



The effects of oral conscious sedation on future behavior and anxiety in pediatric dental patients

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Abstract

Purpose: This study investigated the relationship between oral conscious sedation and subsequent behavior in the dental setting.

Methods: The sample consisted of 38 children between the ages of 39 to 71 months (mean=50 months) who had been treated with oral sedation 2 to 34 months (mean=13 months) previously, and a control group of 38 children, matched by age (mean=51 months) and gender, who had received dental treatment without conscious sedation or general anesthesia one week to 3 years previously. Subjects were matched by age and gender. All children received a standard recall examination and a prophylaxis, during which behavior and anxiety were measured. Independent variables included age at the time of sedation, present age, gender, time elapsed since sedation, effectiveness of sedation, parental scores on Corah's Dental Anxiety Scale and parent's answers to a questionnaire. The dependent variables were child behavior (rated with the 4-point Frankl scale) and self-reported anxiety ratings.

Results: Both groups had mean behavior ratings of positive or very positive (experimental group mean=3.13; control group mean=3.34). There were no statistically significant differences between the groups and there was little correlation of independent and dependent variables.

Conclusions: There is no relationship between oral conscious sedation and the future behavior of children in the dental setting. (*Pediatr Dent* 24:207-211, 2002)

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Uncooperative patients present a unique problem for practitioners treating children. For most patients, acceptable behavior can be achieved by traditional nonpharmacologic management techniques; however, for a small number, conscious sedation is used. The primary use of pharmacologic sedation is to modify or eliminate negative behavior and allow the child to cooperate for dental treatment. The goal, however, is not only to enable treatment to be performed but also to establish a positive psychological response to treatment. Proponents of pharmacologic management report that sedatives allow the practitioner to render dental treatment and allow patients to undergo treatment with reduced anxiety.

Critics of pharmacologic management of children purport that children may learn dysfunctional strategies for coping that result in temporary cooperation at the expense

of intensifying fears or anxieties. However, little data exists to confirm either position, and it is unclear whether sedation techniques with or without physical restraint have any long-lasting effect on the young child.

The objective of this study was to determine if the use of oral conscious sedation is associated with manifestations of future negative behavior in young dental patients.

Methods

This study was approved by the University of Medicine and Dentistry of New Jersey–New Jersey Dental School, Institutional Review Board. Several questions were addressed:

1. How do previously sedated children accept dental treatment 1 to 3 years following sedation?
2. Is there a relationship between the time elapsed since the sedation experience and subsequent behavior in the dental setting?

3. Do children who have experienced dental treatment with oral and inhalation conscious sedation self reported high dental anxiety after 1 to 3 years?
4. Do parent (guardian) responses to specific questions or parent scores on the Dental Anxiety Scale¹ relate to the child's behavior ratings and self-report anxiety ratings?

Thirty-eight children who were previously treated at the New Jersey Dental School's Department of Pediatric Dentistry with oral and inhalation conscious sedation served as study subjects. Sedation appointments had been completed 2 to 34 months (mean=13 months) prior to participation. The subjects ranged in age from 39 to 71 months (mean=50 months) and had been treated previously from 1 to 4 times with a sedative agent (chloral hydrate or midazolam) and 50% nitrous oxide while restrained with a Papoose[®] board with auxiliary head restraint (Olympic Medical Group, Seattle, Wash). None of the subjects had physical disabilities or known psychological disorders, and the sedation appointment had been the first dental treatment experience for the majority of subjects.

A control group consisted of 38 subjects matched by age (mean=51 months) and gender. One week to three years previously, the control subjects had undergone a variety of dental treatment procedures without the aid of pharmacologic agents.

Subjects were identified from a consecutive list of 76 previously sedated patients. Parents were contacted by telephone or letter to schedule a routine recall examination for their child. Of 29 who did not wish to participate, 19 had relocated, 7 were being treated by an outside dentist and 3 expressed lack of interest. Subjects were selected according to the following criteria: present age of 3 to 6 years, presence of the mother or guardian at the recall appointment and the ability of the investigator to communicate with the mother and child in English. Subjects had not had any dental

visit since their sedation appointment. Informed consent was required for participation in the study.

Rating behaviors

The 4-point Frankl scale was used as a measure of behavior.² Numerical equivalents of 1 (definitely negative), 2 (negative), 3 (positive) and 4 (definitely positive) were used during the recall visit at three separate times: (1) subject getting into the dental chair; (2) during the oral examination; and (3) during a rubber cup prophylaxis. Verbal interactions with the subjects were kept to a minimum, and voice control and restraint were not used. The parents were present in the operatory but were instructed to act as passive and silent participants. All behavior in the operatory was videotaped to assess the reliability of the operator's behavior ratings.

