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A study to compare short term postoperative cognitive outcomes in paediatric patients using intravenous propofol versus inhalational sevoflurane in maintenance of general anaesthesia

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Abstract

Postoperative cognitive dysfunction (POCD) is a newly diagnosed subtle impairment of memory, concentration, and speed of information processing after surgery. POCD in adults and geriatric population has been well established, but less explored in the paediatric age group. The aim of this study is to compare the effects of intravenous propofol and inhalational sevoflurane on short term postoperative cognitive outcomes in children.

Experimental approach: 80 paediatric patients aged 5 - 15 years of ASA grade I and II posted for surgeries under general anaesthesia except neurosurgery were randomly allocated into two groups with 40 patients in each group. Group A received intravenous propofol and Group B received inhalational sevoflurane for maintenance of general anaesthesia. Cognitive assessment tests were done using Wechsler's Intelligence Scale for Children (WISC-V) both preoperatively and postoperatively at 6hr, 12hr and 24hr respectively.

Major Findings: Comparison of various cognitive indices in Group A and B is significantly lower at 6 hours in comparison to the preoperative value. Comparison of various cognitive indices between preoperative and at 24 hours postoperative levels, in Group A and B showed that these parameters return to the preoperative state at 24 hours after surgery.

Conclusion: There is no significant postoperative cognitive decline in patients comparing the cognitive functions preoperatively and 24 hour postoperative levels when using intravenous propofol versus inhalational sevoflurane. There was a transient but significant decline noted in the cognitive functions at 6 hour postoperatively compared to the preoperative period, noticed equally with both groups.

Keywords: POCD, children, propofol, sevoflurane

Introduction

Postoperative cognitive dysfunction (POCD) is defined as a newly diagnosed objectively measurable decline of memory, concentration and speed of information processing after surgery. POCD has been reported for over a 100 years, but only recently studied systematically. The diagnosis of POCD is based on both preoperative and postoperative screening with relevant psychometric tests. The epidemiology of POCD in the adult and geriatric population has been well established, but less explored in the paediatric age group. Inhalation induction remains a widely used technique in paediatric anaesthesia. Sevoflurane is a recently introduced halogenated volatile anaesthetic agent. It is an attractive alternative to the currently available anaesthetics and has replaced halothane for inhaled anaesthetic induction. Learning and memory in school-age children influences intelligence development. Although cognitive deficit studies have been undertaken in depth in adult and elderly population cohorts, there is a paucity of paediatric studies due to the inherent challenges of this age group. Whether the risk may increase with longer exposure time, role of specific anaesthetic agents in affecting memory following surgery in children is unknown. This study was done to compare the effects of intravenous propofol and inhalational sevoflurane on short term postoperative cognitive outcomes in children of school going age group.

Material and Methods

It was a prospective, randomized, comparative study involving 80 paediatric patients undergoing surgery under general anaesthesia.

Patients with ASA physical status I & II, age from 5 to 15 years of either sex undergoing surgeries under general anaesthesia except neurosurgery were included in the study. ASA physical status III, IV and V, inability to perform cognitive function tests, refusal to take part in the study, children with congenital syndromes and neurological disorders, with previous history of neurosurgery, visual and auditory disturbances and having allergies to eggs, propofol were excluded from the study. After getting approval from the institutional ethical committee, study was done by randomizing patients into 2 groups of 40 patients each on alternate basis. In both the groups drugs given for maintenance of anaesthesia are the same as per the standard maintenance regimen except,

- **Group A** received only intravenous propofol for the maintenance of anaesthesia intraoperatively
- **Group B** received only inhalational sevoflurane for the maintenance of anaesthesia intraoperatively

A careful preoperative assessment of all the selected patients was done with complete history and physical examination. Routine investigations like complete blood count for all, blood urea, serum creatinine if necessary was done. An informed and written consent was taken from all the parents/guardians of the patient included in this study. Cognitive function was assessed in the patients both preoperatively (one day) and postoperatively 6 hr, 12 hr & 24 hrs after surgery with standard cognitive assessment tests done for school going children using Wechsler Intelligence Scale for Children- WISC-V. WISC- V consists of five primary index scores Visual Spatial Index (VSI), Fluid Reasoning Index (FRI), Working Memory Index (WMI), Verbal Comprehension Index (VCI) and Processing Speed Index (PSI).

