

Comparative Study of Isoflurane and Sevoflurane as an Inducing Agent in Paediatric Group

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Abstract

In the present study pediatric patients of ASA g-1 & ASA-II were selected and divided in two groups each consisting of 30 patients. Induction done by Isoflurane is labelled as "Group-A" and sevoflurane as "Group-B".

The aim of study was to compare the induction and emergence from anaesthesia, complications during induction and post operative period and haemodynamic stability intraoperatively, In the present study, It was observed that mean pulse rate remain stable in sevoflurane and increased in isoflurane.

The mean induction time for isoflurane was 130 seconds as compared to sevoflurane 106 seconds. The complications like bradycardia, hypotension were more with sevoflurane, whereas breathholding, coughing, laryngospasm and salivation were more in isoflurane. In sevoflurane mean recovery time was 84 seconds and in isoflurane it was 110 seconds.

Postoperative pain and crying was same in both groups. In conclusion, induction and emergence from sevoflurane is rapid and pleasant than isoflurane.

Keywords: Anaesthesia; General Paediatrics; Induction Agent; Sevoflurane; Isoflurane.

Introduction

In paediatric age group, anaesthesiologist usually prefer anaesthetic techniques more likely to be associated with a rapid induction and emergence such type of induction is fulfilled by inhalational anaesthesia: halothane, isoflurane and sevoflurane anaesthetic agents. In this study we have studied to evaluate the use for induction and emergence from anaesthesia, complication during induction and postoperative period and haemodynamic stability. Sevoflurane is a newer inhalational inducing agent of anaesthesia, this is because of its low blood gas solubility, more depth of anesthesia, less airway irritation and profound respiratory depression with maintained cardiovascular stability.

Methods

Patients of physical status as a grade I & II undergoing elective surgical procedures like fluid hernia, appendicitis, circumcision and cleft lips of age 4 to 5 years were selected and divided into two groups and were labelled as group 'A' and group 'B'. Informed consent was obtained preoperatively. All patients were premedicated with Inj Glycopyrollate 0.004

mg/kg before induction. In group "A", induction was done with 50% O₂, 50% N₂O and isoflurane and in group "B" induction was done with 50% O₂, 50% N₂O and sevoflurane by using modified Jackson Rees Circuit. Induction in group A was carried out by increasing the concentration of isoflurane from 0.5 to 3 to 3.5% while the group 'B' the concentration of sevoflurane was increased from 1% to 5-6% in a stepwise manner till loss of eyelid and eyelash reflexes with maintained regular breathing.

The time required for induction of anaesthesia was noted and patients were observed for complications like breathholding, coughing, laryngospasm, salivation, tachycardia, bradycardia and hypotension. All patients were intubated under the effect of inj. i.v. succinylcholine 2 mg/kg. Maintenance of anaesthesia was done with 50% O₂, 50% N₂O and isoflurane 1 to 1.5% and sevoflurane 2 to 2.5% with controlled ventilation. The long acting muscle relaxant was

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not given because time required for operative procedures was very short, it was 20 to 25 min. Intraoperative monitoring of pulse, blood pressure, SPO₂ and ETCO₂ was done. At the end of surgery, isoflurane, sevoflurane and N₂O stopped and patients were observed for time required for recovery.

Postoperatively temperature, pulse, blood pressure, SPO₂, ETCO₂ noted and patients were also observed for complications like nausea, vomiting, pain, crying, respiratory movements, hypothermia, shivering and cyanosis.

Observation

Table 1: Demographic Comparison of two groups

Sr. No.	Name of drug	Age in Years	Sex		Weight (kg)
			Male	Female	
1	Group A (Isoflurane)	4-5	20	10	10-14
2	Group B (Sevoflurane)	4-5	20	10	10-14

Table 2: Showing incidence of various complication during

Sr. No.	Group A (Isoflurane)	Group B (Sevoflurane)	Complication
	Number/Percentage	Number/Percentage	
1	6 (20%)	1 (3.33%)	Breath holding
2	2 (6.66%)	0 (0.0%)	Coughing
3	7 (20.33%)	5 (16.66%)	Salivation
4	1 (3.33%)	4 (13.33%)	Bradycardia
5	4 (13.33%)	0 (0.0%)	Tachycardia
6	1 (3.33%)	3 (10%)	Hypotension
7	3 (10%)	0 (0.0%)	Laryngospasm

