

The use of conscious sedation with midazolam in outpatient pediatric dentistry

Introduction

Dental diseases and problems arising during their treatment has always been one of the most important problems of practical medicine. Discomfort, emotional stress, pain have constantly been accompanying the process of dental treatment. Not accidentally, the opening of the general anesthesia, the use of local anesthesia as well as striving for practical use of all new developments in this field of knowledge are connected with dental treatment as a rule.¹⁻³

According to several authors, special attention is paid to the sense of fear of the manipulation (preoperative fear) as a complex combination of emotional components of various strength—fear, strong fear and phobia. Visiting medical facility, in fact, is stressful for a child. The severity of this stress depends on various factors: constitutional features, family upbringing, going to any preschool institution, the level of “education” of the child, negative history of pain manipulation.^{1,3-7}

During the study of the problem of fear methods of assessing the degree of fear were invented. The test mYALE which is currently the “gold standard” in this direction was designed to assess fear in pediatric age group 2-12 years.^{6,7}

Taking into account the origins of the emergence of anesthesiology as a science, it is worth noting that the problem of anesthesia in dentistry, particularly pediatric dentistry, has a number of features. The first Department of pediatric dentistry in Russia was organized in the Moscow Institute of Dentistry in 1963. The occurrence of this Department has arose because of clear understanding of features of childhood and the necessity of providing pediatric patients and problems encountered during their treatment in a special separate group.

In 1965 anesthetic management during dental treatment of children was allocated in a separate direction which was headed by A. S. Dobronravov. Currently, according to the Russian Ministry of health, the prevalence of caries of deciduous teeth in average is 81.4%. Every child in our country on average is faced with the necessity of treatment of caries and its complications 1,5 times a year. The understanding of urgent necessity of anesthesia in dentistry has led Russia to the fact that this is currently the only ambulatory medical service for the provision of which permanent staff of anesthesiologists is selected by normative documents of the Russian Ministry of health.

A study which allowed to assess the state of anesthesia in pediatric dentistry, to determine the need for analgesia, the structure of the applied methods and tools over the last 10 years (1994 to 2003) was conducted by scientific staff of the Moscow state University of medicine. Its conclusions are: Did not need analgesia: a 9.8-14.6% of surgery, a 48.3 and 53.1% therapeutic, and 70.8–72.1% of orthodontic visits.

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During the treatment of children was used: general anaesthesia for provision of 0.3-4.6% of surgical 0,03-0,1% therapeutic, 0.01 to 0.02% orthodontic visits; various methods of local anesthesia of 41.4-48.8 % surgical, 7,1-9,4% therapeutic, 2-3,5% of orthodontic visits. Combined anaesthesia (premedication and local anesthesia amid the resulting effect in the area of dental treatment)-single observations, practically never used. The obtained data revealed a considerable gap in the positions “needed no pain relief and was not applied”. Apparently, there is a category of children—ambulatory patients, the treatment of which should be accompanied by anesthesia, but for some reasons is not. These studies are shown in the manual “General anesthesia and sedation in pediatric dentistry” V. M, Stosh, S. A. Rabinovich (2003). Also, the analysis of the age range in this study showed that children aged 4-7 years which, together with the younger age group 1-3 years were 70% in the stream of ambulatory dental patients the treatment of which is possible only with the use of general anesthesia dominated among patients with a sharp negative attitude to treatment up to categorical rejection of it.³

According Dzh.Wright, P. E. Starkey, D. E. Gardner, see the manual “Managing children’s behavior in dentistry” (2008) following methods are used to improve the quality of dental treatment for children: sedation with nitrous oxide, intravenous sedation, general anesthesia are used for school-age children; general anesthesia, sedation nitrous oxide - for the younger group. The authors consider sedation by drugs in younger age groups is not predictable and reasonable.²

The retention of the patient is described as a separate form of assistance in dental treatment of pediatric patients (Wright at al, 1993). Ready fixtures restraining the child’s movement are used to hold it. This method is widely spread in North America.² According to the Central Scientific Research Institute of Dentistry and Maxillofacial Surgery for the period from 2014 to 2016, there is an increase in the total number of patients in childhood who needs dental treatment as well as a change in the ratio between sanations carried out in conditions of drug sedation and anesthesia (Figure 1) (Figure 2).

