Original Article

Comparative Study between the Thiopental Sodium and Propofol in Day Case Anaesthesia

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Abstract:
A day case patients is one who is admitted for investigation or operation or a planned non-resident basis. Now a days, day care surgery is widely acceptable and gaining popularity due to recent advances in surgical technology and equipments, along with the improved anaesthetic techniques and drugs. Early recovery and cost effectiveness is an integral part of day care surgery in developing country like Bangladesh. This study is done with an objective to compare the cost effectiveness and recovery score after Thiopental Sodium or Propofol induction in day care surgery. The study is conducted at the department of Anaesthesiology of Eastern Medical College and Hospital (EMCH), Comilla, Bangladesh and also at some local clinics of Comilla city during the period of one year from January 2016 to December 2016. Sixty patients, divided into two groups were included in this study. Induction of anaesthesia done on thirty patient of each of Group-A and Group-B by Propofol and Thiopental Sodium respectively. Patients with Propofol having rapid induction and recovery but causes venous pain, respiratory depression and bradycardia. On the other side, in patients having Thiopental Sodium shows slow recovery but also respiratory depression. So, comparing the induction & recovery timing, fitness to go home and cost effectiveness, induction by Thiopental Sodium is relatively better and cost effective than Propofol in day case anaesthesia without any significant changes in hemodynamics, recovery scores as well as time to ready to go home.

Key words: Thiopental Sodium, Propofol, Day Case Anaesthesia

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Introduction:
Surgical day cases are admitted for operations or investigations on a planned, non-resident basis and occupy beds for period of time in a unit set aside the operation theater complex and go back home on the same day[1]. Now a days day care surgery also known as "office-based anaesthesia" or "out–patients ambulatory surgical case" [2,3]. It is one of the most dramatic transformations in health care delivery in the recent past. The primary impetus for this change is the economic saving afforded by not admitting patients the night before surgery or keeping them in hospital over night after surgery. Other advantages include earlier ambulation, patient's convenience and a less risk of nosocomial infections[3,4].

Pre-requisites for this agents are having characteristics of rapid efficient action with quick elimination without hang-over effect and of course cost effectiveness. None of the currently available anaesthetic agents have duration of action short enough to leave the patients with no residual effects within a few hours of surgery. Commonly used induction agent Thiopental Sodium is having elimination half-life of 5 to 10 hours and up to 30% may remain in the body after 24 hours[4,5]. It does not provide a clear-headed recovery in day-case anaesthesia.

On the other hand, Propofol has distribution and elimination half-lives of 2 to 8 minutes and 1 to 2 hours respectively and provides rapid recovery with minimal residual effect, which is suitable for day-cases[5,6]. But high price of Propofol and also chance of contamination of vials are major obstacle to its use for day-cases in the underprivileged population.

This study was carried out with the objective to compare the quality of recovery from Propofol induction with Thiopentone. The cost effectiveness of these induction agents were also evaluated to observe the benefit of the patient.

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Materials and Methods:
This study was conducted in Department of Anaesthesia of Eastern Medical College (EMCH), Comilla, Bangladesh and few local clinics of Comilla city from January 2016 to December 2016. The methods were applied in Dilatation & Curettage (D&C), Bartholin's cyst, foreign body removal from ear and circumcision. Sixty patients within 18 to 35 years of ages, belonging to ASA (American Society of Anesthesiologist) status I and II, scheduled for routine procedure on day-case basis5. Patients were randomly selected by card sampling methods and grouped (Group-A for Propofol induction and Group-B for Thiopental Sodium induction) equally into two with thirty in each group[3,6].

Table-I: SOCA score (10 out of 11 must be scored before discharge under normal circumstances) and Fitness Criteria to go home

Sedation:	
Awake and alert or tense	4
Awake and not alert or tense	3
Drowsy	2
Sleepy or asleep but rousable	1
sleep and not rousable	0
Orientation:	
Full orientation	2
Partial disorientation	1
Total disorientation	0
Comprehension:	
Execution of order	2
Execution of order only by initiation	1
No execution of order	0
Amnesia:	
No amnesia	3
Slight amnesia	2
Moderate amnesia	1
Severe amnesia	0
Criteria of Fitness to go Home:	
• Orientation to person, place and time • Stable vital signs for 30-60 minute • Ability to ambulate unassisted • Ability to walk in straight line • Ability to void • Absence of significant pain or bleeding • Ability to tolerate oral fluids	

After pre-oxygenation, Group-A received Propofol 2.5 mg/kg for induction and Group-B were given induction by Thiopentone 5 mg/Kg. Analgesia and maintenance were managed by Fentanyl 1 µmg/kg and 0.5% halothane respectively. Per-operative vital parameters were observed and recorded at 10 min interval. Recovery quality was assessed by SOCA (S-sedation, O-orientation, C-comprehension, A-amnesia) scores and time required for fitness to go home were monitored and recorded (Table-I) [6,7,8].

After completion of surgery, total cost of induction agents was calculated and recorded.

Data were collected in a pre-designed data collection sheet and then Data were compiled and statistical analysis were done by using SPSS.

Results:
Student's 't' test was done to find out the statistical difference between two groups and statistical significance level was set at $p<0.05$. Results were expressed in the tables as mean ± SD.