Patients were kept nil orally 6 hours for solid foods & 4 hours for clear liquids before surgery. Peripheral intravenous access was obtained. All patients were uniformly premedicated with Inj. Glycopyrrolate 0.02 mg/kg IV and Inj. Midazolam 0.1mg/kg IV 30 min before surgery. Patients were monitored for heart rate (bpm), systolic, diastolic and mean blood pressure (mmHg), respiratory rate and oxygen saturation (SpO₂) using electrocardiography, non-invasive blood pressure and pulse oximetry. Patients were preoxygenated with 100% O₂ for 3mins, general anaesthesia induced with Inj.Fentanyl 1-2 mcg/kg and Inj. Propofol 2mg/kg. Tracheal intubation was facilitated by intravenous administration of depolarizing muscle relaxant Inj.Succinylcholine 2mg/kg. Mechanical

ventilation of the lungs maintained with 50% oxygen and 50% nitrous oxide. The ventilator was set to deliver a tidal volume of 8–10 ml/kg at a frequency between 15-25 breaths/min. End-tidal carbon dioxide level (ETCO₂) was targeted to maintain between 35-45mmHg. Anaesthesia was maintained with either an intravenous infusion of 50–100 mcg/kg/min propofol in GROUP A or 1%–3% end-tidal concentration of inhalational sevoflurane in GROUP B. All patients received Inj.Atracurium loading dose (0.5mg/kg) and divided doses (0.1mg/kg) for muscle relaxation. Mean arterial pressure, heart rate, SpO₂, ETCO₂ and end-tidal concentration of sevoflurane was continuously monitored during surgery. If the blood pressure decreased by more than 20% of the baseline level, an intravenous bolus of Inj.Mephentermine 3mg was administered. Inj. Atropine was administered if the heart rate fell to less than 50 beats/min. Residual neuromuscular blockade was reversed with Inj. Neostigmine (0.05mg/kg) and Inj. Glycopyrrolate (0.02 mg/kg) IV. Once the patient met the signs of adequate reversal, extubation was performed and all patients were given O₂ by face mask during recovery period. After extubation, patients were observed for sedation by Ramsay Sedation Score.

Statistical Analysis

Modified Cochran's formula was used for sample size estimation. By using this formula we obtained a total sample size of 80 patients, 40 in each group.

To test the normality of distribution of various data between 2 groups Kolmogorov-Smirnov test was applied. Comparison of means between the two groups was done using unpaired 't' test and paired 't' test. Descriptive statistics was presented in the form of numbers and percentages. A p value of <0.05 was taken as statistically significant. The final data was presented in the form of tables and graphs.

Observation and Results

The baseline characteristics of the patients were given in the

Table 1: Both the groups were comparable in terms of Age, Duration of surgery, Heart rate and Ramsay sedation score.

Characteristics	Group A (n=40)	Group B (n=40)	P value
Age in years	9.45 ± 2.49	9.00 ± 2.18	0.393
Duration of surgery	116.63 ± 36.57	107.13 ± 26.98	0.190
Heart rate	94.52 ± 5.10	93.64 ± 4.78	0.865
Ramsay Sedation Score	1.56 ± 0.47	1.44 ± 0.46	0.195

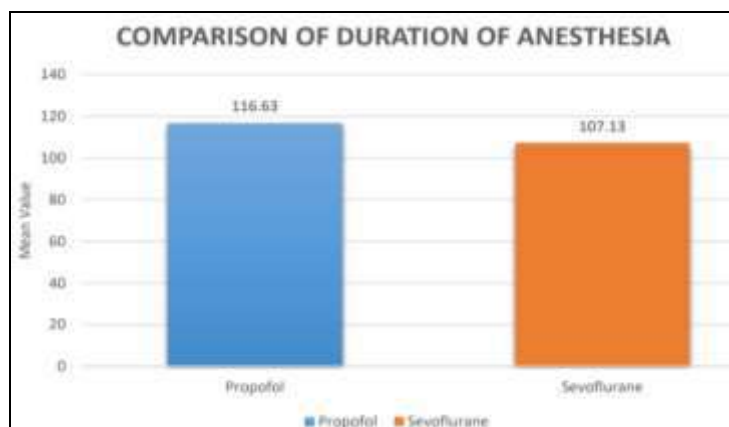


Fig 1: Comparison of duration of anaesthesia between 2 groups.

Visual Spatial Index (VSI)

The Visual Spatial Index (VSI) reflects the ability to understand visual details and relationships in order to solve

puzzles and construct geometric designs. The core subtests are Block Design (orienting blocks to match a picture) and Visual Puzzles (visual spatial integration).

Table 2: Comparison of Visual Spatial Index between the two groups at different time intervals

	Propofol Group [Mean ±SD]	Sevoflurane group [Mean ± SD]	't' value	P value
Preoperative	10.63 + 2.08	11.45 + 2.46	-1.619, df=78	0.110, NS
6 hours postoperative	10.23 + 2.14	11.13 + 2.53	-1.716, df=78	0.090, NS
12 hours postoperative	10.63 ± 2.08	11.45 ± 2.46	-1.619, df=78	0.110, NS
24 hours postoperative	10.63 + 2.08	11.45 + 2.46	-1.619, df=78	0.110, NS

Unpaired 't' test applied. A p value of < 0.05 was taken as statistically significant

