

## Original Research Article

# A Comparative Study of Sevoflurane with Halothane as Inhalational Anaesthetic Agent in Paediatric Patients

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**Abstract: Introduction:** Inhalational anaesthesia is commonly used in paediatric patients. The study was designed to compare sevoflurane and halothane anaesthesia in the neonate and paediatric patients and to assess the haemodynamic status of both agents during induction, maintenance and recovery of anaesthesia. **Material and Methods:** We studied 60 patients aged between 1 day to 7 years. All routine and emergency surgery were included. Children were randomly selected between two groups receiving halothane and sevoflurane. Induction time, intubating condition and haemodynamic changes were recorded. **Results:** Induction of anaesthesia was smooth in both groups but induction was smooth in the sevoflurane group. Maintenance of anaesthesia was smooth in both groups but recovery was rapid in the sevoflurane group. There was no unwanted side effect.

**Keywords:** Sevoflurane, Halothane, Anaesthesia, Induction, Intubation, Neonate, Paediatric.

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## INTRODUCTION

Induction and maintenance of anaesthesia in paediatric patients can be done, Using an inhalational method or intravenous method. Sevoflurane and halothane are inhalational anaesthetic agents used for general anaesthesia in paediatric patients. Halothane is a nonirritant inhalational anaesthetic agent, most commonly used for inhaled induction of anaesthesia in children, although its metabolites are sometimes fatal and may cause hepatitis<sup>1, 2</sup>. However, it exerts cardiac and hepatic side effects and causes delayed recovery. While sevoflurane is a newer anaesthetic agent and has several advantages over halothane. It has a low blood-gas solubility coefficient, which allows more rapid recovery and less myocardial depressant effect and is less extensively metabolised<sup>3, 4</sup>. It has a pleasant smell which is suitable for children.

## MATERIAL AND METHODS

As halothane and sevoflurane are commonly used inhalational anaesthetic agents they are safe for the

paediatric group. There is no need to take permission from the Institutional ethical committee. The study was conducted among 60 paediatric patients aged Between 1 day to 7 years. All routine and emergency surgery were included. This prospective comparative study was carried out in the department of anaesthesiology in Dhaka Shishu Hospital. All patients are healthy and no congenital anomaly was found in these patients. A detailed pre-anaesthetic checkup was done. The patients were kept nil by mouth for 6 hours as per ASA guidelines. The patients were randomly divided into two groups of 30 patients each. On arrival in the operation room, intravenous access was done. In the operation room theatre, standard monitoring devices like pulse Oximeter and ECG monitor were applied to the patient and baseline heart rate and SPO2 were measured. Each patient was pre oxygenated with 100% oxygen for 3 minutes with a face mask. Patients from group I (Sevoflurane) were induced in O<sub>2</sub>: H<sub>2</sub>O (50:50%) was a concentration of 2% and patients from group II (Halothane) were induced on O<sub>2</sub>: N<sub>2</sub> (50:50%) a with a concentration of 1%. After induction patients were intubated with an appropriate size plain

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endotracheal tube. After confirmation of air, the entry tube was fixed. The case of intubation and the number of attempts required for intubation were recorded.

**Statistical Analysis**

Statistical analysis was performed using the chi-square test. Data are presented as mean ± SD. P<0.05 was considered statistically significant.

**RESULTS**

60 patients in the age group 1 day to 10 years were included in the study out of which belongs to the sevoflurane group and 30 belongs to the halothane group. There were differences between the two groups

in patient age, sex and physical status and weight. The type of surgery performed is shown in Table-1. Induction of anaesthesia was smooth and there is no clinical significant unwanted effect. Induction of anaesthesia was smooth in both groups but induction was faster in the sevoflurane group as compared with the halothane group and which was highly significant (p-value) during induction, we observe a fall in heart rate in both the groups but a significant fall in halothane group. Maintenance of anaesthesia was satisfactory in both groups, but recovery was more rapid in the sevoflurane (521.30±62) than halothane (718.32±72.69) group. None of the patients experienced any side effects.

**Table-1: Demographic Data of the Paediatric Patient**

Age	Group-I	Group-II	P-Value
29 day ≤ 1 year	10	10	P>0.05 NS
> 1 year – 4 year	10	10	
> 4 year – 7 year	10	10	
Male/Female	14/16	13/17	
Weight 1 kg – 10 kg	14	15	
11 kg – 20 kg	16	15	

**Table-2: Type of Surgeries**

Serial No	Type of Surgeries	Group - I	Group - II
1	Herniotomy	5	3
2	Hypospadias Repair	3	5
3	Orchidopexy	5	5
4	Anoplasty	2	2
5	Colostomy Closure	3	4
6	Colostomy	1	2
7	Ventriculoperitoneal Shunt	3	2
8	Pyloromyotomy	2	2
9	Undescent Testis	3	2
10	Diaphragmatic Hernia	3	2

**Table-3: Type of Surgeries**

Complications	Halothane	Sevoflurane
Breath Holding	2	-
Cough	1	1
Laryngospasm	2	1
Increased Secretion		
Bradycardia	2	-

**Table-4: Emergence Condition**

	Halothane	Sevoflurane
Nausea and Vomiting	1	1
Agitation	2	9
Abnormal Excitatory		
Movement	0	5

**Table-5: Induction and Recovery Time**

Parameters Second	Group – I (Mean ± SD)	Group – II (Mean ± SD)	P-Value
Induction Time	90.52 ± 6.70	120.87 ± 5.70	< 0.05
Recovery Time	521.30 ± 62.00	718.32 ± 72.69	<0.05

## DISCUSSION

Using an inhalational anaesthetic agent, for induction and maintenance of anaesthesia, there is rapid and smooth induction and recovery and hemodynamic stability. Halothane has negligible pungency and less effect on airway reactivity for this reason it is a good choice for paediatric anaesthesia. Sevoflurane has low blood gas solubility which allows rapid induction and early emergence. We use old inhalational agent halothane and newer agent sevoflurane for induction and maintenance of anaesthesia in remote and paediatric patients. These two agents were compared in regards to induction time and characteristics, hemodynamic changes recovery chance characteristics and side effects. The time to loss of eyelash reflex (induction time-1) was significantly shorter in the sevoflurane group as compared to the halothane group. Induction time is shorter in the sevoflurane group than halothane group. The incidence of intraoperative complications like breath-holding and cough was observed more with halothane anaesthesia. Intubating conditions were satisfactory in both groups in the majority of cases. We found similar results of intubating conditions in study done by V.N Swadia Nantu Patel. Postoperative reason and vomiting was less sevoflurane group than halothane group. We concluded that sevoflurane is the most suitable agent for paediatric age groups because of its rapid induction and recovery few intraoperative and postoperative complications and no risk of repented sevoflurane exposure to patients.

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