Vital parameters of the Patients like heart rate, systolic and diastolic blood pressure were recorded at various timing. There was not much variation regarding those vital parameters among both groups (Table-II).

Table-II: Heart rate changes in both groups in pre, per and post-operative period.

Timing	Group A (n=30)	Group B (n=30)	P value (<0.05)
Pre-operative	78±4	76±6	0.039
At induction	82±8	84±9	
After 10 minutes	80±8	81±8	
After 20 minutes	76±6	77±8	
After 30 minutes	76±6	79±8	
At reversal	84±8	81±13	

Recovery score at different timing is shown in Table-III. Immediately after reversal recovery score for Group-A (Propofol group) and Group-B (Thiopental Sodium group) were 5.98±2.00 and 5.26±1.84 respectively. Scores were recorded after 5, 10, 20 and 30 minutes of reversal. In the end of the result the recovery score in Propofol group) and Thiopental group were 8.8±1.75 and 8.01±1.03 respectively after thirty minutes of reversal.

Table-III: Recovery score (SOCA) in both groups.

Timing	Group A (n=30)	Group B (n=30)	P value (<0.05)
At reversal	5.98±2.0	5.26±1.84	<0.047
After 5 mins	6.00±1.79	5.66±1.62	
After 10 mins	7.02±1.72	6.10±1.08	
After 20 mins	7.78±2.82	6.86±1.27	
After 30 mins	8.86±1.75	8.01±1.03	

Time for fitness to go home was recorded when patients were fulfilled the criteria for fitness to go home. It was about 4 hours 30 minutes and 5 hours

30 minutes for Group A (Propofol group) and Group B (Thiopental Sodium group) respectively (Table-IV).

Table-IV: Time for fitness to go home in both groups.

Group	Fitness to go home	P value
Group-A (n=30)	4 hours 30 minutes	0.98*
Group-B (n=30)	5 hours 30 minutes	

*Not Significant at p <0.05 between two groups

Cost of induction agents used during anaesthesia was about 340 taka per patient in Propofol group and about 120 taka per patient in Thiopental Sodium group. (Table-V).

Table-V: Cost of induction agents in both groups.

Group	Cost of induction agent (Taka per patient)	P value
Group-A (n=30)	340±20	0.027*
Group-B (n=30)	120±10	

*Significant at p <0.05 between two groups

Discussion:

Proper selection, planning & uneventful clear headed anaesthetic recovery are the hallmarks of fruitful day-case surgery. Many operations are performed at one-fifth cost of inpatients surgery if carried out on a day-case basis. These are economical when they come out safely with an early discharge[9,10,11].

This study was to find out a relatively safe and cost-effective recipe of induction agent, alternative to Propofol which is the choice in day-cases but quite expensive. So, during the comparison of Propofol and Thiopental Sodium, the variation in recovery scores and the time for fitness to go home between the two groups were almost similar[12]. Moreover, the perioperative vital parameters like heart rate, systolic and diastolic blood pressure deviations between the two groups were also similar. The addition of potent opioids tends to prolong the recovery, but Fentanyl up to 1.5 µgm/kg does not delay emergence when given immediately before induction[13].

Kumar et al. found Propofol produce less nausea, vomiting and fast induction & recovery[14]. Manjula and Nagaraja found that general recovery time was prolong in Thiopentone and in 20% cases it is >15 minutes. On the other hand, Propofol has better, shorter recovery time, but they complain about pain in corresponding vein during induction by propofol[15]. These findings are similar in this study.

In all the poor countries like Bangladesh, cost effectiveness is an influential consideration related to the health-care consumers along with other aspects. In this study, it was found that the expense for Propofol was 340±20 taka per patient. One ampule costing 260 Taka contains 200 mg of Propofol while the average requirement is 120±10 mg for induction. Rest of drug Propofol has to discard for its higher risk of contamination. So, actual expenditure per case goes higher due to system loss.

On the other hand, in Thiopental Sodium Group, the average cost of induction agents was 120±10 taka per patient. So, the cost of Propofol Group (BDT 120±10) was significantly lower (P<0.05) than that of Thiopental Sodium Group (BDT 340±20). Moreover, Thiopental Sodium remains stable for 24-36 hours after mixing and is permitted to use in several patients from multi-dose vials and thereby seems more economic[16,17].

In this study, hyponatraemia and hypochloraemia were more common than hypokalaemia and dyselectrolyteaemia was more common in haemorrhagic stroke (42.85%) than ischaemic stroke (31.80%). Similar findings were observed in study done by Kusuda et al[18].

Conclusion:

Both Propofol and Thiopental Sodium are widely used in day case surgery for induction of anaesthesia. Patients with Propofol having rapid induction and recovery which is a land mark of the day case anaesthesia but causes pain in vein, respiratory depression and bradycardia. On the other hand, Thiopental Sodium causes slow recovery and also respiratory depression. Regarding cost effectiveness induction by Thiopental Sodium is relatively cost effective than Propofol induction in day case anaesthesia [17,18].

Under the condition of present study, we could conclude that intravenous thiopental sodium induction in day case surgery is highly cost effective than Propofol without any significant changes in hemodynamics, recovery scores as well as time to ready to go home.

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