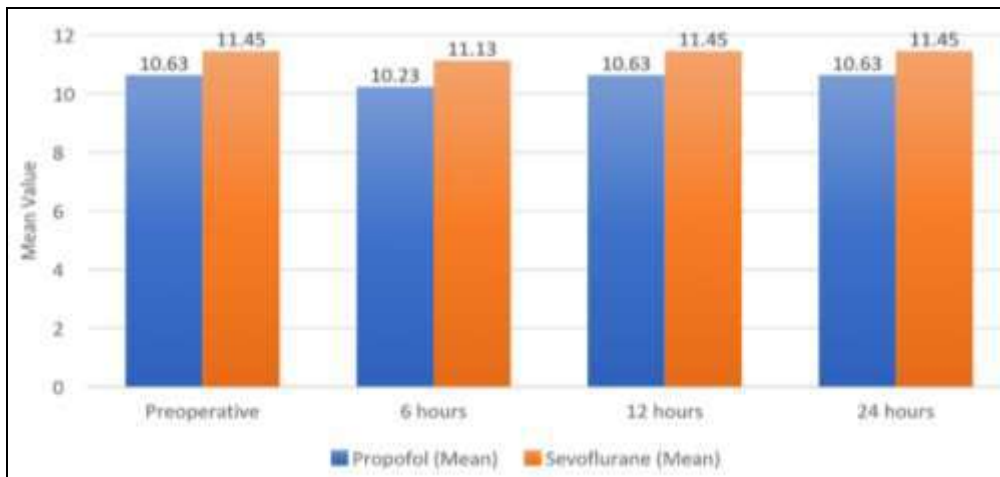


Fig 2: Comparison of visual spatial index between the two groups

Fluid Reasoning Index (FRI):

The Fluid Reasoning Index (FRI) reflects the ability to detect relationships among visual objects. The core subtests

are Matrix Reasoning (reasoning with continuous and discrete visual patterns) and Figure Weights (quantitative reasoning).

Table 3: Comparison of Fluid Reasoning Index between the two groups at different time Intervals

	Propofol Group [Mean+SD]	Sevoflurane group [Mean±SD]	't' value	P value
Preoperative	10.45 + 1.97	11.35 + 2.43	-1.816, df=78	0.073, NS
6 hours postoperative	10.05 + 2.04	10.95 ± 2.51	-1.760, df=78	0.082, NS
12 hours postoperative	10.45 + 1.97	11.25 ± 2.35	-1.648, df=78	0.103, NS
24 hours postoperative	10.45 + 1.97	11.28 + 2.49	-1.642, df=78	0.105, NS

Unpaired 't' test applied. A p value of < 0.05 was taken as statistically significant

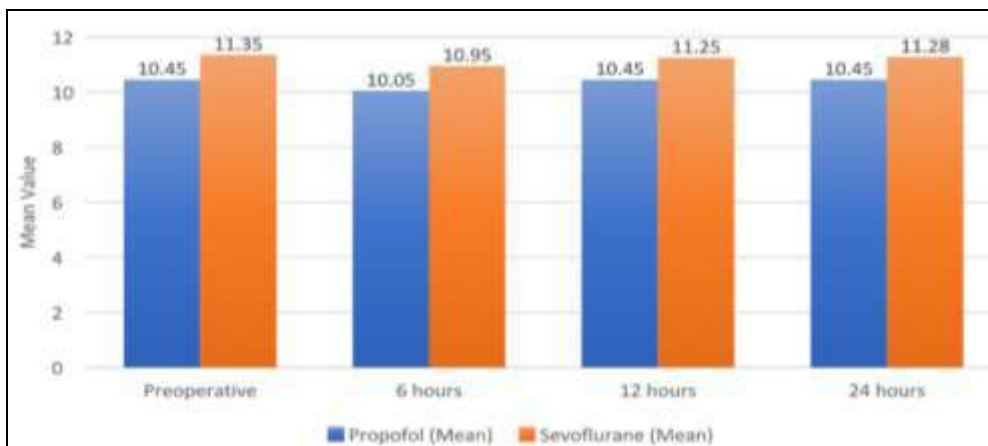


Fig 3: Comparison of fluid reasoning index between the two groups

Working Memory Index (WMI):

The Working Memory Index (WMI) reflects the ability to register, maintain, and manipulate visual and auditory

information. The core subtests are Digit Span (repeating number sequences) and Picture Span (auditory and visual attention and working memory).

Table 4: Comparison of Working Memory Index between the two groups at different time intervals

	Propofol Group [Mean ± SD]	Sevoflurane group [Mean±SD]	't' value	P value
Preoperative	9.48 ± 1.84	10.33 ± 2.59	-1.694, df=78	0.094, NS
6 hours postoperative	8.95 ± 1.75	9.80 ± 2.52	-1.749, df=78	0.084, NS
12 hours postoperative	9.33 ± 1.80	10.00 ± 2.46	-1.400, df=78	0.166, NS
24 hours postoperative	9.33 ± 1.80	9.98 ± 2.51	-1.332, df=78	0.187, NS

Unpaired 't' test applied. A p value of < 0.05 was taken as statistically significant

Processing Speed Index (PSI):

The Processing Speed Index (PSI) reflects the speed at which a child can accurately make decisions. The core

subtests are Coding (matching symbols to associated numbers) and Symbol Search (visual scanning and graphomotor speed of matching symbols).

