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Research Article

Comparison of Sevoflurane and Halothane for Induction of Anesthesia and Laryngeal Mask Airway Insertion in Pediatric Patients: A Tertiary Care Experience

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- Halothane
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Abstract

Introduction: Inhalational anaesthesia is the preferred technique of induction in the pediatric age group. Halothane with its negligible pungency and minimal effects on airway reactivity has been the cornerstone of pediatric inhalational induction despite its propensity to cause bradycardia, hypotension and arrhythmias. Sevoflurane with low blood gas solubility allows rapid induction and early emergence. Due to its pleasant odor, it is non-irritant to the airway which makes it an attractive alternative for inhalational induction in children.

Objective: To compare the induction characteristics and ease of laryngeal mask airway insertion with halothane and sevoflurane in pediatric patients.

Material and methods: This prospective observational study was conducted in Postgraduate Department of Anesthesiology and Critical Care, Government Medical College, Srinagar and associated hospitals. A total of 100 patients were studied. Patients receiving halothane designated "H" were compared with patients receiving sevoflurane designated "S". Patients in the age group of 1-12 years belonging to ASA I and II undergoing short elective operative procedures under general anesthesia were included in the study. In patients receiving halothane, the inspired concentration was set at 0.5% initially followed by stepwise increase of 0.5% every 3 to 4 breaths up to a maximum of 3.5% until the loss of eyelash reflex occurred. In patients receiving sevoflurane, the inspired concentration was set at 1% initially and increased gradually by 1% up to a maximum of 6% until the loss of eyelash reflex occurred. Proper size Laryngeal Mask Airway- proseal was inserted using standard technique when eyeballs were centralized and the jaw was relaxed.

Results: The two groups were comparable in terms of age, weight, sex distribution, ASA status and surgical procedure performed. The difference was not statistically significant ($p > 0.05$). The time required from the onset of induction to centralization of eyeballs was 252.26s and 166.62s for the group H and group S respectively. The difference was statistically significant between the two groups ($p < 0.001$). In both the groups, condition at LMA insertion and patient response were found satisfactory, LMA was inserted successfully in first attempt in 49 patients in group H and 47 patients in group S. Full jaw opening was achieved in 48 patients in group H and 49 patients in group S at the time of LMA insertion. There was a gradual decrease in mean heart rate in group H during the course of induction with clinically significant bradycardia in 4 patients. Similarly, there was decrease in mean heart rate in group S with clinically significant bradycardia in 1 patient. The reduction in mean heart rate was pronounced in group H. The difference was statistically significant. There was decrease in both systolic and diastolic blood pressure before LMA insertion and 1, 3, 5 min after insertion in both the groups. The difference was statistically significant ($p < 0.001$). However, there was slight increase in systolic/diastolic blood pressure at the time of LMA insertion in both the groups.

Conclusion: Sevoflurane was an excellent agent for inhalational anaesthesia and suitable alternative to halothane in children. It had a short induction time, rapid emergence, low incidence of airway complications or other intraoperative or postoperative side effects and better hemodynamic stability.

INTRODUCTION

Inhalational anaesthesia is the preferred technique of induction in the pediatric age group. Halothane with its negligible pungency and minimal effects on airway reactivity has been the cornerstone of pediatric inhalational induction despite its propensity to cause bradycardia, hypotension and arrhythmias. Continued research to manufacture an inhalational agent which would match the induction properties of halothane, with minimal cardiac and hepatic side effects and requiring lesser time for induction and emergence led to the introduction of sevoflurane. Sevoflurane with low blood gas solubility allows rapid induction and early emergence [1]. Due to its pleasant odor, it is non-irritant to the airway which makes it an attractive alternative

for inhalational induction in children [2,3]. An area where sevoflurane might be expected to find increasing use is that of laryngeal mask airway (LMA) insertion which is becoming more frequent in pediatric ambulatory surgery as this avoids some of the hazards of endotracheal intubation.

Anesthetic management of pediatric age group is unique because these patients are more vulnerable to anesthetic complications and thus need a special consideration. Safe anesthetic management depends upon full appreciation and understanding of physiological, anatomical and pharmacological characteristics of each age group [4].

