



USE OF SEDATIVES IN CHILDREN 2-8 YEARS OF AGE UNDERGOING ELECTIVE SURGERIES IN GMC SRINAGAR

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Abstract

Background: Surgery and anesthesia exert an immense emotional stress on both parents and children. Behavioral and physiological measures of anxiety have identified anesthetic induction as the most stressful point during the entire preoperative period in children.

Aim: To study the use of anxiolytics in immediate preoperative/ pre-induction in children 2-8 years of age undergoing elective surgeries.

Methods: This prospective observational study was conducted in the department of Anesthesiology in Government Medical Collage Srinagar from over a period of 18 months for 120 patients of American Society of Anesthesiology physical status I-II of both sexes, aged between 2 to 8 years, scheduled for elective surgeries. Patients with cardiovascular, respiratory or neurological compromise, with known allergy to drug were excluded from the study. The study was approved by the Institutional ethics committee. Children were equally divided in to three groups Group A (n=40) oral midazolam 0.5 mg/kg (5 mg/ml parenteral formulation, Group B (n=40) oral ketamine 5.0 mg/kg (50 mg/ml parenteral formulation and Group C (n=40) oral loly pop Fentanyl (15-20mcg/kg) by random selection using random number tables between the study groups.

Results: The treatment groups were similar with respect to age, weight, sex distribution, and duration of surgery. Sedation score at 0 min (before premedication) among the study groups was statically insignificant with (p value >0.05).

The mean values of sedation score (Ramsay sedation score) at different intervals among three groups were statistically not significant with a p value of > 0.05. Anxiety score at parenteral separation between the study groups was statically insignificant with (p value >0.05). Anxiety score at intravenous cannulation between the study groups was statically insignificant with (p value >0.05). Anxiety score at mask application among the study groups the shows no statically significant differences with (p value >0.05).

Conclusion: It can be concluded from our study, that the parenteral formulation of midazolam, ketamine and Fentanyl can be safely used as premedicant in children. These oral drugs do not produce any respiratory depression in children.

Keywords: Surgery and anesthesia, midazolam, ketamine and Fentanyl, Anxiety, anxiolytics, children

Introduction:

Surgery and anesthesia exert an immense emotional stress on both parents and children. The preoperative period in children is fraught with extreme anxiety and emotional stress, most of which arises from fear of the unknown. Behavioral and physiological measures of anxiety have identified anesthetic induction as the most stressful point during the entire preoperative period in children. [1] Preoperative anxiety causes adverse neuroendocrine responses, which not only prove deleterious in the immediate postoperative period, but often persist into the future as post-traumatic stress disorder.[2] Thus, allaying this anxiety is of utmost importance for providing a calm and pleasant anesthetic experience and preventing an adverse impact on the psychological milieu of the child in future.

Temperament and personality Impulsive children (i.e. high EASI score for impulsivity) have an increased risk of general anxiety and separation anxiety at 2 weeks postoperatively, as well as children with poor social adaptability, children who are shy and inhibited, with higher intelligence, and with increased parental anxiety. [3] In addition to behavioural manifestations, preoperative anxiety activates the human stress response, leading to increased serum cortisol, epinephrine, and natural killer cell activity. [4,5] This stress response can be activated by many different noxious stimuli including fear, anxiety, pain, cold, major surgery, and infection. [5]

The primary goal of premedication in children is anxiolysis, which helps facilitate smooth separation from the parents and ease the induction of anaesthesia. Other effects that may be achieved by premedication include amnesia, prevention of physiologic stress, vagolysis, reduction in total anaesthetic requirements, decreased probability of aspiration, decreased salivation and secretions, antiemesis and analgesia. All medications used have the potential to produce sedation and respiratory depression and should always be administered with caution under supervision and close monitoring.