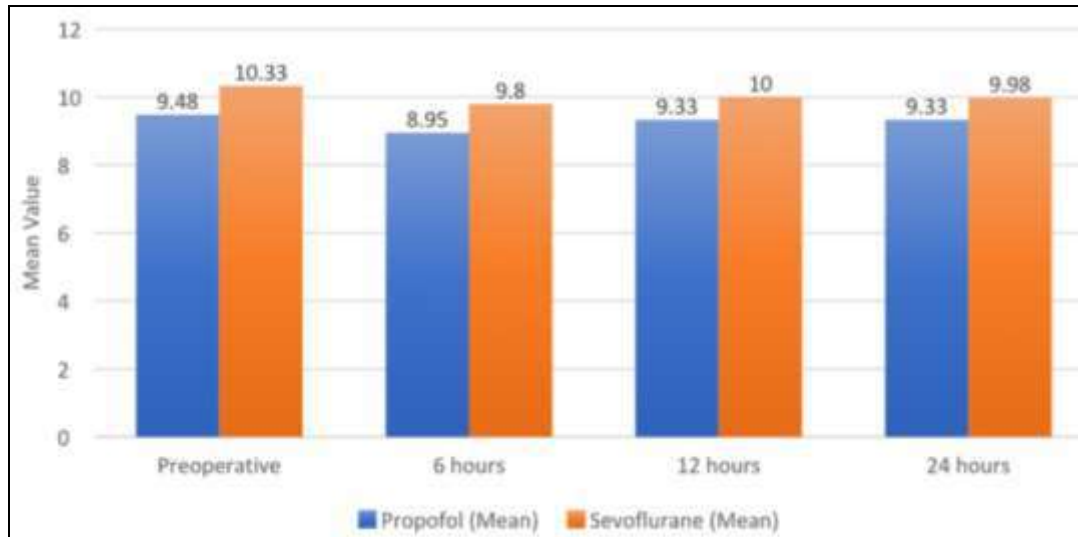


Fig 4: Comparison of working memory index between the two groups

Table 5: Comparison of Processing Speed Index between the two groups at different time intervals

	Propofol Group [Mean±SD]	Sevoflurane Group [Mean±SD]	't' value	P value
Preoperative	9.10 ± 1.82	9.83 ± 2.35	-1.541, df=78	0.127, NS
6 hours postoperative	8.88 ± 1.76	9.48 ± 2.31	-1.308, df=78	0.195, NS
12 hours postoperative	9.10 ± 1.82	9.80 ± 2.26	-1.527, df=78	0.131, NS
24 hours postoperative	9.10 ± 1.82	9.80 ± 2.26	-1.527, df=78	0.131, NS

Unpaired 't' test applied. A p value of < 0.05 was taken as statistically significant

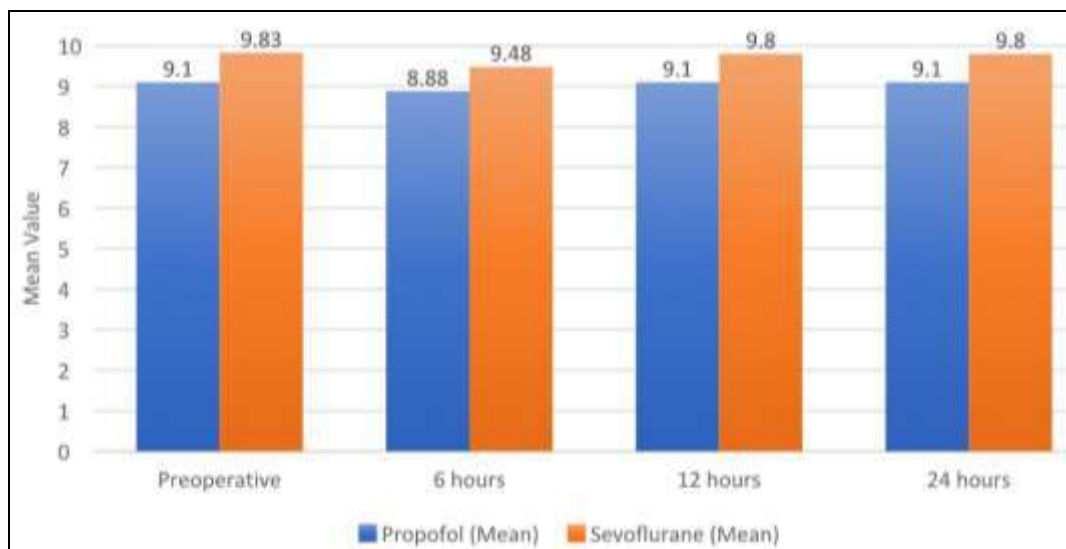


Fig 5: Comparison of processing speed index between the two groups

Verbal Comprehension Index (VCI):

The Verbal Comprehension Index (VSI) measures a child’s ability to verbally reason, which can be heavily influenced

by their semantic knowledge. This index score is derived from the Similarities, Vocabulary, Information, and Comprehension subtests.