The benefits of anaesthesia in children include alleviation of pain, anxiety, maintaining stable vital signs and providing adequate conditions for surgery. These benefits have resulted in an exponential increase in the number of anesthetics administered to children in many different settings, for varied surgical procedures and to children of increasingly younger age [5].

The two methods for induction of General Anaesthesia in children include intravenous and inhalational techniques. However, inhalational anaesthesia is a preferred anesthetic technique of induction in pediatric age group [6]. Whether used for induction or maintenance of anaesthesia inhalational anesthetics are pervasive because they are effective, reliable, safe, easy to deliver, stable and without end organ sequelae [7].

Even though painless intravenous cannulation is possible, inhalational induction of anaesthesia remains a fundamental technique in pediatric anaesthesia. Children prefer to avoid injections, and intravenous cannulation in awake small infants is often difficult. Unfortunately, induction by inhaling halothane causes many children to cry, because of its odour. Sevoflurane not only has a slightly sweet smell but is also rapidly effective because of its low blood gas solubility coefficient (0.6) and the lack of airway irritation. It has a low blood gas solubility which allows rapid induction and early emergence [7]. Owing to its pleasant odour and non-irritant chemical nature and bronchodilatation, it is an alternative volatile anesthetic agent of choice for induction in children [8,9].

MATERIALS AND METHODS

The aim of present study was to compare the induction characteristics and ease of laryngeal mask airway insertion with halothane and sevoflurane in pediatric patients.

Study design: Prospective Observational Study

Study area: Postgraduate Department Of Anesthesiology and Critical Care, Government Medical College, Srinagar and associated Hospitals after obtaining approval from Institutional Ethical Committee.

Study population: A total of 100 patients were studied. Patients receiving halothane designated "H" were compared with patients receiving sevoflurane designated "S".

Study duration: The study was conducted from July 2015 to December 2017

Inclusion criteria: Patients in the age group of 1- 12 years belonging to ASA I and II undergoes short elective operative procedures under general anaesthesia.

Exclusion criteria: The fallowing patients were excluded from our study

a. ASA III and above

b. Patient's attendant refusal.

c. Patients with anticipated difficult airway.

d. Any contraindication to drugs under study.

e. Short surgical procedures which cannot be done using LMA.

All the patients included in the study were pre-medicated with Injection glycopyrollate 6mcg/kg (im) and syrup Triclofos 20mg/kg (orally) one hour before surgery.

Anaesthesia was induced using face mask of appropriate size and Jackson-Rees circuit or non-rebeathing circuit as per the weight of the patient, with 50% nitrous oxide in 50% oxygen and incremental concentrations of the volatile anesthetic agent to be studied.

In patients receiving halothane, the inspired concentration was set at 0.5% initially followed by stepwise increase of 0.5% every 3 to 4 breaths up to a maximum of 3.5% until the loss of eyelash reflex occurred. In patients receiving sevoflurane the inspired concentration was set at 1% initially and increased gradually by 1% up to a maximum of 6% until the loss of eyelash reflex occurred.

Struggling score [10] till the loss of eye lash reflex (struggling score 0 – No movement, 1 – head movement, 2-Head and limb movement, 3-severe struggle), time of loss of eyelash reflex, time of onset of regular respiration, time of centralization of eyeballs and time of adequate jaw relaxation was noted in every patient.

Proper size LMA- proseal was inserted using standard technique when eyeballs were centralized and the jaw was relaxed.

The hemodynamic parameters were recorded as follows:

- Baseline
- Immediately before induction
- Immediately before insertion of LMA
- 1 minute after insertion of LMA
- 3, 5 and 10 minutes after insertion of LMA

Complications were noted and treated immediately.

At the time of LMA insertion the following parameters were noted:

- Jaw opening: Full-3, Partial-2, Nil-1
- Ease of insertion: Easy-3, Difficult-2,Impossible-1
- Number of attempts.
- Limb/head movements: nil-3, slight-2, gross-1
- Coughing: nil-3, slight-2, gross-1

- Phonation
- Need for tracheal intubation.

