Induction with Propofol Lowers Emergent Agitation in Pediatric Patient Undergoing Strabismus Surgery

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Abstract

Background and the aims: Emergency agitation (EA) is a common complication seen after inhalation anesthesia most frequent on sevoflurane . The aim of the study was that induction of propofol on end of operation reduces the incidence and severity of EA when compared with sevoflurane anesthesia only.

Material and methods: A prospective study on 109 patient's age 3-6 years old having strabismus surgery with sevoflurane. Division in 2 groups: 1 (n=49) sevoflurane anesthesia and B (n=59) sevoflurane and propofol inducted on the end of surgery. The induction and maintain of anesthesia was the same in both groups. On group 2 Propofol was applied on the end of surgery. It is studied the incidence of EA in each group. The PAED scale valued the agitation. Is considered EA score 4 and 5. Results were expressed as mean ± standard deviation median and range or frequencies. Comparisons of numerical variables between groups were done by employing t test for independent samples.

Results: There were no differences regarding age, weight and ASA the incidence of emergent agitation depended on time of operation, number of muscles operated, and sex. This incidence of EA was lower on the propofol group.

Conclusions: Using propofol on the end of surgery is effective in reducing the incidence of EA on strabismus surgery.

KEYWORDS: Sevoflurane; Propofol; Emergency agitation; Strabismus.

Background and the aims: Emergence agitation (EA)or emergency delirium(ED) is one of the most common complication seen after inhalational anesthesia, with an estimated incidence of 20–80% The agitation occure within 30 min after surgery and lasts 5-15 min . Emergence agitation is described as non-purposeful restlessness and agitation, thrashing, crying or moaning, involuntary physical activities, disorientation, and incoherence after extubation (Menca SB et al. 2007). Mechanisms behind EA are still not clear. Suggested mechanisms involve variable rate of recovery of certain brain areas likelate emergence of cognitive function when compared with other areas (such as locomotion and audition) causes the confusion state. Animal and human studies demonstrated that sevofluran exerts transient paradoxical excitatory effects by exciting neurons in the locus coeruleus (Guenther U, Radke FM 2011). Various pharmacological agents have been used to reduce the incidence of EA, including propofol, midazolam, α2 adrenoceptor agonists and opioids. Propofol is a short-acting hypnotic agent used in children for induction and maintenance of general anesthesia.

Propofol has been used in different studies to decrease EA. Administration of propofol at the end of procedure has been associated with decrease in the incidence of EA (Sikich N, Lerman J 2004). There are few studies at the literature comparing the effect of propofol and sevoflurane in children and EA. But they are limited with sample size and administration time and dose of propofol with no clear conclusion. Thus, we tested the primary hypothesis that induction with propofol at the end of surgery will decrease the incidence and severity of EA when compared with sevoflurane.

Matherial and method: Are studied 108 patients on age 3-6 years old; male n=65; female n=43; age ± 5.29. All patients were ASA I (n=89) ASA ll (n=19). ASA ll patients were considered patients with congenital disease, pettite or major mal, mental diseases ecet.. No cases were excluded. All the patients had strabismus surgery. The surgery was on 1-2-3 muscles. The time of operation was ± 60.09 . The patients were observed on recovery room for about 30-40 min. PAED scale classified the agitation on 5 score : 1- the child makes eye contact, 2- Purposeful response after repeated stimuli , 3 – the child is aware of the surrounding environment, 4- severe restlessness 5 – The child is inconsolable . The score 4 and 5 was considered as EA. Rectal midazolam (0.3 mg/kg) was given 20 min before operation. All patients received dexamethasone 0.15 – 0.5 mg/kg and metoclopropamid 0.1-1.15 at the beginning of induction for the antiemetic and analgesic effect. The airway was controlled by a laryngeal mask. Thus, no myorelaxantswere used. Paracetamol (30 mg/kg) was intravenously injected last 15 min. to the end of the surgery as pain controlling. Intraoperative monitoring consisted of continuous electrocardiography, pulse oxymetry, non invasive blood pressure, and end-tidal CO_2 measurements. The maintenance of anesthesia was with sevofluran 1.5%, while fentanyl 2 –3 mcg/kg was employed for induction and maintenance. Propofol dose was 2.5-3.5 mg/kg. No other complications were recorded during and after the operation. Patient's behavior was assessed on recovery room for one hour.