Table 6: Comparison of Verbal Comprehension Index between the two groups at different time intervals

	Propofol Group [Mean ± SD]	Sevoflurane group [Mean±SD]	't' value	P value
Preoperative	9.03 ± 1.80	9.80 ± 2.26	-1.697, df=78	0.094, NS
6 hours postoperative	8.80 ± 1.73	9.45 ± 2.33	-1.417, df=78	0.160, NS
12 hours postoperative	9.03 ± 1.80	9.80 ± 2.26	-1.697, df=78	0.094, NS
24 hours postoperative	9.03 ± 1.80	9.80 ± 2.26	-1.697, df=78	0.094, NS

Unpaired t test applied. A p value of < 0.05 was taken as statistically significant

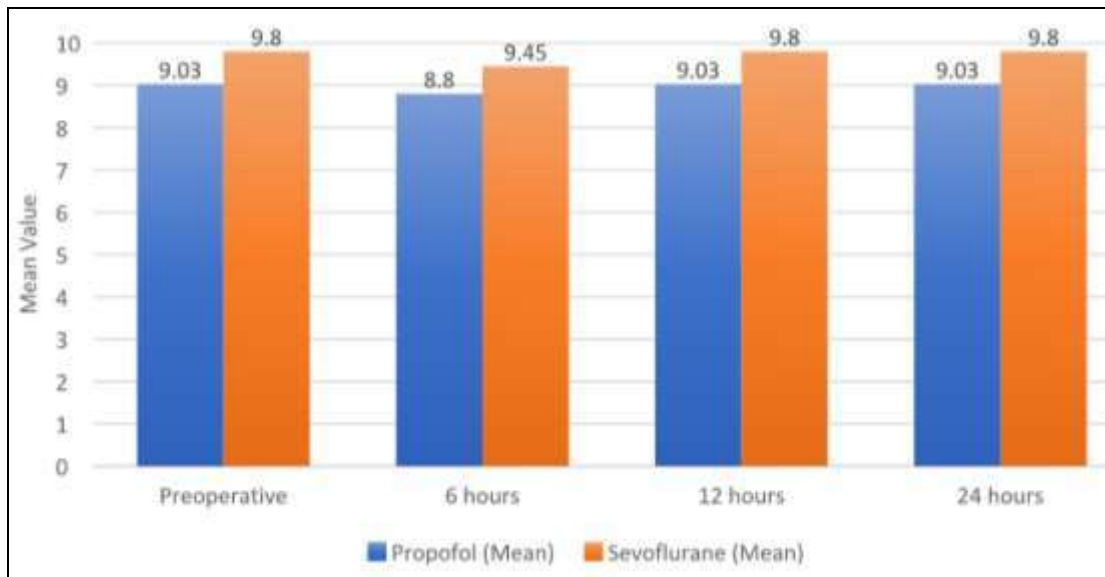


Fig 6: Comparison of verbal comprehensive index between the two groups

Table 7: Comparison of various parameters between preoperative and 6 hours postoperative levels in Propofol group:

Parameter	Time interval	No.	Mean ± SD	't' value	P value
VSI	Preoperative	40	10.63 ± 2.08	4.639, df=39	0.001*
	At 6 hours postoperative	40	10.23 ± 2.14		
FRI	Preoperative	40	10.45 ± 1.97	4.639, df=39	0.001*
	At 6 hours postoperative	40	10.05 ± 2.04		
WMI	Preoperative	40	9.48 ± 1.84	4.423, df=39	0.001*
	At 6 hours postoperative	40	8.95 ± 1.75		
PSI	Preoperative	40	9.10 ± 1.82	2.966, df=39	0.001*
	At 6 hours postoperative	40	8.88 ± 1.76		
VCI	Preoperative	40	9.03 ± 1.80	2.966, df=39	0.001*
	At 6 hours postoperative	40	8.80 ± 1.73		

Paired 't' test applied. P value < 0.05 was taken as statistically significant

The mean VSI, FRI, WMI, PSI and VCI are significantly lower at 6 hours in comparison to the preoperative value ($p < 0.05$) in the propofol group.

Table 8: Comparison of various parameters between preoperative and 6 hours postoperative levels in Sevoflurane group:

Parameter	Time interval	No.	Mean ± SD	'V' value	P value
VSI	Preoperative	40	11.45 ± 2.46	3.911, df=39	0.001*
	At 6 hours postoperative	40	11.13 ± 2.53		
FRI	Preoperative	40	11.35 ± 2.43	4.284, df=39	0.001*
	At 6 hours postoperative	40	10.95 ± 2.51		
WMI	Preoperative	40	10.33 ± 2.59	3.457, df=39	0.001*
	At 6 hours postoperative	40	9.80 ± 2.52		
PSI	Preoperative	40	9.83 ± 2.35	3.009, (H=39)	0.001*
	At 6 hours postoperative	40	9.48 ± 2.31		
VCI	Preoperative	40	9.80 ± 2.26	2.479, df=39	0.001*
	At 6 hours postoperative	40	9.45 ± 2.3		

Paired test applied. P value < 0.05 was taken as statistically significant

The mean VSI, FRI, WMI, PSI and VCI are significantly lower at 6 hours postoperatively in comparison to the preoperative value ($p < 0.05$) in the sevoflurane group.