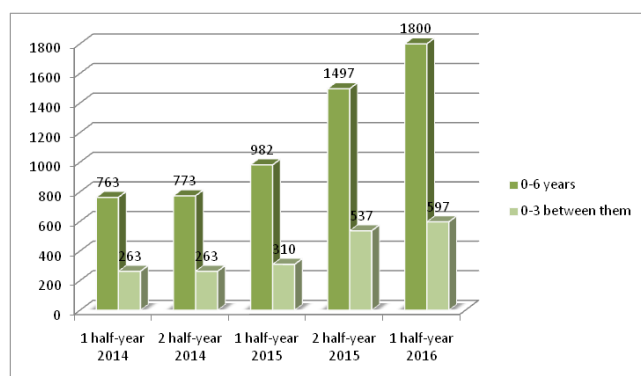


Figure 1 Diagram showing the number of children under the age of 6 who have applied for dental care.

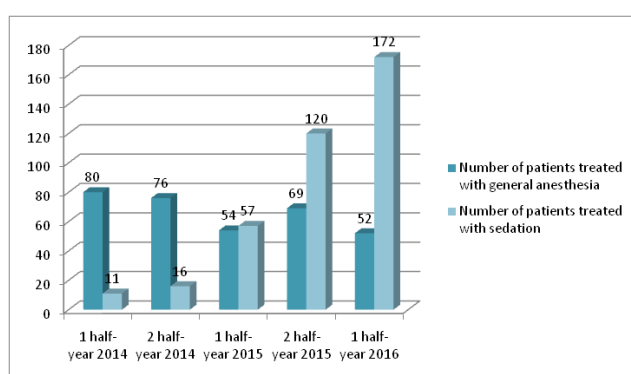


Figure 2 Ratio of children aged 6 years treated with conscious sedation and general anesthesia.

Objective

To improve the quality of treatment for children in outpatient dentistry on the basis of combined use of conscious sedation for premedication (midazolam) and local anesthetics.

Materials and methods

The study was carried out in 208 children. The group included children with negative experience in surgical and therapeutic treatment of teeth (treatment without local anesthesia, forced treatment with restraint) in anamnesis, children with “fear of white robes” (without negative dental experience), children with hyperactivity and characteristic features. Some of the children did not meet the above criteria, however, the expected duration of treatment, the use of local anesthesia and dental manipulation, the age from 0 to 3 years could cause a negative experience of dental treatment. These children were also included in the study group. After explaining to parents the purpose of the study and obtaining voluntary consent, the child was included in the group. All children were divided into two age groups: 0-3 years and 3-6 years. The distribution in each group by sex and inclusion criteria is shown in the Table 1.

It should also be noted that in the younger age group, the average age of the patients was 39 months (2 years 5 months), of which 20.6% are younger than 24 months (2 years). Patients enrolled in the study were planned to be treated in conditions of combined anesthesia (conscious sedation plus local anesthesia) or only conscious sedation.

The decision on the need for local anesthesia was taken by a dentist, depending on the degree of tooth damage. Medication sedation was carried out by intramuscular injection of the drug “Midazolam” (in combination with blocker of histamine H1 receptors and atropine). Intramuscular injection was preceded by local anesthesia of the skin of the upper quadrant of the buttock with the cream “EMLA”.