STATISTICAL ANALYSIS

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were summarized in the form of means and standard deviations and categorical variables were expressed as frequencies and percentages. Student's independent t-test was employed for comparing continuous variables. Chi-square test or Fisher's exact test, whichever appropriate, was applied for comparing categorical variables. A P-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 100 patients were studied. Patients receiving halothane designated "H" were compared with patients receiving sevoflurane designated "S". The following observations were made

Demographic characteristics

Out of a total of 100 patients studied, the mean age of patients in group H was 3.15 and in group S it was 3.11 years as shown in Table 1

Weight

The mean weight in kilograms of patients in our study was 15.06 kgs in group H and 15.21kgs in group S as shown in Table 2

Sex distribution

There were 40 (80%) male patients in group H and 10 (20%) female patients in group H. Similarly, 38 (76%) and 12 (24%) male and female patients respectively were in group S as shown in Table 3

ASA class (American Society of Anesthesiologists)

48 (96%) patients in group H and 47 (94%) in group S, had ASA I status, 2 (4%) and 3 (6%) patients had ASA II status in Group H and group S respectively as shown in Table 4

Type of surgery

When we distributed patients as per surgical procedures, Orchidopexy was done in 16 (32%) and 14 (28%) patients in group H and group S respectively. Herniotomy was done in 12 (24%) patients in group H and 16 (32%) in group S. Herniotomy with circumcision was done in 5 (10%) and 2 (4%) patients followed by hydrocele repair in 5 (10%) and 4 (8%) patients respectively. Corneal tear repair, corneal suture removal, debridement, lipoma excision and scrotal trauma were the other surgical procedures done in our study (Table 5).

Table 1: Mean age (years) among two groups.

Age (years)	Number	Mean	SD	p value
Group H	50	3.15	1.358	0.896
Group S	50	3.11	1.385	

SD: Standard Deviation; S: Sevoflurane Group; H: Halothane Group

Table 2: Mean weight (years) among two groups.

Weight (Kg)	Number	Mean	SD	P-value
Group H	50	15.06	2.543	0.937
Group S	50	15.21	2.543	

SD: Standard Deviation; S: Sevoflurane Group; H: Halothane Group

Heart rate

The mean heart rate (beats/min) in both the groups before induction was 132.34 ± 3.55 (Group H) and 131.36 + 3.71 (Group S). Before LMA insertion the mean heart rate in group H was 121.30 3.74 and in group S it was 128.22 + 3.57. At LMA insertion the heart rate in group H was 125.28 + 4.04 and in group S it was 129.60 + 3.92. The heart rate at 1 minute, 3 minutes and 5 minutes after insertion was 113.54 + 4.18, 108.08 + 2.92 and 105.12 + 4.08 in group S and in group H it was 127.34 + 3.59, 125.08 + 3.58 and 122.36 + 3.72 respectively (Table 6, Figure 1)

Systolic blood pressure

The mean systolic blood pressure [SBP] (mmHg) in both the studied groups before induction was 101.54 + 3.30 (Group H) and 102.28 + 3.25 (Group S). Before LMA insertion the SBP in group H was 94.18 + 2.78 and in group S it was 99.12 + 3.34. At LMA insertion the mean SBP in group H was 96.34 + 3.59 and in group S it was 101.46 + 3.25. The SBP at 1 minute, 3 minutes and 5 minutes after insertion was 88.08 + 3.36, 85.08 + 3.06 and 82.46 + 3.01 in group S and in group H it was 97.82 + 2.70, 95.48 + 2.76 and 92.90 + 2.96 respectively (Table 7, Figure 2).

Diastolic blood pressure

The mean diastolic blood pressure [DBP] (mmHg) in both the studied groups before induction was 70.22 + 2.63 (Group H) and 70.78 + 2.76 (Group S). Before LMA insertion the DBP in group H was 67.28 + 2.66 and in group S it was 69.22 + 2.63. At LMA insertion the mean DBP in group H was 68.48 + 2.84 and in group S it was 69.80 + 2.62. The DBP at 1 minute, 3 minutes and 5 minutes after insertion was 63.48 + 3.17, 61.92 + 3.53 and 60.42 + 3.59 in group S and in group H it was 67.58 + 3.01, 65.92 + 2.83 and 64.72 + 2.64 respectively (Table 8, Figure 3).

