperative hemodynamics. Similar results were also noted by Vedat Cakirtekin *et al.*, [13] There was smooth induction in 86.67% of the patients of Propofol group and 13.33% had disturbed induction. In the Thiopentone group, 76.67% had smooth induction and 23.33% had disturbed induction. The results were similar to other studies that have done in the past [12, 14] The mean change at the time of induction in heart rate of propofol group was 18 beats/min and the mean change of heart in thiopentone group was 23 beats/min. Studies have reported variable response in relation to heart rates on induction [12, 14, 15]. The mean heart rate after 10 minutes of delivery was significantly better in the propofol group as compared to thiopentone group. Indicating the propofol group reached the baseline better as compared to thiopentone group. The mean SBP change during induction in Propofol group was -2.8mmHg and DBP change was -2.0 mmHg. In thiopentone group SBP change was -2.55mmHg and DBP change was -1.3 mmHg. Similar findings have been reported by M Mamidi *et al.*, [10] The patients

pH, PO<sub>2</sub>, and PCO<sub>2</sub> were very similar in for the two groups no much variations were found in these values, therefore it can be concluded the propofol and thiopentone has similar effects on these values.

### CONCLUSIONS

Within the limitations of the present study, it can be concluded that Propofol has rapid actions and does not have any adverse effects on the CVS. The amount of pain produced due to propofol was also lesser compared to the thiopentone group and the induction was smooth in propofol group compared to thiopentone group and both has similar effects on respiratory parameters. The overall outcomes of Propofol were better than the Thiopentone group. Therefore propofol appears to better induction agent than thiopentone for obstetric anesthesia.

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