Table 9: Comparison of various parameters between preoperative and 24 hours postoperative levels in Propofol group:

Parameter	Time interval	No	Mean ± SD	't' value	P value
VSI	Preoperative	40	10.63 ± 2.08	-	-
	At 24 hours postoperative	40	10.63 ± 2.08		
FRI	Preoperative	40	10.45 ± 1.97		
	At 24 hours postoperative	40	10.45 ± 1.97		
WMI	Preoperative	40	9.48 ± 1.84	1.637, df=39 NS	0.110,
	At 24 hours postoperative	40	9.33 ± 1.80		
PSI	Preoperative	40	9.10 ± 1.82		
	At 24 hours postoperative	40	9.10 ± 1.82		
VCI	Preoperative	40	9.03 ± 1.80		
	At 24 hours postoperative	40	9.03 ± 1.80		

Paired test applied. P value < 0.05 was taken as statistically significant

The mean VSI, FRI, WMI, PSI and VCI are comparable between preoperative and at 24 hours postoperative, showing that these parameters return to the preoperative state at 24 hours postoperatively in the Propofol group.

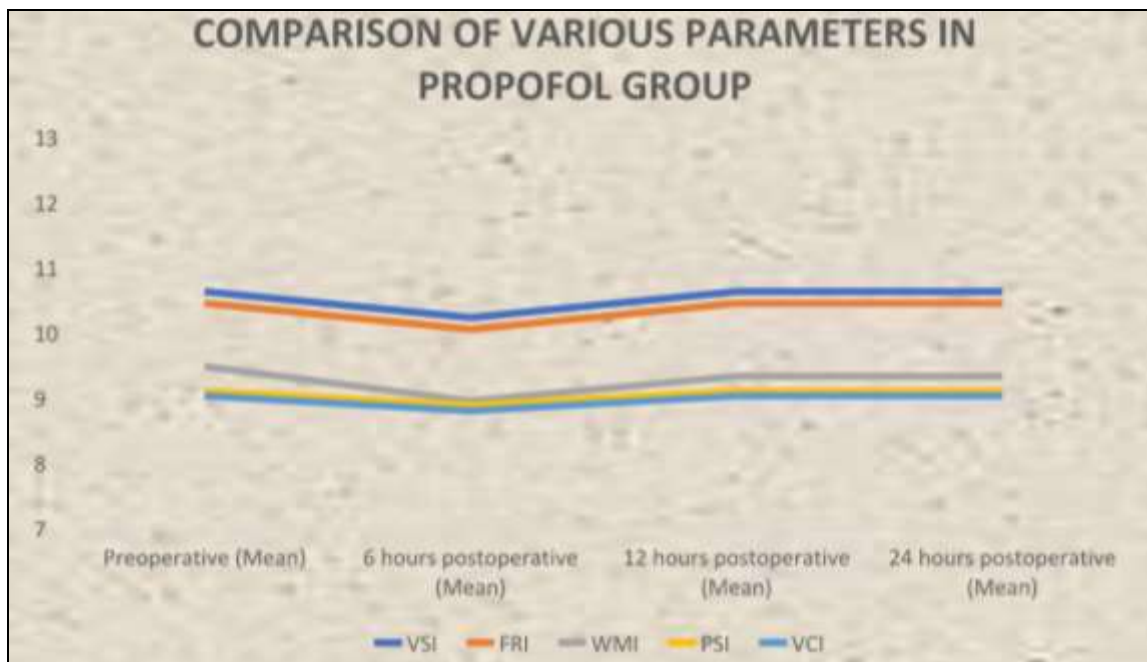
Table 10: Comparison of various parameters between preoperative and 24 hours postoperative levels in Sevoflurane group:

Parameter	Time interval	No.	Mean ± SD	't' value	P value
VSI	Preoperative	40	11.45 ± 2.46		
	At 24 hours postoperative	40	11.45 ± 2.46		
FRI	Preoperative	40	11.35 ± 2.43	1.356, df=39 NS	0.183,
	At 24 hours postoperative	40	11.28 ± 2.49		
WMI	Preoperative	40	10.33 ± 2.59	2.403, df=39	0.021*
	At 24 hours postoperative	40	9.98 ± 2.51		
PSI	Preoperative	40	9.83 ± 2.35	0.443, df=39 NS	0.660,
	At 24 hours postoperative	40	9.80 ± 2.26		
VCI	Preoperative	40	9.80 ± 2.26		
	At 24 hours postoperative	40	9.80 ± 2.26		