Measurement of anxiety

A fear survey (FS) consisting of a modified dental subscale of the Children's Fear Survey Schedule³ was administered by the investigator as a self-report measure of anxiety (Fig 1). All subjects were asked to verbally rate their fear on a 4-point scale (1=not afraid at all; 2=a little afraid; 3=pretty much afraid; 4=very afraid) concerning 10 hypothetical questions. To ensure that all children understood the concept of increasing degree of fear, a drawing of 4 different size circles was used as a visual aid (Fig 2). Children were asked to point to the "smallest, largest and medium circles" to facilitate valid responses to questions regarding quantity of fear. The fear survey was administered at the beginning and at the end of the recall appointment to establish short-term reliability and then again, at a follow-up preventive visit to establish longer-term reliability.

At the recall visit, parents completed the Corah's Dental Anxiety Scale (DAS)¹ in a quiet room prior to the child's

| | Items | Not afraid at all (1 point) | A little afraid (2 points) | Pretty much afraid (3 points) | Very afraid (4 points) |
|-----|---|-----------------------------|----------------------------|-------------------------------|------------------------|
| 1. | Dentists | | | | |
| 2. | Doctors | | | | |
| 3. | Injections (shots) | | | | |
| 4. | Having somebody look in your mouth | | | | |
| 5. | Having a stranger touch you | | | | |
| 6. | Having your teeth fixed | | | | |
| 7. | Having somebody put tools in your mouth | | | | |
| 8. | Choking | | | | |
| 9. | Having to go to the hospital | | | | |
| 10. | People in white uniforms | | | | |

Fig 1. Dental subscale of the Children's Fear Survey Schedule (FS). Scoring of the modified CFSS (DS): The total possible questionnaire score ranged from 10 to 40. Points for each of the 10 hypothetical questions ranged from 1 (not at all afraid) to 4 (very afraid).

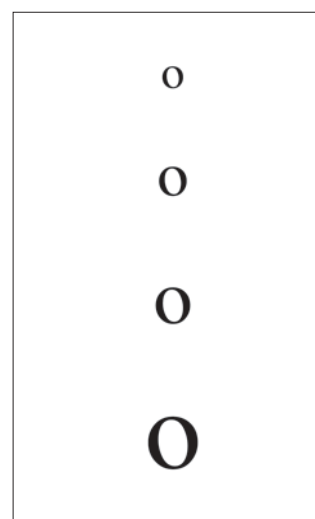


Fig 2. Visual aid shown to each child prior to administration of the Children's Fear Survey Schedule (FS)

1. If you had to go to the dentist tomorrow, how would you feel about it?
 1. I would look forward to it as a reasonably enjoyable experience.
 2. I would not care one way or the other.
 3. I would be a little uneasy about it.
 4. I would be afraid that it would be unpleasant and painful.
 5. I would be very frightened of what the dentist might do.

2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
 1. Relaxed
 2. A little uneasy
 3. Tense
 4. Anxious
 5. So anxious that I sometimes break out in a sweat or almost feel physically ill.

3. When you are in the dentist's chair waiting while he gets his drill ready to begin working on your teeth, how do you feel?
 1. Relaxed
 2. A little uneasy
 3. Tense
 4. Anxious
 5. So anxious that I sometimes break out in a sweat or almost feel physically ill.

4. You are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist is getting out the instruments which he will use to scrape your teeth around the gums, how do you feel?
 1. Relaxed
 2. A little uneasy
 3. Tense
 4. Anxious
 5. So anxious that I sometimes break out in a sweat or almost feel physically ill.

Fig 3. Corah's Dental Anxiety Scale (DAS). Scoring the DAS: The DAS was scored with 1 point for choice 1 to 5 points for choice 5. Corah et al (1978) suggested that "a score of 13 or 14 should make the dentist suspicious that he is dealing with an anxious patient. A score of 15 or more almost always indicates a highly anxious patient."

examination (Fig 3). Parents also completed a 5-question child assessment (PA) adapted from the work of Wright and Alpern⁴ (Fig 4).

Data analysis

Independent variables for the experimental group were gender, present age, age at the time of sedation, time elapsed since sedation, effectiveness of original sedation, parent's scores on the DAS, and the parent assessment of the child (PA). The dependent variables included the self-reported fear survey measurement of anxiety in the child (FS) and behavior ratings at the three different time periods during the recall appointment. The Kendall's tau correlation coefficient was used to examine the correlation of dependent and independent variables with a *P* value of ≤ 0.05 , considered statistically significant, and a coefficient of ≥ 0.5 considered clinically meaningful. The Wilcoxon-ranked sum test was used to compare behavior and anxiety scores of the experimental group and the control group by gender.

Reliability of ratings was calculated as a percent agreement of behavior ratings made by the principal investigator (MM) in the operator with a consensus rating made by two investigators (MM and SK) from videotapes approximately one month later.