Table 1 Characteristics of patient groups

	0-3 years	3-6 years
All in all	90	118
Boys	52 (57,7%)	72 (61%)
Girls	38 (42,2%)	46 (39%)
With negative experience	14 (15,5%)	40 (33,8%)
Hospital fear	12 (13,3%)	10 (8,5%)
Characteristic features	-	8 (6,8%)
Age features	90 (100%)	-
More than 2 teeth for treatment	72 (80%)	110 (93,2%)
Intended use of local anesthesia	50 (55,5%)	95 (80,5%)

For the study, doses of midazolam were used from the calculation of 0.1mg/kg, 0.15mg/kg and 0.2mg/kg. As a result, within each age group, there were three subgroups that corresponded to the doses of the drug. After 20-25 minutes from the anesthesia ward the patient was transferred to the dentist's office for treatment. The depth of conscious sedation was assessed using a visual scale of sedation Ramsay (II-III degree) and BIS-monitoring. The general condition of the patients was monitored using a Drager Infinity monitor (Drager). Monitoring data were fully reflected in medical records of patients.

After the planned dental treatment, the patient was transferred for observation to the anesthesia ward, where he also controlled the overall somatic state. After the exit from the state of conscious sedation the contactness and activity of the patients, the accuracy of the implementation of proposed instructions were checked. After reaching a positive result the parents took the child home.

The quality of treatment in conditions of drug sedation was assessed with the help of questionnaires of parents and dentists. In the questionnaires for parents reflected: the level of comfort of treatment in conditions of drug sedation, the adequacy of the behavior of the child in the immediate period after treatment and the child's desire to continue to visit the dentist.

In the questionnaires for doctors subjective criteria were reflected:

- Convenience of work on a 5 point scale
- Possibility of contact with the child
- Number of teeth treated in one visit
- The possibility of treating a child without any anesthesia during further visits (after how many visits)
- Child's attitude to treatment

And objective criteria:

- Tight seizure of the filling after 3,6,12 and 24 months (1-color disorder, but no obvious gap, 2) color disturbance plus the presence of an edge gap, 3) complete loss of the filling)
- The appearance of chips on the fillings
- Complications after the treatment (development of pulpitis and periodontitis).

Results and discussion

The results are presented in Table 2 & Table 3.

During the analyzing the obtained data it was noted that treatment in conditions of drug sedation is possible in both age groups. Comfortable time of treatment does not depend on the administered dose of the drug, and, moreover, with an increase in the dose of the

drug, there are such side effects as hallucinations and double vision in the eyes, the disinhibition of patients. An increase in the dose of the drug also did not improve the quality of tooth filling. Complications of dental treatment have not been recorded in any of the groups. Data were also obtained for children of the younger age group on the possibility of treatment without the use of anesthesia in several visits.

Table 2 Patients of the 0-3 age group

Dose	0, 1 mg/kg	0, 15 mg/kg	0, 2 mg/kg
Number of patients	26	36	28
Degree of sedation Rumsay / Bis	II/73-80	II/60-73	II-III/60-73
Comfortable time of treatment	Up to 30 minutes	Up to 40 minutes	Up to 40 minutes
Number of treated teeth per visit	1-2	2-6	2
Possibility of contact with the child	20	35	12
Saved marginal seals for 12 months (%)	80,7%	97,2%	92,8%
Complications of treatment	-	-	-
Hallucinations and doubling	0	0	12
Disinhibition and hyperactivity	0	1	4

Table 3 Patients of the age group 3-6 years

Dose	0, 1 mg/kg	0, 15 mg/kg	0, 2 mg/kg
Number of patients	35	43	40
Degree of sedation Rumsay/Bis	II/73-80	II/60-73	II-III/60-73
Comfortable time of treatment	Up to 30 minutes	Up to 40 minutes	Up to 40 minutes
Number of treated teeth per visit	1-2	2-4	1-4
Possibility of contact with the child	34	42	28
Saved marginal seals for 12 months (%)	94,8%	97,7%	97,5%
Complications of treatment	-	-	-
Hallucinations and doubling	0	0	28
Disinhibition and hyperactivity	1	0	16

Conclusion

Based on the data obtained in the study, the conclusions are made:

- The most effective is the dose of 0.15 mg/kg.
- The dose works in both age groups.
- Timely application of conscious sedation during sanitation of the oral cavity for children of younger age group (0-3 years) improves the quality of treatment, and further facilitates dental treatment without the use of anesthesia.

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