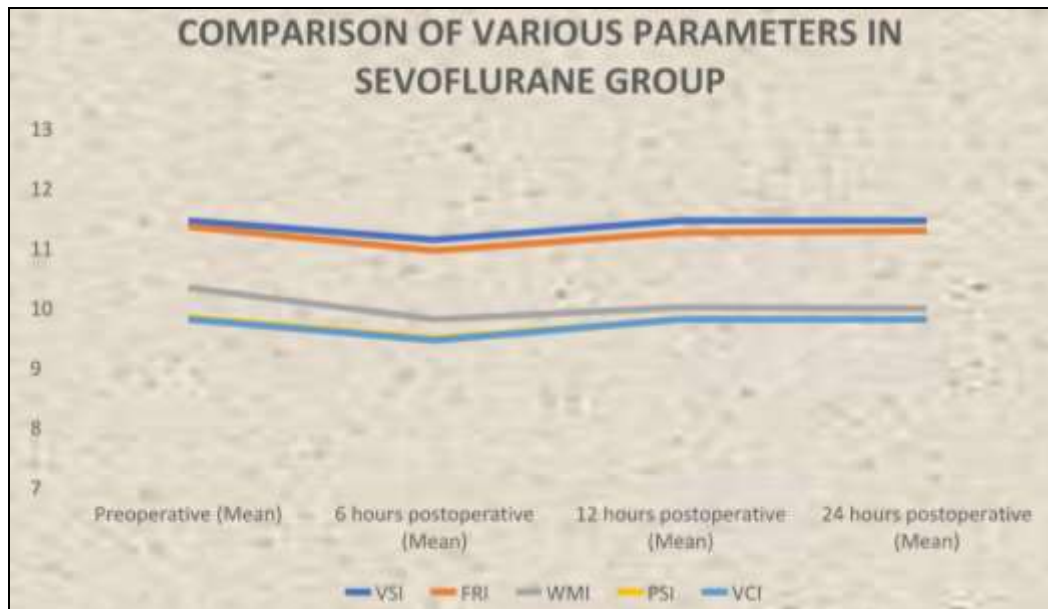
Paired 't' test applied. P value < 0.05 was taken as statistically significant

The mean VSI, FRI, PSI and VCI are comparable between preoperative and at 24 hours postoperative, showing that these parameters return to the preoperative state at 24 hours

postoperatively in Sevoflurane group, but the WMI was found to be significantly lower at 24 hours in comparison to the preoperative level ($p < 0.05$).



Graph 1: Line diagram showing comparison of various parameters in propofol group



Graph 1: Line diagram showing comparison of various parameters in sevoflurane group

Discussion

Cognitive dysfunction occurring after anesthesia and surgery was described in literature over 100 years ago, as delirium and dementia initially. Cognitive impairment after anesthesia and surgery termed as Post Operative Cognitive Dysfunction is a transient disturbance in cognition. This affects all age groups but most common in older age >60 yrs.

POCD in paediatric age group is less extensively studied. In POCD there is a decline in cognitive functions postoperatively when compared to pre-operative function.

This study was done to,

1. Assess short term postoperative cognitive outcomes in paediatric patients of school going age group between 5 - 15 years.
2. Compare between intravenous propofol and inhalational sevoflurane anaesthesia
3. Propofol and sevoflurane effect on postoperative cognitive function as assessed by the appropriate cognitive assessment tests designed particularly for paediatric age group.

Cognitive assessment test in children was done using the Wechsler Intelligence Scale for Children (WISC-V). It is an assessment based on a five part structure, and the resulting five, factor-based index scores have become the primary level of clinical interpretation.

The WISC-V consists of five primary index scores:

1. Visual Spatial Index (VSI)
2. Fluid Reasoning Index (FRI)
3. Working Memory Index (WMI)
4. Verbal Comprehension Index (VCI)
5. Processing Speed Index (PSI)

These 5 indices were assessed in all the paediatric patients both preoperatively and postoperatively in this study. Each patient's own preoperative performance was compared with postoperative performance at 6hr, 12hr and 24hr respectively.

In this study, distribution of patients according to age in the propofol group was 9.45 ± 2.49 years and in the sevoflurane group was 9.00 ± 2.18 years. P value was 0.393 and the

difference was found to be comparable and statistically not significant. Mean duration of anesthesia in the propofol group was 116.63 ± 36.57 minutes and in the sevoflurane group was 107.13 ± 26.98 minutes. P value was 0.190 and the difference was found to be comparable and statistically not significant.

Visual Spatial Index

Preoperative: The mean VSI in propofol group was 10.63 ± 2.08 and in sevoflurane group was 11.45 ± 2.46 . P value was 0.110.

6 Hours Postoperative: The mean VSI in propofol group was 10.23 ± 2.14 and in sevoflurane group was 11.13 ± 2.53 . P value was 0.090.

12 Hours Postoperative: The mean VSI in propofol group was 10.63 ± 2.08 and in sevoflurane group was 11.45 ± 2.46 . P value was 0.110.

24 Hours Postoperative: The mean VSI in propofol group was 10.63 ± 2.08 and in sevoflurane group was 11.45 ± 2.46 . P value was 0.110.

On the basis of p values obtained preoperatively and postoperatively, the mean VSI difference was statistically not significant between the two groups at all the time intervals and was comparable between the propofol and sevoflurane group.

Fluid Reasoning Index

Pre-operative: The mean FRI in propofol group was 10.45 ± 1.97 and in sevoflurane group was 11.35 ± 2.43 . P value was 0.073.

