Research Paper

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Comparison Of Complications During Induction, Maintenance, Recovery And Post-Operative Period With Sevoflurane And Propofol In Paediatric Day Care Anaesthesia

Medical Science

KEYWORDS : complications, sevoflurane, propofol, paediatric, daycare anaesthesia

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ABSTRACT

Objective: To compare complications during induction, maintenance, recovery and post-operative period with sevoflurane and propofol. Methods: In this randomized study, a total of fifty children, American Society of Anaesthesiologist (ASA) status I or II, were assigned randomly to intravenous propofol(Group P) or inhalatory sevoflurane group(Group S).N2O was used in both groups. Complications were observed and noted during induction, maintenance and recovery. A chi- square test was used to determine statistical significance of complications data.

Results: No significant differences were detected in age, sex and ASA grading between two groups. During induction, Group P got complications like hypotension in 5 patients (20%), pain on injection in 3 patients (12%) and apnea in 3 patients (12%). Hypotension was noted in 3 patients (12%) of group S. Hypotension was noted in 2 patients (8%) of Group S and 3 patients (12%) of Group P during maintenance. In Group S, 4 patients (16%) had emergence agitation and 2 patients (8%) had nausea and vomiting during recovery and post-operative period.

Conclusion: Pain on injection, Apnea, decreased blood pressure more with propofol but not significantly comparable to sevoflurane. Sevoflurane was associated with nausea and vomiting and emergence agitation but not significantly comparable to Propofol. Complications during induction, maintenance, recovery and postoperative period were not significantly different between sevoflurane and propofol groups.

Introduction:

Care of children whenever possible should be provided on a day care basis. Their interests are most often best served by being in hospital for the briefest possible time in order to provide safe and effective treatment [1, 2]. Day care surgery is the most appropriate method for children, providing the operation is not complex or prolonged and the child is healthy with no major coexisting illnesses [3]. Pediatric surgery in an ambulatory setting shortens hospital stay, reduces exposure to nosocomial infections, and allows for the active parental participation. Ambulatory surgery is especially suitable for children because many of the surgical procedures they commonly undergo are short and simple, and children are generally in good health. [4, 5]

Different anaesthetic agents with different routes are in constant search for pediatric day care anaesthesia. Halothane, being sweet smelling has been standard inhalational agent of choice. New agents with low blood gas partition coefficient are known to provide fast induction and rapid recovery [6]. Recently, a controversy has been raised regarding emergence delirium following administration of inhalational agents [7]. Sevoflurane compares quite favorably with isoflurane in most of the aspects and it also has a number of significant advantages. It has lower blood gas solubility, so induction and recovery are slightly quicker. It offers good hemodynamic stability. It is pleasant to inhale, and therefore it is suitable for inhalational induction. Adverse effects include bradycardia, hypotension, nausea and vomiting, agitation, somnolence, dizziness and increased salivation. [8]

Amongst the Intravenous agents thiopentone remains to be the hypnotic drug of reference,

But propofol's versatility is causing it to gain wider acceptance. [9] Propofol is one of the most frequently used intravenous anesthetic. Adverse effects include pain in injection and thrombophlebitis. General side effects include myoclonus, opisthotonus, apnea, pulmonary edema. [10]

For, pediatric day care surgery, anesthesiologists usually prefer Sevoflurane as it showed better intra-operative and post-operative hemodynamic stability than propofol. [11]

Propofol is used widely for induction and maintenance of anaesthesia, but can often cause local pain when administered into peripheral veins. Several methods have been described to reduce this pain, of which the most effective and common are use of a larger vein and mixing with lidocaine [12]. Propofol can also cause cardiovascular and respiratory depression [11].The incidence of delirium in recovery was greater in sevoflurane group. In post-operative ward, the incidence of nausea and vomiting was significantly higher in the sevoflurane group. [13]

The aim of this study was to compare complications during induction, maintenance, recovery and post-operative period with sevoflurane and propofol.

Methods

We studied fifty children, aged one month to 14 years, with ASA physical status I or II undergoing pediatric day care surgeries.

Surgeries with minimal bleeding with duration less than 2 hours were selected. Surgeries like circumcision, hernia, hydrocele, excision biopsy, orchidopexy, incision & drainage, dilatation, tongue tie release, polydactyly excision, cauterization of umbilical granuloma were selected in our study.