Oxygen saturation

The mean oxygen saturation, SpO_2 (%) in both the studied groups before induction was 98.82 + 1.10 (Group H) and 98.76 + 1.10 (Group S). Before LMA insertion the SpO_2 in group H was 99.20 + 0.83 and in group S, it was 99.10 + 0.89. At LMA insertion the mean SpO_2 in group H was 99.12 + 0.98 and in group S it was 99.10 + 1.06. The SpO_2 at 1 minute, 3 minutes and 5 minutes after insertion was 98.64 + 0.84, 90.92 + 3.53 and 60.42 + 3.59 in group S and in group H it was 67.58 + 3.01, 65.92 + 2.83 and 64.72 + 2.64 respectively (Table 9).

Start of induction to onset of regular respiration (in seconds)

The mean time required from start of induction to onset of regular respiration (seconds) in group H was 79.08 + 10.66 and in group S was 43.24 + 11.4. The results were statistically

Table 3: Gender distribution of study patients among two groups.

Gender	Group H		Group S		p value
	No.	%age	No.	%age	
Male	40	80	38	76	0.629
Female	10	20	12	24	
Total	50	100	50	100	

H: Halothane Group; S: Sevofurane Group

Table 4: Distribution of study patients as per ASA among two groups.

ASA	Group H		Group S		P-value
	No.	%age	No.	%age	
ASA I	48	96	47	94	0.646
ASA II	2	4	3	6	
Total	50	100	50	100	

ASA: American Society of Anesthseiogists; H: Halothane Group; S: Sevoflurane Group

Table 5: Distribution of study patients as per surgical procedure among two groups.

Surgical Procedure	Group H		Group S		P value
	No.	%age	No.	%age	
Orchiopexy	16	32	14	28	0.964
Herniotomy	12	24	16	32	
Herniotomy with Circumcision	5	10	2	4	
Hydrocele Repair	5	10	4	8	
Corneal Tear Repair	4	8	4	8	
Corneal Suture Removal	3	6	4	8	
Debridment	2	4	3	6	
Lipoma Excision	2	4	2	4	
Scrotal Trauma	1	2	1	2	
Total	50	100	50	100	

H: Halothane Group; S: Sevoflurane Group

Table 6: Changes in heart rate among two groups at various intervals of time.

Heart Rate (Beats/min)	Group H		Group S		P-value
	Mean	SD	Mean	SD	
Before Induction	132.34	3.55	131.36	3.71	0.180
Before LMA Insertion	121.30	3.74	128.22	3.57	<0.001*
At LMA Insertion	125.28	4.04	129.60	3.92	<0.001*
1MinAfter Insertion	113.54	4.18	127.34	3.59	<0.001*
3 Min After Insertion	108.08	2.92	125.08	3.58	<0.001*
5 Min After Insertion	105.12	4.08	122.36	3.72	<0.001*

*Statistically Significant Difference (P-value <0.05), SD: Standard Deviation; LMA: Laryngeal Mask Airway

significant with a p value of < 0.05 (Table 10)

Start of induction to loss of eye lash reflex (in seconds)

The mean time required from the start of induction to loss of eye lash reflex (seconds) in group H was 109.28 + 10.57 and in group S was 72.64 + 11.30. The results were statistically significant with a p value of < 0.05 (Table 11)

Start of induction to jaw relaxation (in seconds)

The mean time required from start of induction to jaw relaxation (seconds) in group H was 235.90 + 17.64 and in group S was 149.76 + 17.68. The results were statistically significant