1. How do you think your child has reacted to past medical procedures?
 1. Very poor
 2. Moderately poor
 3. Moderately good
 4. Very good

2. How would you rate your child's anxiety (fear, nervousness) at this moment?
 1. Very high
 2. Moderately high
 3. Moderately low
 4. Low

3. How do you think your child will react to this procedure?
 1. Very poor
 2. Moderately poor
 3. Moderately good
 4. Very good

4. In the last two years, my child has experienced actual physical pain in connection with medical procedures:
 1. Quite often (3 or more times)
 2. Occasionally (one or two times)
 3. Never

5. How do you feel about the previous sedation experience?
 1. Very poor
 2. Moderately poor
 3. Moderately good
 4. Very good

Fig 4. Parent assessment of child behavior (PA). Adapted from Wright and Alpern, 1971.

Results

Reliability of ratings

The ratings of behavior by the examiner were highly reliable. The percent agreement between behavior ratings of the operator and the consensus ratings made one month later was 91%. In regard to the fear survey (FS), the subjects responded in a reliable fashion. Kendall's tau correlation coefficient was 0.58 ($P=0.001$) when values obtained at the beginning of the recall visit were compared with those at the end of the visit.

Behavior scores

In this study, the experimental subjects were unexpectedly well behaved and their behavior was similar to that of the control subjects. Both groups had mean behavior ratings of positive or very positive on the Frankl scale (control group mean=3.34; experimental group mean=3.13) and there were no statistically significant differences between the groups. That unexpected finding resulted in little differences with all of the independent variables. That unexpected finding resulted in little differences with all of the independent variables. There were no significant differences between male and female subjects (Table 1), with Wilcoxon scores equal to 0.87, 0.59 and 0.50 for the three different times of observation. The current age of subjects was not related to

behavior (Kendall's tau ranged from 0.25 to 0.3, Table 2). When age at the time of sedation was examined, there were small but statistically insignificant differences in the behavior scores for the various age groups (Kendall's tau ranged from 0.12 to 0.26, Table 3).

Time elapsed since sedation vs the observed behavior scores is illustrated in Table 4. Behavior scores ranged from 2.9 to 4 for the procedures climbing into the chair and examination, and they were slightly lower (2.7 to 3.3, omitting a single outlier observation of 2) for the prophylaxis procedure.

When current behavior was analyzed with regard to the effectiveness of the original sedation, no statistically or clinically meaningful difference between groups was observed (Table 5). Average ratings of behavior were either positive or very positive regardless of the effectiveness of the original sedation, and the correlation coefficients were quite low, rating from 0.16 to 0.26.

Anxiety scores

No significant differences between the self-reported anxiety scores on the CFSS of the control and experimental groups were found. Mean scores for the baseline administration of

Table 1. Behavior Related to Gender (Mean±SD)*

| | Getting into chair | During examination | During prophylaxis |
|----------------|--------------------|--------------------|--------------------|
| Female(n=23) | 3.4±0.9 | 3.3±1.0 | 2.9±0.9 |
| Male(n=15) | 3.5±1.0 | 3.5±0.9 | 3.1±0.9 |
| Wilcoxon score | 0.87 | 0.59 | 0.50 |

*Behavior scores for all tables according to Frankl rating scale. Scores could range from 1=definitely negative to 4=definitely positive.

Table 2. Behavior Related to Current Age (Mean)

| | Getting into chair | During examination | During prophylaxis |
|---------------|--------------------|--------------------|--------------------|
| Age 3(n=18) | 3.1 | 3.0 | 2.4 |
| Age 4(n=13) | 3.8 | 3.6 | 3.4 |
| Age 5(n=7) | 3.5 | 3.5 | 3.0 |
| Kendall's tau | 0.30 | 0.25 | 0.25 |
| P | 0.02 | 0.05 | 0.06 |

Table 3. Behavior Related to Age at Time of Sedation (Mean)

| | Getting into chair | During examination | During prophylaxis |
|---------------|--------------------|--------------------|--------------------|
| Age 2(n=18) | 3.6 | 3.3 | 2.9 |
| Age 3(n=17) | 3.4 | 3.4 | 3.1 |
| Age 4(n=3) | 3.0 | 2.3 | 2.3 |
| Kendall's tau | 0.12 | 0.26 | 0.19 |
| P | 0.29 | 0.07 | 0.19 |

Table 4. Behavior Related to Time Elapsed Since Sedation (Mean)

| | Getting into chair | During examination | During prophylaxis |
|---------------------|--------------------|--------------------|--------------------|
| 2-6 months(n=9) | 2.9 | 3.0 | 2.6 |
| 7-12 months(n=14) | 3.2 | 3.1 | 2.6 |
| 13-24 months (n=10) | 4.0 | 4.0 | 3.2 |
| 25-34 months (n=5) | 4.0 | 3.2 | 3.3 |
| Kendall's tau | 0.39 | 0.29 | 0.31 |
| P | 0.003 | 0.03 | 0.02 |

the fear survey were 20±7 for the experimental group and 21.7±9 for the control group. Means for the second and third administrations of the dental fear survey were 20.6 and 20.7, respectively. The scores were not significantly correlated with any of the other variables studied for either males, females or the entire group of experimental subjects. Maternal self-reported dental anxiety was found to be low, with only 3 of the 38 parents surveyed indicating dental anxiety. Consequently, there was no correlation evident between maternal anxiety and child behavior.