All patients were equally divided into two groups (Group S and P). Inj. Glycopyrrolate 0.01 mg/kg i.v. was given to all the patients. Inj. Midazolam 0.05 mg/kg i.v. was given to the children above 6 months of age 15 – 20 minutes before the surgery.

Patients of Group-S were induced with 50% O_2 + 50% N_2O with 3 volume % of sevoflurane and increasing concentration stepwise according to the individual response till loss of eyelid / eyelash reflex.

In patients of Group-P, venous occlusion was made by manually compressing the site proximal to vein puncture. Inj. Xylocaine (1%) 1 mg/kg was injected over 10 sec. and occlusion was released after 1 min. Inj. propofol 3-4 mg/kg was injected.

Maintenance

i) When expected duration of surgery < 20 minutes.

Group-S: 50% O_2 + 50% N_2 O + sevoflurane (3 to 5 volume %) by mask.

Group-P: 50% O_2 + 50% N_2O by mask + propofol infusion 8 mg/kg/hr by infusion pump.

ii) When expected duration is > 20 minutes.
Immediately after induction all patients were given Inj. Atracurium 0.5 mg/kg.
They were intubated and maintained with 50% O_2 + 50% N_2O + sevoflurane or propofol infusion according to the group.
Inj. Atracurium 0.1 mg/kg was repeated as per the need of surgery.

Reversal
At the end of surgery, N_2O and anaesthetic agent were stopped and residual neuromuscular blockade was reversed with Inj. Glycopyrrolate 0.01 mg/kg and Inj. Neostigmine 0.05 mg/kg. Patients were extubated after adequate spontaneous respiration, reflexes muscle tone and power.

Per operative monitoring of ECG, pulse, SPO_2, temperature, NIBP were done till recovery of patient and in post anaesthesia care unit. Patients were shifted to post anaesthesia care unit after recovery from general anaesthesia and were observed for vital signs, airway and SPO_2. All patients were watched for complications like nausea, vomiting, drowsiness, sore throat, pain, excessive crying, post extubation croup and emergence agitation during induction, maintenance, recovery and post-operative period.

Statistical analysis
Microsoft Excel 2010® was used for statistical analysis. A chi-square test (X^2) was performed to determine statistical significance of complications data. The P value < 0.05 is considered to be statistically significant.

Results
The patients in study were in the age group of 1 month to 14 years. There was no significant different in the mean age, sex distribution and ASA grading in two groups (Table 1). During induction, Group P got complications like hypotension in 5 patients (20%), pain on injection in 3 patients (12%) and apnea in 3 patients (12%). Hypotension was noted in 3 patients (12%) of group S. (Table 2) Hypotension was noted in 2 patients (8%) of Group S and 3 patients (12%) of Group P during maintenance. (Table 3) Table 4 shows recovery and post-operative complications in both groups. Difference in complications during induction, maintenance, recovery and postoperative period were not statistically significant between sevoflurane and propofol groups.

Table 1.Demographic comparison of two groups

Variable	Group S (n=25)	Group P (n=25)
Mean Age (Years)	3.30	3.72
Number of Male (% of patients)	16 (64)	18 (72)
Number of Female (% of patients)	9 (36)	7 (28)
ASA Grade I Number of patients (% of patients)	21(84)	20(80)
ASA Grade II Number of patients (% of patients)	4(16)	5(20)

Table 2.Complications during induction

Complications	Group S (n=25)	Group P (n=25)	P value
Pain on Injection	-	3(12%)	0.2337
Apnea	1(4%)	3(12%)	0.6022
Coughing	1(4%)	-	0.3124
Laryngospasm	-	-	-
Hypotension	3(12%)	5(20%)	0.6997
Bradycardia	1(4%)	1(4%)	-
Hypertension	-	-	-
Tachycardia	-	1(4%)	0.3124

Table 3.Complications during maintenance

Complications	Group S (n=25)	Group P (n=25)	P value
Hypotension	2(8%)	3(12%)	0.6374
Bradycardia	1(4%)	1(4%)	-
Tachycardia	1(4%)	1(4%)	-

Table 4.Post-operative Complications

Complications	Group S (n=25)	Group P (n=25)	P value
Emergence Agitation	4(16%)	-	0.1179
Vomiting	2(8%)	-	0.4705
Pain / crying	2(8%)	2(8%)	-
Sore throat	-	-	-

Discussion
General anaesthesia is the commonest technique used for paediatric day care surgery, as co-operation of children with regional anaesthesia is poor. Most anaesthetists prefer sevoflurane and propofol as anaesthetic for day care anaesthesia now a days. Most of the previous studies compared either induction or maintenance or recovery and post-operative complications with sevoflurane and propofol. So we conducted this study with the aim to compare complications during induction, maintenance, recovery and post-operative period during general anesthesia with sevoflurane and propofol undergoing pediatric day care surgeries.