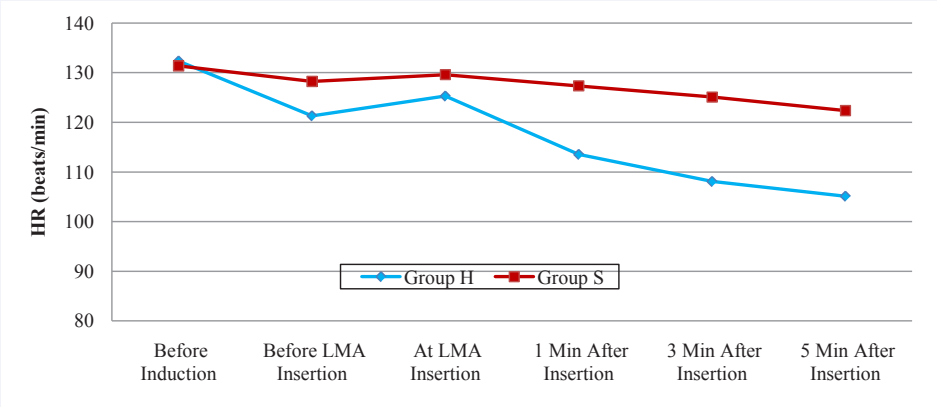

Figure 1 Changes in heart rate (beats/min) among two groups at various intervals of time.

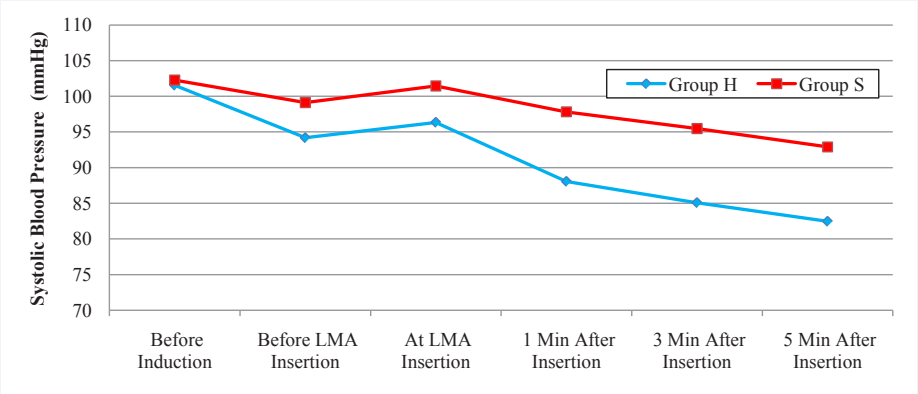

Figure 2 Changes in SBP (mmHg) among two groups at various intervals of time.

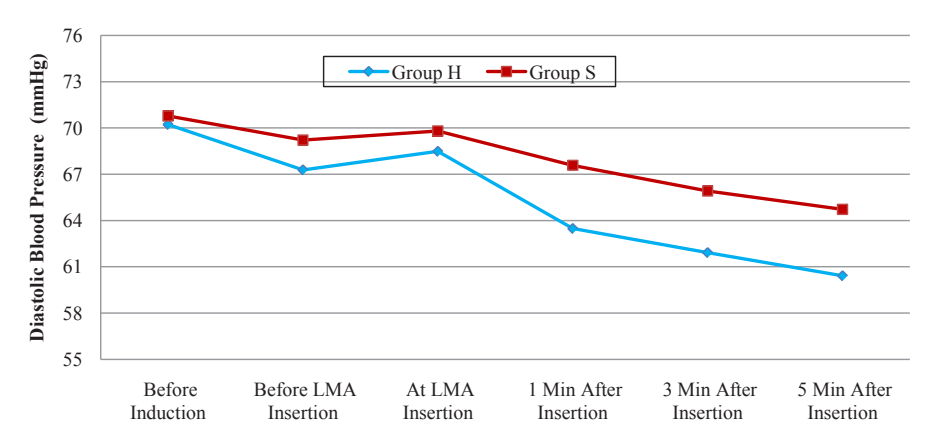

Figure 3 Changes in DBP (mmHg) among two groups at various intervals of time.

with a p value of < 0.05 (Table 12)

Start of induction to centralization of eye balls (in seconds)

The mean time required from start of induction to centralization of eye balls (seconds) in group H was 252.26 + 17.10 and in group S was 166.62 + 17.93. The results were statistically significant with a p value of < 0.05 (Table 13)

DISCUSSION

Traditionally halothane has been a corner stone of pediatric inhalational induction despite its slightly pungent smell and