6 Hours Postoperative: The mean FRI in propofol group was 10.05 ± 2.04 and in sevoflurane group was 10.95 ± 2.51 . P value was 0.082.

12 Hours Postoperative: The mean FRI in propofol group was 10.45 ± 1.97 and in sevoflurane group was 11.25 ± 2.35 . P value was 0.103.

24 Hours Postoperative: The mean FRI in propofol group was 10.45 ± 1.97 and in sevoflurane group was 11.28 ± 2.49 . P value was 0.105.

On the basis of P values obtained preoperatively and postoperatively, the mean FRI difference was statistically not significant between the two groups at all the time intervals and was comparable between the propofol and sevoflurane group.

Working Memory Index

Preoperative: The mean WMI in propofol group was 9.48 ± 1.84 and in sevoflurane group was 10.33 ± 2.59 . P value was 0.094.

6 Hours Postoperative: The mean WMI in propofol group was 8.95 ± 1.75 and in sevoflurane group was 9.80 ± 2.52 . P value was 0.084.

12 Hours Postoperative: The mean WMI in propofol group was 9.33 ± 1.80 and in sevoflurane group was 10.00 ± 2.46 . P value was 0.166.

24 Hours Postoperative: The mean WMI in propofol group was 9.33 ± 1.80 and in sevoflurane group was 9.98 ± 2.51 . P value was 0.187.

On the basis of P values obtained preoperatively and postoperatively, the mean WMI difference was statistically not significant between the two groups at all the time intervals and was comparable between the propofol and sevoflurane group.

Processing Speed Index

Preoperative: The mean PSI in propofol group was 9.10 ± 1.82 and in sevoflurane group was 9.83 ± 2.35 . P value is 0.127.

6 Hours Postoperative: The mean PSI in propofol group was 8.88 ± 1.76 and in sevoflurane group was 9.48 ± 2.31 . P value is 0.195.

12 Hours Postoperative: The mean PSI in propofol group was 9.10 ± 1.82 and in sevoflurane group was 9.80 ± 2.26 . P value is 0.131.

24 Hours Postoperative: The mean PSI in propofol group was 9.10 ± 1.82 and in sevoflurane group was 9.80 ± 2.26 . P value is 0.131.

On the basis of P values obtained preoperatively and postoperatively, the mean PSI difference was statistically not significant between the two groups at all the time intervals and was comparable between the propofol and sevoflurane group.

Verbal Comprehension Index

Preoperative: The mean VCI in propofol group was 9.03 ± 1.80 and in sevoflurane group was 9.80 ± 2.26 . P value was 0.094.

6 Hours Postoperative: The mean VCI in propofol group was 8.80 ± 1.73 and in sevoflurane group was 9.45 ± 2.33 . P value was 0.160.

12 Hours Postoperative: The mean VCI in propofol group was 9.03 ± 1.80 and in sevoflurane group was 9.80 ± 2.26 . P value was 0.094.

24 Hours Postoperative: The mean VCI in propofol group was 9.03 ± 1.80 and in sevoflurane group was 9.80 ± 2.26 . P value was 0.094.

On the basis of P values obtained preoperatively and postoperatively, the mean VCI difference was statistically not significant between the two groups at all the time intervals and was comparable between the propofol and sevoflurane group. This present study primarily compares between intravenous propofol and inhalational sevoflurane and assesses the occurrence of any POCD in the immediate postoperative period.

Comparison of various parameters between preoperative and 6 hours postoperatively in the Propofol group the mean VSI, FRI, WMI, PSI and VCI are significantly lower at 6 hours in comparison to the preoperative value ($p < 0.05$) in the propofol group. In Sevoflurane group the mean VSI, FRI, WMI, PSI and VCI are significantly lower at 6 hours postoperatively in comparison to the preoperative value ($p < 0.05$) in the sevoflurane group.

Comparison of various parameters between preoperative and 24 hours postoperatively in the Propofol group the mean VSI, FRI, WMI, PSI and VCI are comparable between preoperative and at 24 hours postoperative, showing that these parameters return to the preoperative state at 24 hours postoperatively in Propofol group. In Sevoflurane group the mean VSI, FRI, PSI and VCI are comparable between preoperative and at 24 hours postoperative, showing that these parameters return to the preoperative state at 24 hours postoperatively in Sevoflurane group, but the WMI was found to be significantly lower at 24 hours in comparison to the preoperative level ($p < 0.05$). In this study there is a significant decrease in the cognition levels 6 hours postoperatively and it reverted back to normal levels 24 hours after surgery.

Conclusion

From the above observation and results it may be concluded that, There is no significant postoperative cognitive decline in patients comparing the cognitive functions preoperatively and 24 hour postoperative levels when using intravenous propofol versus inhalational sevoflurane. There was a transient but significant decrease noted in the cognitive functions at 6 hour postoperatively as compared to the preoperative period and was noticed equally with both intravenous propofol and inhalational sevoflurane groups. However the cognitive functions recovered back to preoperative levels at 24 hour postoperative period. Duration of general anaesthesia using intravenous propofol and inhalational sevoflurane showed no significant postoperative cognitive decline in both groups.

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