Statistics: Results were expressed as mean ± standard deviation median and range or frequencies. Comparisons of numerical variables between groups were done by employing t test for independent samples. Also, we test if the agitation depends on the ASA classification, time of operation, age, sex and weight of the patients, the number of muscles operated, or the type of anesthesia inducted. To achieve this, we first analyzed the correlations of each variable with agitation as a total and for each different group (defined by the types of anesthesia strategy). Then, since we believe that the characteristics do not only affect the agitation status independently but that they are interrelated to each other, we tested the relationship between the dependent variable (agitation) and the independent variables by the use of a linear regression analysis. Means square method regression was applied. The significance of the variables was controlled by means of probability. Consequently, the variable is considered to be statistically significant if the p value is lower than <0.10 and the sign of relation is the expected one. The results have been considered within a confidence interval of 95%. The goodness of fit of the mode l was tested by R2. In addition, statistical tests were performed through the use of views.

Results: Table 1 shows some descriptive statistics of the different groups of cases and the total number. No case was excluded from the patients.

Table1. Descriptive statistics:

	ASA	AGITATION	TIME OP	AGE	NR_MUSK	WEIGHT	SEX	SEV	SEV/PROP
Mean	0.18	0.18	60.09	5.29	1.69	16.91	0.61	0.45	0.45
Std. Dev.	0.38	0.38	13.29	1.12	0.68	4.58	0.49	0.50	0.50
Observations	108	108	108	108	108	108	108	49	59

In order to statistically evaluate the significance of age, sex, and the type of anesthesia on the incidence of agitation, we run individual linear. Hence, the significance was controlled by means of the probability of significance.

The table 2 below shows the results of the regressions of each individual variable with agitation. The results show that the only variables affecting agitation are sex and the type of anesthesia strategy.

Table 2 . Individual regression analysis

	ASA	TIME OP	AGE	Nr. Musc	Weight	Sex	Anesthesia
t-Statistic	-0,23	1,48	-0,66	1,11	-0,37	1,77	3,38
Prob	0,82	0,14	0,51	0,27	0,71	0,08	0,00

The table 3 below shows the results of the linear relation.

Table 3. Results of statistical analysis:

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ASA	0.03	0.10	0.30	0.77
Time OP	0.01	0.01	1.86	0.07
Age	-0.11	0.08	-1.32	0.19
Nr. Musc.	-0.08	0.10	-0.78	0.44
Weight	0.02	0.02	0.85	0.40
SEX	0.10	0.07	1.42	0.16
Anesthesia	0.24	0.07	3.37	0.00

Discussion: The incidence of the emergency agitation does not represent a rare phenomenon occurring anesthesia with sevoflurane. The value varies from 20 – 80 %.) Early childhood represents a significant risk factor. On the ophthalmology, a high incidence of EA was observed (Constant I et al., 2010). Most of strabismus surgery was indicated on this period of life. After the operation, the patient had to lock the eye and it was difficult for the patient to communicate with vision. In these cases, age and fear is more frequent sometimes. This is the reason we chose to observe the age group from 3 to 6 years. From the results, we got the higher incidence of emergency agitation in the age 4 year old. And higher on female than male. The incidence of emergency agitation were to be 17%. Consequently, there are many studies showing the factors which interfere with this complication and how to reduce it as; induction with propofol and intraoperative analgesics as pain controlling .We had the induction with propofol and applied dexametason, paracetamol and metocorpropamid during anesthesia which think had reduced of this complication. Hence, these papers have study the relation with weight, age, sex, time of operation, type of anesthesia. (Tab. 1) Since factors are interrelated and cannot be analyzed separately by the use of a linear regression, we tested the significance of the variables. Based on the results observed, we inserted a dummy variable for the type of anesthesia used. The dummy variable takes the value of 1 when sevoflurane is used alone and 0 when sevoflurane is used in conjunction with propofol. (Tab. 2)