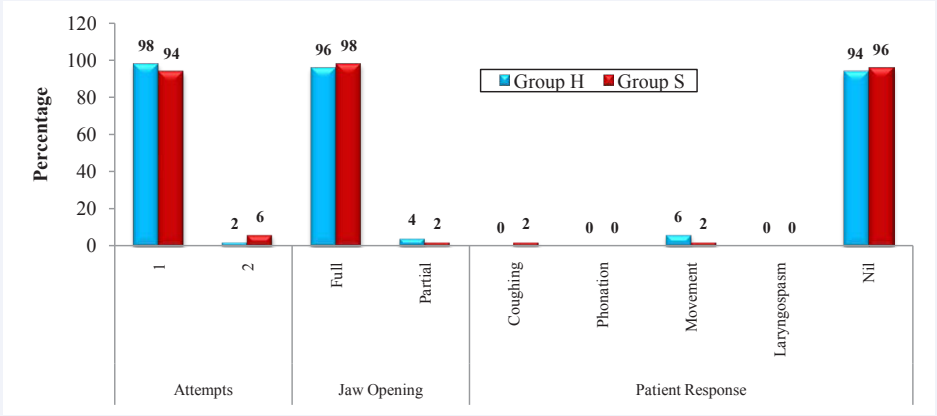

Figure 4 Conditions at LMA insertion and patient response among two groups.

Table 7: Changes in systolic blood pressure (mmHg) among two groups at various intervals of time.

SBP (mmHg)	Group H		Group S		P-value
	Mean	SD	Mean	SD	
SBP Before Induction	101.54	3.30	102.28	3.25	0.261
SBP Before LMA Insertion	94.18	2.78	99.12	3.34	<0.001*
SBP At LMA Insertion	96.34	3.59	101.46	3.25	<0.001*
SBP 1 Min After Insertion	88.06	3.36	97.82	2.70	<0.001*
SBP 3 Min After Insertion	85.08	3.06	95.48	2.76	<0.001*
SBP 5 Min After Insertion	82.46	3.01	92.90	2.96	<0.001*

*Statistically Significant Difference (P-value<0.05); SD: Standard Deviation; SBP: Systolic Blood Pressure

Table 8: Changes in diastolic blood pressure (mmHg) among two groups at various intervals of time.

DBP (mmHg)	Group H		Group S		P-value
	Mean	SD	Mean	SD	
DBP Before Induction	70.22	2.63	70.78	2.76	0.301
DBP Before LMA Insertion	67.28	2.66	69.22	2.63	<0.001*
DBP At LMA Insertion	68.48	2.84	69.80	2.62	0.017*
DBP 1 Min After Insertion	63.48	3.17	67.58	3.01	<0.001*
DBP 3 Min After Insertion	61.92	3.53	65.92	2.83	<0.001*
DBP 5 Min After Insertion	60.42	3.59	64.72	2.64	<0.001*

*Statistically Significant Difference (P-value<0.05), SD: Standard Deviation, H: Halothane Group; S:Sevoflurane

Table 9: Changes in SpO_2 (%) among two groups at various intervals of time.

SPo2 (%)	Group H		Group S		P-value
	MEAN	SD	MEAN	SD	
SPo_2 Before Induction	98.82	1.10	98.76	1.10	0.786
SPo_2 Before LMA Insertion	99.20	0.83	99.10	0.89	0.562
SPo_2 At LMA Insertion	99.12	0.98	99.10	1.05	0.922
SPo_2 1 Min After Insertion	98.64	1.12	98.60	1.11	0.858
SPo_2 3 Min After Insertion	98.84	0.98	98.80	0.97	0.838
SPo_2 5 Min After Insertion	99.08	0.99	99.02	0.96	0.758

SD: Standard Deviation; H: Halothane Group; S: Sevoflurane Group

propensity to cause bradycardia, hypotension and arrhythmias. Sevoflurane which is a recent addition to the inhalational agents with lack of pungency, low blood gas solubility and limited cardio respiratory side effects, is a desirable and suitable alternative for use in infants and children [1,11].

In our study there was no significant difference between two groups as far as baseline parameters like age, gender, weight, ASA class and surgical procedure were concerned.

In order to ease out parenteral separation besides averting complications like laryngospasm, bronchospasm and excitement a sedative premedication was used by Black et al., and Piot et al., [2,12]. In the present study Syrup Triclofos at a dose of 20mg/kg was given 1 hr before induction as a premedication in both the groups. About 70% of the patients did not get sedated however acceptance of mask was comparatively better in sedated patients than in non-sedated patients. Overall there was no significant effect of sedation on outcome of induction. Injection Glycopyrolate 6mcg/kg (im) was also used 1 hour prior to induction as a premedication for decreasing the secretions in both the groups.