Methods:

The present study was conducted in the department of Anesthesiology in Government Medical Collage Srinagar on 120 patients of American Society of Anesthesiology physical status I-II of both sexes, aged between 2 to 8 years, scheduled for elective surgeries. All subjects were free of allergy to study drugs, hemodynamic instability, and comorbidities pertaining to the respiratory, cardiovascular, renal, and nervous system. The patients' parents received a complete description of the study and a written informed consent was subsequently obtained. The study was approved by the Institutional ethics committee. Children were equally divided in to three groups Group A (n=40) oral midazolam 0.5 mg/kg (5 mg/ml parenteral formulation, Group B (n=40) oral ketamine 5.0 mg/kg (50 mg/ml parenteral formulation and Group C (n=40) oral loly pop Fentanyl (15-20mcg/kg) by random selection using random number tables between the study groups. On the day of surgery parents were allowed to stay with the child in the preoperative room and they were asked to administer the study drugs orally. All the children were observed for the sedation and anxiety. The levels were recorded at 5 minute interval till patient was received inside the operation theatre. Any child who did not achieve desirable sedation and anxiolysis was separated from parents after waiting for a maximum period of 45 mins. The major data collected were the sedation and anxiety scores based on a 5point or 4 point scale respectively (Table A).

Vitals were also recorded and monitored during this period without disturbing the child. Any score < 3 was considered satisfactory for sedation. Anxiolysis was considered satisfactory if the score was 1 or 2. The child was separated from parents and taken to the operation theatre. Reaction of the child to separation was noted . IV cannulation was attempted in the operation theatre and child's reaction assessed. Reaction to venepuncturc was assessed by scoring system. The final sedation,

final anxiety, separation and induction scores were analysed using the student 't' test. A close watch was kept to note the occurrence of any adverse effects like vomiting, respiratory depression.

Table A. Sedation and Anxiety Score:

Sedation score	Score	Anxiety score	score
Barely arousable (fully asleep)	1	Calm and sleepy	1
Eyes closed (light sleep)	2	Apprehensive but withdrawn from surroundings	2
Eyes open but appears drowsy	3	Crying	3
Awake	4	Agitated and difficult to Control	4
Agitated	5		5

If the premedication was not completely ingested or retained, that child was excluded from further analysis. Demographic data were recorded. Sedation was assessed at baseline (before premedication), followed by an interval of 5 minutes up to 40 minutes at which child was separated from its parents to be taken to the operating room for anesthetic induction.

In the operating room, a cannula was inserted into a peripheral vein and anesthesia was induced with intravenous dose of propofol 2.-2.5 mg/kg and glycopyrrolate 0.01 mg/kg followed by Atracurium 0.5 mg/kg to facilitate endotracheal intubation. Anesthesia was maintained with halothane, at an inspired concentration titrated to stable vital signs, in 66% nitrous oxide in oxygen. If cannulation was resisted by the child, it was done after induction of anesthesia with inhalational anesthetic technique.

The lungs were ventilated mechanically. At the conclusion of surgery, all anesthetic drugs were discontinued simultaneously and the trachea extubated at resumption of spontaneous ventilation and return of reflexes. Diclofenac sodium suppository was administered as analgesic of choice. Child was observed in PACU for a period of 24 hours.

Statistical Methods:

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 expressed as Mean±SD and categorical variables were summarized as frequencies and percentages. Graphically the data was presented by bar and line diagrams. Student's independent t-test or Mann-Whitney U-test, whichever feasible, 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:

Study population was comparable with regard to demographic profile [Table 1].

Table 1: Demographic population among the three study groups

Variables	Group A	Group B	Group C	P Value
Age (years)	4.97±2.9	5.35±3.2	4.85±2.9	0.782
Weight (kgs)	9.25±6.49	8.20±6.07	9.90±5.44	0.621
Sex M/F	30/10	28/12	31/09	0.831
ASA I/II	35/5	36/4	37/3	0.427
Duration of surgery	97.66±13.70	94.66±14.45	92.73±16.04	0.531

The mean values of sedation score (Ramsay sedation score) at different intervals among three groups were statistically not significant with a p value of > 0.05 [Table 2].