Parent assessment of child behavior

There was very low correlation of the parent assessment of the child with child behavior in the dental operatory. Of the five items on the assessment scale, only one question ("How do you think your child will react to this procedure?") demonstrated a significant and meaningful correlation with the subsequent behavior of the child (Kendall's tau=0.61 for behavior in the chair and Kendall's tau=0.54 for behavior during the examination).

Discussion

This study has shown that young children who experienced sedation for their dental treatment exhibited good behavior when subsequent dental treatment was provided. Furthermore, the behavior of the sedated group at subsequent appointments was not statistically different than a control

Table 5. Behavior Related to Effectiveness of Original Sedation (Mean)

| | Getting into chair | During examination | During prophylaxis |
|-----------------|--------------------|--------------------|--------------------|
| Excellent(n=4) | 4.0 | 4.0 | 3.3 |
| Very good(n=12) | 3.4 | 3.5 | 3.0 |
| Good(n=17) | 3.4 | 3.1 | 2.9 |
| Fair(n=4) | 3.0 | 3.0 | 2.5 |
| Poor(n=1) | 4.0 | 4.0 | 4.0 |
| Kendall's tau | 0.16 | 0.26 | 0.19 |
| P | 0.29 | 0.07 | 0.19 |

group of children who were matched by both age and gender but who had never received sedation. Whether or not the children simply did not recall the prior sedation experiences was not determined, but the data suggests that sedation, regardless of its effectiveness or the time elapsed between the sedation and future dental treatment, does not lead to negative behavior or dysfunctional strategies for coping with fears or anxieties in the dental setting. These findings were similar to those of Kupietzky and Blumenstyk⁵ with regard to children treated with either general anesthesia or sedation.

The majority of the independent variables in the current study, including age at the time of sedation, present age, gender of the patient, time elapsed since sedation, effectiveness of the sedation, parental scores on the DAS, and child scores on the FS were not significantly related to current child behavior. It is possible that young children could not give accurate responses to questions such as “What did the dentist do the last time you visited?” or “Do you like the dentist?” It is also possible that discussions with family and friends might have affected the children’s memory regarding prior dental treatment. These findings contrast with those of Koroluk,⁶ which demonstrated higher anxiety on the DAS scale with children treated with sedation compared to a control group.

Although some earlier studies⁷⁻⁹ found a relationship between maternal self-reported anxiety and the child behavior in the dental setting, the current study does not corroborate those findings. One explanation may be that the measure of parental anxiety was different from that used in the current study. Another possibility is that in this study only 3 of the 38 parents of children in the experimental group reported dental anxiety.

While the prediction of dental behavior of children was not a goal of the current study, practitioners have always been interested in learning this information to adjust their treatment strategy. The current study corroborated an earlier report¹⁰ that simply asking the parents “How do you think your child will react to this procedure?” provides significant information about the actual behavior of the children. However, questions regarding the child’s previous reactions to dental or medical procedures and the mother’s impression of her child’s anxiety were not significantly related to that child’s behavior.

The control group used was matched for age and gender but with the primary exclusionary factor of no prior sedation or general anesthesia experience. However, this group was selected retrospectively and had had a variety of previous dental experiences. If the study had been prospective, variables such as specific restorative treatment and specific drugs used might have been controlled. In spite of those possible confounding variables, the results of this study found that oral conscious sedation was not related to future dental behavior.

The current study involved only a recall appointment and a prophylaxis. If a restorative appointment involving local anesthesia and rubber dam placement was studied, results might have been different. However, the original decision to sedate a child is usually based on the behavior of the child exhibited during an initial appointment where an examination and prophylaxis are often performed, and not a restorative visit. Consequently, in this study, only a recall appointment was used to measure the effect, if any, of prior sedation(s).

Conclusions

1. Dental treatment with oral sedation has no significant effect on future dental behavior when a recall examination and prophylaxis are performed 2 to 34 months later.
2. None of the variables—such as time elapsed since sedation, current age, gender, effectiveness of the sedation, parental scores on the dental anxiety scale, or a self-report measure of anxiety of the Children’s Fear Survey Schedule—are significantly associated with child behavior on a later recall visit.

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