In our study induction with halothane was started as 0.5% and increased stepwise by 0.5% every 3 to 4 breaths till the loss of eye lash reflex to a maximum of 3.5% in 50:50 oxygen and nitrous oxide, while sevoflurane was started at 1% and increased gradually to a maximum of 6% until the loss of eyelash reflex. This was done to obtain comparative values in terms of MAC for both halothane and sevoflurane respectively. Black et al. [2], had also used increments of 0.5 to 1% to a maximum of 5% for halothane and 1.5 to 2% increment to a maximum of 7% for sevoflurance in their study. Gradual increase in concentration was carried out in our study to avoid excitement phase of induction. Sigston PE et al. [3], used 8% sevoflurane after priming the circuit with sevoflurane which resulted in faster induction but it was associated with a considerable amount of excitement and adverse airway reaction. We did not encounter any case of excitement or any adverse airway reaction in our stepwise incremental strategy.

In our study a struggling score of 2 was observed in 3 patients receiving halothane and a struggling score of 1 was observed in 1 patient receiving sevoflurane. Similar results were seen by Sigston PE et al. [3], who found sevoflurane as more pleasant inhalational agent.

Due to low blood gas solubility of sevoflurane, induction is faster with sevoflurane when compared with halothane. Time of loss of eyelash reflex, time of onset of regular respiration, time of adequate jaw relaxation, time of centralization of eye balls was uniformly lesser in sevoflurane group than in halothane group.

Mean time required for loss of eyelash reflex was 109.28 for group “H” and 72.68 for group “S”. The difference observed between the two study groups was statistically significant (p value < 0.001). Similar results were noted by Black et al. [2], where sevoflurane caused a loss of eyelash reflex more quickly than halothane by approximately 40 seconds.

Table 10: Start of induction to onset of regular respiration (seconds) among two groups.

Group	Mean	SD	Range	P-value
Group H	79.08	10.66	61-96	<0.001*
Group S	43.24	11.40	24-63	

*Statistically Significant Difference (P-value <0.05), SD: Standard Deviation

Table 11: Start of induction to loss of eye lash reflex (seconds) among two groups.

Group	Mean	SD	Range	P-value
Group H	109.28	10.57	91-126	<0.001*
Group S	72.64	11.30	53-92	

*Statistically Significant Difference (P-value<0.05); SD: Standard Deviation; H: Halothane Group; S: Sevoflurane Group

Table 12: Comparison based on start of induction to jaw relaxation (seconds) among two groups.

Group	Mean	SD	Range	P-value
Group H	235.90	17.64	201-265	<0.001*
Group S	149.76	17.68	121-178	

*Statistically Significant Difference (P-value<0.05) SD: Standard Deviation; H: Halothane Group; S:Sevoflurane group

Table 13: Comparison based on start of induction to centralization of eye balls (seconds) among two groups

Group	Mean	SD	Range	P-value
Group H	252.26	17.10	218-282	<0.001*
Group S	166.62	17.93	137-196	

*Statistically Significant Difference (P-value<0.05); SD: Standard Deviation; H: Halothane Group; S: Sevoflurane Group.
Conditions at LMA insertion and patient response

Table 14: Conditions at LMA insertion and patient response among two groups.

Parameter		Group H		Group S		P-value
		No.	%age	No.	%age	
Attempts	1	49	98	47	94	0.617
	2	1	2	3	6	
Jaw Opening	Full	48	96	49	98	1.000
	Partial	2	4	1	2	
	Nil	-	-	-	-	
Patient Response	Coughing	0	0	1	2	0.646
	Phonation	0	0	0	0	
	Movement	3	6	1	2	
	Laryngospasm	0	0	0	0	
	Nil	47	94	48	96	

H: Halothane Group; S: Sevoflurane Group

Mean time required for jaw relaxation was 235.90 seconds for group H and 149.76 seconds for group S. The difference observed was statistically significant with p value <0.001. Similar findings were observed by Dr. Kajal N Dedhia et al. [13], in their study.

