

# Evaluation of general anesthesia and sedation during dental treatment in emotionally immature children: A Randomized Clinical Trial

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## *Abstract*

### *Background*

*Emotionally immature children are more likely to develop health problems, including dental problems. Dental treatments require a good level of communication with the patient. Therefore, in these patients, sedation and general anesthesia are an extremely humanistic approach for comfortable and successful treatment. In such children, there is no standard anesthetic approach due to varying clinical conditions. The aim of this study was to compare general anesthesia and sedation during dental treatment of such children.*

### *Methods*

*25 children with greater than 16 score on Rutter's Child Behaviour Scale were treated under general anesthesia or sedation. Demographic data, the American Society of Anesthesiologists classification, Mallampati score, anesthesia duration, anesthesia type, anesthetic and analgesic agents used, dental treatment performed, secondary diseases, and complications in the perioperative period were recorded.*

### *Results*

*From 25 children (12 females, 13 males) that were treated during February 2016 and December 2019, 13 were treated under GA, their mean age at the time of the post treatment examination was  $48 \pm 11$  months, and the mean time lapse after treatment was  $14.5 \pm 6.2$*

*months. The group treated by sedation (Pental Sodium and Propofol) included 12 children, with a mean age of  $56 \pm 11.6$  months at the time of the post treatment examination, and a mean time lapse after treatment of  $16.5 \pm 5.03$  months.*

#### **Conclusion**

*Both the anesthetic approaches shows better results with no complications reported post treatment. Hence can be effectively used in emotionally immature children.*

*Keywords: Anesthesia, Dental Care, General Anesthesia, Pediatric Dentistry, Special care*

## **INTRODUCTION**

Emotional immaturity is the term often used to variety of behavioral disturbances and personality distortions in children [1]. For such patients, medical treatment should be personalized and the most appropriate medical treatment should be provided [2]. Such patients are more likely to develop health problems, including dental issues [3], and could belong to any race or social class. According to the World Health Organization data, it affects about 3% of the world's population each year, and they constitute 3% of the population of our country. This rate can increase later up to 8.5% due to acquired chronic diseases [4,5].

A good level of communication with the patient is essential during dental treatments to conduct the procedures smoothly [6]. Because of anatomic deformations or pathophysiological or psychological reasons, these patients may not cooperate at the desired level and dentists cannot provide effective treatment [7]. In some disabled individuals, dental treatment cannot be performed without sedation or general anesthesia. Thus, sedation and general anesthesia are extremely humanistic approaches in these patient groups [8,9]. Although dental treatments do not pose a risk to the patients' lives, general anesthesia and sedation have serious risks, especially in patients presenting a high score according to the American Society of Anesthesiologists (ASA) classification of physical status, and those with cardiovascular problems and respiratory or central nervous system pathologies. To avoid these risks as much as possible, a thorough preoperative preparation process and optimum conditions for treatment should be followed. The healthcare team serving the patient should have sufficient experience to intervene in a timely, fast, and accurate manner when needed. Patients should not only be under supervision of anesthesiologists and dentists, but also have consultant physicians present who are experts in their respective branches, in order to minimize risk [10]. Although there is sufficient literature on dental treatment modalities used in these patient groups, there are not enough clinical studies on anesthesia use. The majority of anesthesia studies are review articles. For emotionally immature, till date there is no standard approach due to varying clinical conditions.

Therefore, health practitioners do not have enough experience to deal with this complex patient group. Therefore in this study we aimed to contribute to the literature by sharing our results and experiences about anesthesia applications in such patients

## **MATERIAL AND METHODS**

### **Ethical approval**

The institutional Ethical Committee approved this study.

### **Study population**

This study were carried out in children with scores >16 assessed using Rutter's Child Behavior Scale . Patients without necessary information or informed consent were excluded from the study.

### **Study design**

This randomized clinical trial was carried out between February 2016 and December 2019, at the Department of Pediatric Dentistry, Swargiya Dadasaheb Kalmegh Smruti Dental College & Hospital after getting approval from Institutional Ethical Board and carried out under the supervision of Pediatric Anesthesiologist and Pediatric Dental expert.

The anesthetic approaches were randomly allocated amongst 25 emotionally immature children during the evaluation time period. Demographic data, ASA classification, Mallampati score, anesthesia duration, type of anesthesia, anesthetic and analgesic agents used, dental treatment applied, secondary diseases, and complications seen in the peroperative period were recorded.

### **Dental treatments**

#### **Dental treatments were classified into two groups**

Simple dental treatments and surgical procedures. The former group included dental examination, teeth extraction, filling, canal treatment, and prosthetic procedures under anesthesia, while the latter included surgical treatment of jaw fractures, surgical excision of cysts in the jaw,

### **Preoperative evaluation**

Patients who did not cooperate for dental examination and treatment were evaluated preoperatively. Laboratory tests and consultations were requested if necessary. Other accompanying medical and drug history were noted and necessary precautions were taken. All patients undergoing sedation or general anesthesia were operated after a fasting period of at least 6 h. After explaining about anesthesia and the possible risks, written informed consent was obtained from the legal guardians of these patients.