Table 2: Comparison of sedation score (Ramsay sedation between the groups at various scale time points)

Time	Group	Mean±SD	P-Value
0M	A	1.95±0.56	0.51
	B	1.89±0.745	
	C	1.85±0.973	
5M	A	2.05±0.099	0.69
	B	2.00±0.875	
	C	2.08±0.050	
10M	A	2.40±0.071	0.31
	B	2.39±0.933	
	C	2.32±0.933	
15M	A	2.81±0.89	0.45
	B	2.79±0.040	
	C	2.72±0.099	
20M	A	2.91±0.164	0.29
	B	3.09±0.118	
	C	2.99±0.999	
25M	A	3.05±0.967	0.18
	B	3.15±0.005	
	C	2.99±0.973	
30M	A	3.10±0.50	0.74
	B	3.20±0.988	
	C	3.05±0.813	

With regard to Anxiety score (Grade I-IV) at parenteral separation between the study groups was statically insignificant among the study groups with (p value >0.05) [Table 3].

Table 3: Anxiety score at parenteral separation between the study groups

Variables	Group A	Group B	Group C	P Value
Anxiety score (Grade I)	31	29	33	>0.05
Anxiety score (Grade II)	13	8	9	>0.05
Anxiety score (Grade III)	6	4	7	>0.05
Anxiety score (Grade IV)	1	0	2	>0.05

The Anxiety score (Grade I-IV) at intravenous cannulation between the study groups was statically insignificant among the three study groups with (p value >0.05) [Fig 1].

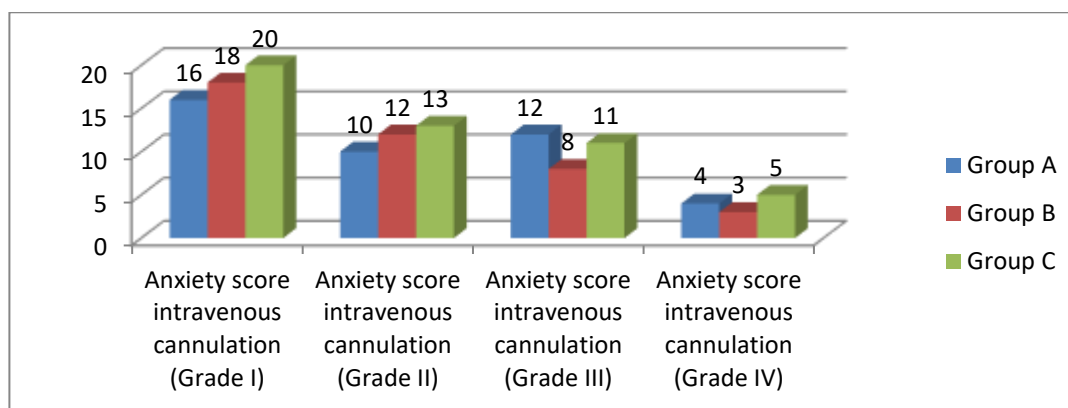


Fig 1.

The Anxiety score (Grade I-IV) at mask application between the study groups was comparable between the three study groups with (p value >0.05) [Fig 2].

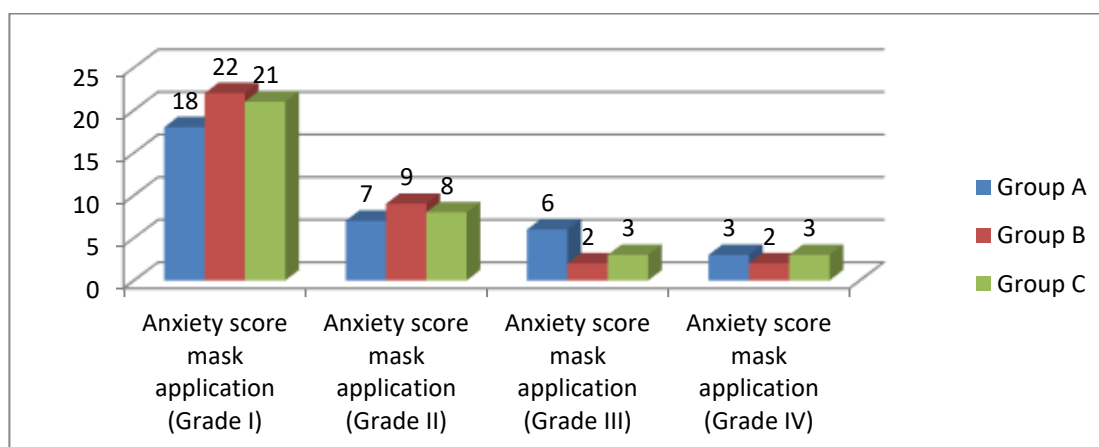


Fig 2.