Table 3: Showing statistical changes in mean induction time

Sr. No.	Name of Drug	Mean Induction time (Seconds)	S. D.	t Value	p Value
1	Group A (Isoflurane)	130	+/- 20.30	4.20	P < 0.01
2	Group B (Sevoflurane)	106	+/- 12.20		

Table 4: Showing statistical changes in mean recovery time

Sr. No.	Name of Drug	Mean Recovery time (Seconds)	S. D.	t Value	p Value
1	Group A (Isoflurane)	110	+/- 30.20	3.99	P < 0.01
2	Group (Sevoflurane)	84	+/- 22.40		

Results

In this study 60 patients were compared in respect with age, sex and body weight (Table 1). Table 2 showing the incidence of respiratory complications like breathholding, coughing and laryngospasm during the induction were higher in the isoflurane group whereas bradycardia and hypotension were more with sevoflurane group.

The mean induction time with isoflurane was 130 (+/- 20.30) sec. and in sevoflurane was 106 (+/- 12.20) sec. Induction was faster with sevoflurane as compared to isoflurane which was highly significant statistically (P < 0.01) (Table 3). In sevoflurane group mean pulse rate/min remain stable and in isoflurane group mean pulse rate/min. increase which was

statistically significant (P < 0.05). In sevoflurane group mean arterial pressure decreased and in isoflurane group, there was no significant change in mean arterial pressure which was statistically highly significant (P < 0.01). No significant changes in arterial oxygen saturation (SPO₂) were noted in both groups. Mean recovery time in sevoflurane was 84 (+/- 22.40) which was shorter than isoflurane group. 110 (+/- 30.20) sec and was statistically highly significant (P < 0.01) (Table 4).

Discussion

Inhalation induction by mask is the commonly used technique in paediatric anaesthesia because it can be achieved relatively easily and rapidly in most

children. Sevoflurane is one of the newer addition to inhalational anaesthesia agents and its use as induction agent is well documented in children.

In this study group sevoflurane was well accepted by 29 patients. (96.67%). The significantly short induction time (106 +/- 12.20 sec.) was the main advantage. While in isoflurane group 6 in 30 patients started breathing, 2 patients coughing, 7 salivation, 1 bradycardia, 4 tachycardia and 1 hypotension as compared to sevoflurane, 1 in 30 patients started breath holding, 5 salivation, 4 bradycardia and 3 patients hypotension. 3 in 30 patients in isoflurane had laryngospasm. So mask was kept away from the face and slowly brought closer and the concentration of isoflurane was gradually increased which look significantly longer induction time. (130 +/- 20.30 sec.)

Dash field et al, sloan MH et al, had quoted induction time of 54 sec and 34 sec. respectively. They had taken children in the age group of 7 years and above could easily follow the command for single breath vital capacity induction. In this study group age was 4 to 5 years and weight was 10-14kg, so explanation of the methodology for single breath vital capacity induction was not possible. The induction of anaesthesia was smooth in sevoflurane group. The incidence of coughing (6.66%) and laryngospasm (10%) was noted in isoflurane group which is similar to the result obtained by Dashfield et al.

Sevoflurane did not alter the heart rate and it remained stable and unchanged from awake baseline throughout anaesthetic period and even lower heart rates were noticed compared with isoflurane. 4 Patients developed, bradycardia, but it returned to normal after decreasing the concentration of sevoflurane. Same findings described by Ebert TJ et al. In sevoflurane group mean arterial pressure decrease more than isoflurane group. Ebert TJ et al showed that sevoflurane decreased blood pressure to a greater extent than did isoflurane. Mean recovery time in sevoflurane was 84 +/- 22.40 sec and in isoflurane 110 +/- 30.20 sec. Frink EJ et al found that more rapid emergence occurred after sevoflurane anaesthesia (7.5 min) compared with isoflurane

anaesthesia (18.6 min.) From the present study it is concluded that induction and emergence from sevoflurane anaesthesia is rapid and pleasant and is associated with less complications like breathholding, laryngospasm, coughing as compared with isoflurane anaesthesia.

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