### **Intraoperative period**

Peripheral oxygen saturation, heart rate, and blood pressure were monitored according to the ASA guidelines during the dental procedures. Different anesthetic agents and methods were used according to the patients' medical and compliance status. After initiation of sedation or general anesthesia in all patients, proper local anesthesia was achieved using lignocaine before starting dental treatment. Duration of anesthesia in patients was calculated as the time from induction onset to extubation for general anesthesia.

### **Postoperative period**

Postoperatively, the patients were monitored in the recovery unit for 15–30 min. Patients with satisfactory vital functions were put into service. Oral nutrition was started after 1 h of

observation in patients sedated with inhalation agent, after 2 h in those sedated with intravenous agent, and after 4 h in those under general anesthesia. The patients who could tolerate the oral intake were discharged on the same day, while those with nausea and vomiting or requiring more recovery time were followed-up and treated in the in-patient service for 24 h.

**Statistical analysis**

Statistical Package for Social Sciences (version 18.0, Chicago, IL, USA) was used for statistical analysis. Categorical variables were represented as number and percentage, and numerical variables as mean and standard deviation. Chi-square and Fisher's exact test were used for categorical variables. The comparisons of the mean of two independent groups of the numerical variables were performed using the two tailed paired t test.

**RESULTS**

From 25 children(12 females, 13 males) that were treated during February 2016 and December 2019 , 13 were treated under GA, their mean age at the time of the post treatment examination was 48±11 months, and the mean time lapse after treatment was 14.5±6.2 months. The group treated by sedation included 12 children, with a mean age of 56±11.6 months at the time of the post treatment examination, and a mean time lapse after treatment of 16.5±5.03 months. (Table 1)

The mean duration of sedation anesthesia was 45.15 ± 30.25 min .7 (60%) children were sedated using ketamine alone while ketamine + midazolam were used in 4 (40%) children . Pentol sodium and propofol were used in 65%(8) % and 35% (5)cases undergoing intravenous induction of general anesthesia, respectively. The mean duration for general anesthesia was 55.20 ±15 .20 min

Table 1. Children Characteristics			
	Sedation	General Anesthesia	P value
<b>Gender</b>	12	13	0.51*
Male	6	7	
Female	6	6	
Age (in months)	56±11.6	48±11	0.10 <sup>#</sup>
Weight (in kgs)	9.5±2.05	11.25±2.05	0.24 <sup>#</sup>
<b>Dental Treatment</b>			
Simple Treatment	10	02	1.20*
Surgical Treatment	02	11	
<b>Complications</b>			
Bradycardia	0	0	0.11*
Allergy	0	0	
Bronchospasm	0	0	
<b>Mallampati Scores</b>			
MP class 1	12	13	0.62*

MP class 2	0	0	
MP Class 3	0	0	
<b>ASA Scores</b>			
ASA II	11	11	0.84*
ASA III	1	2	
*Fisher's exact test was performed with Chi-square test, ; # paired t test			

## DISCUSSION

Emotionally immature children are unable to maintain adequate oral care and hygiene, as they cannot perform self-care or remove dental plaque from the mouth. Furthermore, problems may intensify due to malocclusion [12], and they present higher prevalence of dental caries as compared to their peers. Especially in this group of patients, sweets given as reward in behavior-change programs can negatively affect their oral health, similar to diet containing dry-fruits leading to constipation [4,13]. Moreover, they require frequent dental treatment, and most times, their treatment cannot be performed only with local anesthesia [4]. General anesthesia and sedation are an essential part of repetitive dental procedures in such patients [14]. However, these patients are not a homogenous group, and there are varying clinical conditions presented.

There are a limited number of clinical studies in the literature [15]. Due to the complexity of the subject, mental retardation, other syndromes, psychiatric disorders, physical disorders, and complex medical history were compared with healthy patients or with each other [16]. The clinician would be more comfortable performing the treatment if the patient is immobile during the procedure in order to reach the area of treatment easily. This can only happen under general anesthesia or sedation. Our study was based on the need for anesthesia in such patients. The groups were distributed as homogeneously as possible with respect to their clinical findings. Although this is a complex subject, the common point was that all these patients required special care during dental procedures.

Pentothal was more preferred in general anesthesia induction in all the groups, because of the high number of epileptic patients. There are studies in the literature reporting the successful application of nitrogen protoxide in conscious sedation of pediatric patients [17]. However, nitrogen protoxide was not used in any groups in our study, because airway problems could have been an issue in each group.

Local anesthesia is sufficient for simple dental treatments, and 90% of the patients in our study sustained with it, but some patients (7%) needed additional analgesia. Narcotic analgesics were administered in operations causing severe pain (3%). Özkan et al. [18], in their study of narcotic analgesic requirement in dental treatment 3% as stated in the literature.

The literature concludes that dental treatments for such children should be performed under general anesthesia or sedation [19,20,21,22]. However, the anesthetic methods and approaches used are not mentioned, thus our publication is a first in this respect. There have been no studies evaluating these parameters to report in this section. Hence, we found it appropriate to evaluate and compare our groups amongst themselves.

Therefore, these procedures can be performed safely with detailed preoperative examination, appropriate premedication and anesthetic agents, selection of method and equipment, and experienced staff. In our study, the expected complications were not as severe as reported in the literature, because conditions were maintained at an optimum level.

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