The table 3 shows that by means of probability of occurrence, the time of operation and type of anesthesia are the only important variables affecting the agitation. In particular, the results show that the longer the time of operation, the higher the probability of agitation. The regression results also show that the use of propofol in addition to sevoflurane diminishes the agitation occurrence. The goodness of fit of the model was tested by R2 value. The model has a low R2 equal to nearly 0.2. This value shows that there are other characteristics not included in the model that affect the agitation occurrence. Sow EA were depended on type and time of anesthesia. ($p<0.1$). It was observed that the emergent of agitation were present higher in female than on male ($p<0.1$) but we think that need higher number of patients to achive the results.

CONCLUSION: Based on the results of this randomized trial, we recommend the injecting propofol IV on the end of operation on strabismus surgery. It reduces the incidence of EA after anesthesia of sevofluran.

BIBLIOGRAPHY:

1. Oh AY et al. (2005). Delayed emergency process does not result in a lower incidence of emergence agitation after sevoflurane anesthesia in children. Acta Anesthesiol Scand;49: 297-9
2. Constant et al. (2010). Ihalation anesthetic in pediatric anesthesia. Cun. Opn. Anesthesiologyst; 49:297-9
3. Menca SB et al. (2007). Analgesia and sedation in children. Practical approach for prevention of emergent situation. J. Anesthesiol(rios); 83: 571-83.

4. Martini DR (2005). Commentary : Diagnosis of delirium on pediatric patients. J.Am.Acod child,Adolesenc. Physiatry; 44: 395-399

5. PicardV et al. (2008). Quality of recoverty in children.Sevoflurane versus propofol..Acta Anesth. Scandinave. 2005; 18: 277-81 mo.2Porto Alegre Mar/Ap 2

6. Mizuno J; Nagata Y Monla S (2011). Pub Med Predisposiny factors and prevention of emergency agitation.

7. Key KL, Rich C, De Cristoforo C (2010). Use of propofol and emergence agitation in children (literature review), AANAJ dec; 78 (6); 468-73.

8. Sikich N, Lerman J (2004). Development of the psychometric evaluation of the pediatric anesthesia emergence delirium scale. Anesthesiology; 100; 1138-1145.

9. Liberati A (2009). The PRIZMA statement for reporting systematic reviewes and meta-analyses of studiesthat evaluate healthcare interventions; explanation and elaboration. PLoS Med; 6; e1000100.

10. Leman J (2013). Preoperative assessment and premedication in pediatrics. Eur Jur of Anes. 30; 645-650.

11. Da Silva LM et al. (2008). Emergente agitation in pediatric anesthesia: current features. J Pediatric(Rio); 84: 107-113.

12. Popp j, Arlt S (2007). Prevention and treatment options for postoperative delirium in the eldery.Current features.J Pediatric(Rio); 76: 179-185.

13. Acuant MT, Nasr VG (2005). Emergence agitation in children: an update. Curr Opim Anesthesiol; 18: 614-619.

14. Guenther U, Radke FM (2011). Delirium in postanethesia period. Curr Opim Anesthes. 24:670-675.

15. Theuerkauf GP et al. (2012) . Postoperative delirium in PACU and intensive care unit. Trends Anesth Crit Care. 2: 148-15

16. Melborn LG et al. (2011). Comparison of emergence and recoverty characteristics of sevoflurane, desflurane, halothane, in pediatric ambulatory patients. Cur.opn.anesthesiologist, 52 291-4.