Efficacy of Intranasal Dexmedetomidine as a Sedation Modality for Dental Procedures

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PURPOSE

The purpose was to determine whether intranasal dexmedetomidine with nitrous oxide is effective and safe in achieving the desired level of sedation and improving behavior in children aged 3-6 years old who receive dental treatment in office.

INTRODUCTION

One of the most important responsibilities of a pediatric dentist is being able to manage patients with dental fear and anxiety. Children that are fearful during dental treatment often become uncooperative. This may result in situations that are unsafe and may ultimately lead to treatment failure. Conscious sedation is one modality pediatric dentists can use to ease the fear of patients. Currently, pediatric dental clinics across the country use a variety of oral and intranasal sedation modalities including: dexmedetomidine, diazepam, midazolam, meperidine, chloral hydrate, hydroxyzine, and others. There is a shift away from chlorate hydrate for safety concerns and away from opioids for safety and addiction concerns. Dexmedetomidine is used successfully as a sedation agent in other medical specialties, but there is limited research regarding the use of dexmedetomidine for pediatric dental sedations.[1] A study in dentistry has been published establishing the safety of dexmedetomidine with nitrous oxide for sedation in pediatric dentistry.[2] The aim of this project is to examine the efficacy of intranasal dexmedetomidine with nitrous oxide as a sedation modality for dental procedures. Depending on the efficacy of intranasal dexmedetomidine, this may be an adequate alternative sedation medication for pediatric dental patients due to the drowsiness it provides, with limited effect on respirations and airway.

METHODS

1. A retrospective chart review identified patients who have received intranasal dexmedetomidine with nitrous oxide at the UPMC Children's Hospital of Pittsburgh dental clinic, between December of 2019 and December of 2021
2. Identified participants were pediatric dental patients at the Children's Hospital of Pittsburgh dental clinic who required moderate sedation to complete their dental treatment needs. Those included healthy children ages 3-6 years old, classified as either ASA I or II.
3. Exclusion Criteria included the following: patients outside of this age range, patients who are medically complex (i.e. ASA III or higher, difficult airway, obstructive sleep apnea, obesity, and gastroesophageal reflux disease), and patients who do not speak English.
4. From the patient charts, various outcomes were measured and analyzed including: age, sex, behavior (using a standardized Frankl scale), whether expected treatment was performed, whether additional treatment was scheduled, adverse effects (such as vomiting) and amount of time for treatment.
5. Descriptive statistics was used to analyze data for the criteria indicated above.

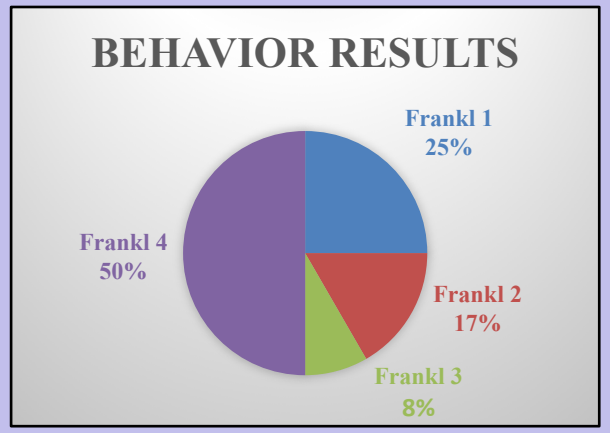

Figure 1.

OUTCOME MEASURMENTS	
Total Subjects	12
Female	8 (66.7%)
Male	4 (33.3%)
Treatment completed	8 (66.7%)
Additional treatment needed	7 (58.3%)
Adverse events	6 (50%)
Average treatment time	26.6 min.
Average sedation time	88.6 min.

Figure 2.

RESULTS

In two years, there were 12 patients who were treated in the dental clinic with sedation using intranasal dexmedetomidine and nitrous oxide. Of these, 8 were female (66.7%) and 4 were male (33.3%). Expected treatment was completed for 8 of the patients (66.7%). Additional treatment was needed for 7 patients (58.3%), 3 of which required general anesthesia. Adverse events occurred for 6 of the patients (50%). Adverse events included nausea, vomiting, partial airway obstruction, and failed sedation. The average treatment time was 26.6 minutes and the average total sedation time was 88.6 minutes. The Frankl behavior score distribution is displayed in figure 1. Six patients received a Frankl behavior score of 4 (50%). Half of this subset had adverse events and half (not the same half) required additional treatment. Treatment time of this subset lasted between 20-40 minutes and had no correlation to outcomes. 6 of the patients received a Frankl behavior score below 4 (50%). Within this second subset, half of the patients had adverse events. Only 1 of the 6 patients in this second subset had treatment completed. Across all 12 patients, failures was not related to sedation time or treatment time. There was no statistical significance in this data set.

DISCUSSION

Due to the small sample size enrolled in this study, a significant statistical analysis could not be achieved. Future studies should prioritize a larger sample size; ideally a minimum of 50-60 patients. One of the interesting findings of this study is the apparent randomness of failed treatment, as this did not seem to be related to behavior, age, sex, or treatment plan. Though ~67% of patients had treatment completed, the number of adverse events is of concern as an ideal sedation is one that provides comfortable treatment in a safe manner. The adverse event that seemed to occur most frequently is nausea and vomiting. As a majority of these patients were treated using a high concentration of nitrous oxide (~65%) throughout the entire treatment, it is possible that this contributed to the adverse reaction.

CONCLUSIONS

Continuation of this is study is recommended as knowledge is limited in the use of dexmedetomidine in pediatric dental patients. Further research comparing dexmedetomidine with other sedations in the pediatric dental patient, will provide pediatric dentists with research-based evidence regarding the efficacy of this sedation modality. Future studies should also examine the potential use of dexmedetomidine as an adjunct, in combination with other more traditional sedation medications.

REFERENCES

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