Centralization of eye ball was considered to be the end point of LMA insertion in our study. Mean time for centralization of eyeball was 252.26 seconds for group H and 166.62 seconds for group S. The difference observed between the two groups was statistically significant (p value < 0.001). Dr. Kajal N Dedhia et al. [13], in their study also found induction with sevoflurane to be faster (164.8 + 39.73) than halothane (249.83 + 40.58) with a p value of < 0.001. Black et al. [2], also found that time required for centralization of eye balls was faster with sevoflurane.

In the present study, successful LMA insertion was achieved in the first attempt in 49 and 47 patients in group H and group S respectively. The difference observed between the two groups was statistically insignificant (p value 0.617). Manish Patel et al. [14], in their study observed that all patients in sevoflurane group were incubated in first attempt whereas in Halothane group 90% of patients were incubated in first attempt and rest in second attempt.

In the present study, the mean baseline heart rates of the two groups before induction were comparable and the difference was not statistically significant (group H 32.34, group S 131.36, p value 0.180). The mean heart rate before LMA insertion and 1 min, 3 min, 5 min after insertion was less in group H as compared to group S. The differences between the mean heart rate of the two groups were statistically significant before LMA insertion and 1, 3, 5 minutes after insertion with a p value < 0.005. However there was slight increase in heart rate in both the groups at the time of LMA insertion. Clinically significant bradycardia was seen in 4 patients in group H and 1 patient in group S. In a study by Woody E et al. [15], sevoflurane did not alter heart rate while halothane causes a reduction in heart rate. Black et al. [2], found that both agents caused similar effect on heart rate during the course of induction. None of our patients in either of the groups had any arrhythmia during induction. Johannesson GP et al. [16], and Lerman J et al. [17], noted that the incidence of arrhythmia was higher in halothane group than in sevoflurane group. In a study conducted by Girotra S [18] there was no change in cardiac rhythm in sevoflurane group but in halothane group 60% of children had arrhythmias. The results in their study were significant with a p value of < 0.001. The occurrence of arrhythmias was probably because of the higher concentration of the drugs used in their study.

In the present study, mean baseline systolic arterial blood pressure of the two groups was comparable and the difference was not statistically significant (group H 101.54, group S 102.28, p 0.261). The systolic blood pressure before LMA insertion and 1, 3, 5 min after insertion was less in group H as compared to group S. The difference of mean systolic blood pressure of the two groups was statistically significant before LMA insertion and 1, 3, 5 min after insertion (p value < 0.001). However, there was slight increase in mean systolic BP at the time of LMA insertion.

The mean baseline diastolic blood pressure of the two groups was comparable and the difference was not statistically significant (group H 70.22, group S 70.78, p < 0.001). The mean diastolic BP before LMA insertion and 1, 3, 5 min after insertion was less in group H as compared to group S. The difference between the mean diastolic BP of the two groups was statistically significant (p <0.001) before LMA insertion and 1, 3, 5 min after insertion. However there was slight increase in mean diastolic blood pressure at the time of LMA insertion in both the groups.

Saturation remained 97-100% in both the groups, 1 patient in group H had a saturation of 87%. In a study conducted by Dr. Kajal N Dedhia et al. [13], oxygen remained between 95-100% with desaturation in 2 patients of sevolfurane group, Koprulu AS et al. [19], did not encounter any desaturation in their study.

No laryngospasm, coughing, phonation was seen in either of the groups, however head and limb movements were seen in 3 patients in group H and 1 patients in group S during induction. Dr. Kajal N Dedhia et al. [13], reported no significant laryngospasm, coughing phonation and purposeful movement in either of the two groups at the time of LMA insertion in their study.

CONCLUSION

Sevoflurane was an excellent agent for inhalational

anaesthesia in our study. It had a short induction time, rapid emergence, and low incidence of airway complications or other intraoperative or postoperative side effects. Sevoflurane had a better hemodynamic stability. Hence, we conclude that sevoflurane is a suitable alternative to halothane for inhalational induction of anaesthesia especially in children. As sevoflurane is both appreciably quicker than and safe as halothane, it should be preferred for induction.

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