Fifty patients of ASA status I or II aged 1 month to 14 years were studied as per the protocol mentioned before. There was no significant difference in the mean age, sex distribution and ASA grading in two groups.

During induction, there was no significant incidence of coughing, laryngospasm and bronchospasm, in any of the groups. In Group S, 1 patient (4%) had Apnea, whereas in Group P, 3 patients (12%) had apnea. Pain on injection indicated by withdrawal of that limb was noted in 3 patients (12%) of Group P despite the use of lidocaine. Hypotension was noted in 3 patients (12%) of group S in comparison to 5 patients (20%) of group P.

Fredman, Brian et al (1995) conducted a study of Sevoflurane for out patient Anaesthesia and compared with Propofol. It was found that there were no significant differences in the incidence of coughing, airway irritation, or laryngospasm during induction of anaesthesia. (14)

Noriaki Kanaya et al (2003) concluded that induction of anesthesia with Propofol, decreases blood pressure, entropy, high frequency (HF) in a BIS – dependent manner indicating that Propofol reduces cardiac parasympathetic tone depending on the depth hypnosis conversely Sevoflurane did not show the BIS dependent decrease on HR, BP, HF and entropy indicating that Sevoflurane has little or no effect on cardiac parasympathetic tone.(15) Ismai Kati, Cengiz Bekir (2003) studied comparison of Propofol versus Sevoflurane for LMA Insertion. They found

that no significant difference in terms of Heart rate MAP in both groups. (16)

During maintenance, hypotension was noted in 2 patients (8%) of Group S and 3 patients (12%) of Group P. Fredman, Brian et al (1995) conducted a study of sevoflurane for outpatient Anaesthesia and compared with propofol. The use of sevoflurane was associated with consistently lower heart rate values during the early maintenance period. (14)

In Group S, 4 patients (16%) had emergence agitation and 2 patients (8%) had nausea and vomiting during recovery and post-operative. These complications were absent in Group P. The absence of a significant difference in emergence agitation and PONV (post-operative nausea and vomiting) in recovery and post-operative period is probably a consequence of the final size of the study groups, the overall low rates of emergence agitation and PONV.

Lyndu T. Wells (1999) observed emergence delirium after Sevoflurane anaesthesia in children (1-4 years) but not in adults. (17)

Moore et al (2003) studied incidence of delirium in recovery was greater in sevoflurane group. In post operative ward, the incidence of nausea and vomiting was significantly higher in the sevoflurane group. (18) Erk G et al (2007) studied comparison of target controlled Propofol infusion and Sevoflurane inhalational anesthesia found propofol TCI causes lower incidence of PONV in operations such as laproscopic cholecystectomy. (19)

Anil Gupta et al (2004) compared recovery profile after ambulatory anesthesia with Propofol and Sevoflurane, a system review. The postoperative complications including postoperative nausea and vomiting was significantly increased with Sevoflurane. There were no other significant differences between the anesthetics.(20) W. Scott Jellish et al (1996) compared the effects of Sevoflurane versus Propofol in the induction and maintenance of anaesthesia in adult patients. Overall frequency of complication free induction, maintenance and emergence did not differ between the two anaesthetic groups. (21)

There was no significant difference in the incidence of intraoperative and post-operative complications. Fredman et al., found no significant differences in complications between sevoflurane and propofol. (14)

Conclusion

Pain on injection, Apnea, decreased blood pressure more with propofol but not significantly comparable to sevoflurane. Sevoflurane was associated with nausea and vomiting and emergence agitation but not significantly compared to Propofol. Complications during induction, maintenance, recovery and postoperative period were not significantly different between sevoflurane and propofol groups.

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