Discussion

Psychological preparation of children before induction of anesthesia results in better perioperative outcome. Reduction of anxiety, calm, and sedated child in preanesthesia room has better postoperative emergence. Kain *et al.*'s [6] primary goal of premedicating the child is to produce amnesia, anxiolysis, and prevention of stress response during preinduction period. Although a drug given parenterally is more effective, in pediatric practice, needle pricks is feared most.

Opioids are frequently used as premedication. They have good analgesic effects and have ability to calm the patient but lack the ability to tranquilize with some side effects namely nausea, vomiting, and giddiness, cardiovascular and respiratory depression which may make anaesthesia difficult and hazardous. With opioids as premedication, there is delayed post-operative recovery with prolonged depression of laryngeal reflexes and under ventilation, which leads to pulmonary complications. [5,6] In a study by Karl *et al.*, it was found that sufentanil although being a very good premedication, had serious side effects like oxygen desaturation ($SPO_2 < 96\%$) in as many as 55% of patients, difficulty in ventilation of patients in 37% of patients and requiring reversal by naloxone in some patients. [7]

Nowadays benzodiazepines like diazepam, lorazepam, triazolam and midazolam have been used as premedication in children through various routes. [5] Premedication drugs like diazepam, trimeprazine have been used in children. Diazepam has a good anxiolytic properties, with poor anti-emetic effect, has a longer duration of action and a more profound respiratory depressant effect.

Trimeprazine also provides good sedation and had a mild anti-sialogogue effect but it is associated with more post-operative restlessness.

In various studies comparing midazolam, with other drugs like diazepam, morphine, fentanyl, sufentanil, scopolamine, promethazine and pethidine, it was found to be very effective, short acting, having profound amnesic properties, hemodynamic stability, lesser respiratory depression and safe. [8]

Use of ketamine in children has renewed interest in search of an ideal premedicant, as it includes a state of analgesia, sedation and anxiolytic without depressing either cardiovascular or respiratory system.

Presently another oral drug formulation as Fentanyl lolly pops has gained interest as premedication in pediatric groups.

In the present study, among the study groups Group A, Group B and Group C, majority of children were sedated to score of 3 at 20 min of administration of drugs. In a comparative study, Alderson and Lerman[9] used oral midazolam and ketamine but concluded that score of >3 was never achieved and children remained drowsy but awake. In my study, 75% children in both groups achieved sedation score of 4 at 20 min i.e., they became drowsy and asleep. In the present study, the heart rate, systolic blood pressure, and diastolic blood pressure across the group do not indicate any significant difference.

Awake IV placement, parental separation, and induction are the time points of maximum anxiety in children during the preoperative period. In the present study, we observed no significant difference in the parental separation anxiety score at 40 min between the study groups Jannu *et al.*[10] Acceptable parental separation was found in 92.5%, 95% and 93% of children belonging to group A,B and group C respectively ($P = 0.684$). Mountain *et al.*, find the same results and could not find any significant difference with regard to acceptable behavior at parent separation or mask acceptance in children receiving these premedicants 30 min before induction.[11]

In the present study, the sedation score of all Groups A, B and C, Statistical test does not show significant difference in sedation score. At different times of 5, 10, 15, 20, and 25 min produced similar sedation (Ramsay sedation score). Saarnivaara *et al.* [12] have reported that 75 mg/kg and 0.5 mg/kg of midazolam produced fair anxiolysis in children of <5 years and good anxiolysis in above 5 years age group. In our study, among age group 2–8 years, the result goes with the above study but different from the Singh *et al.*[13] who reported better anxiolysis and sedation with midazolam compared to triclofos and promethazine premedication.

Conclusion:

It can be concluded from our study, that the parenteral formulation of midazolam, ketamine and Fentanyl can be safely used as premedicant in children. These oral drugs do not produce any respiratory depression in children.

Conflict of interest: Nil

Funding: Nil

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