

Oversedation in a pediatric patient: case report

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Abstract

Management of uncooperative pediatric dental patients may be carried out successfully by employing a variety of pharmacologic agents and techniques. Any method selected has associated risks even when calculated doses and accepted protocol are followed carefully. Early recognition of an undesirable response and prompt, appropriate reaction to that response is essential in order to avoid harm to the patient. The following case report illustrates an undesirable reaction and the successful management of that reaction.

The management of uncooperative pediatric patients is a recognized problem in dental therapy (Myers and Shoaf 1977). Various sedative measures are used to manage patients during treatment. Pharmacologic methods of management include intravenous, intramuscular, subcutaneous, oral, and inhalation agents, or combinations thereof.

Intravenous techniques are the most predictable since drugs may be titrated to achieve the desired effect for each patient, but it may be difficult to start an intravenous infusion on an uncooperative patient. Intramuscular and subcutaneous routes can facilitate drug administration, although the administration still may be difficult on an uncooperative patient. In addition, unpredictable levels of the agent in the blood may be produced, leading to varied child responses and unpredictable sedation duration. Oral administration produces unpredictable blood levels and varied patient responses as a result of variations in gastric activity and absorption. Inhalation sedation, such as nitrous oxide, is easily controlled, but is useful only with mildly apprehensive and reasonably cooperative patients (Bennett 1974; Giovannitti 1984).

Each method of sedation has unique administration characteristics as well as predictability of patient response. Combining methods of administration may lead to even more unpredictable patient response. An under-sedated patient may continue to be a management problem during treatment while oversedation may lead to an emergency situation.

Problems related to pediatric oversedation are not uncommon, as shown by the 14 case presentations of Goodson and Moore (1983) involving complications during treatment or in the reported anesthetic death of a 28-month-old child after alphaprodine and promethazine administration (Hine and Pasi 1972). Complications often are presented as respiratory depression or arrest such as occurred in a 3 year old following an accepted dose regimen of meperidine, promethazine, and chlorpromazine (Benusis et al. 1979) or of another child following alphaprodine administration (Finder et al. 1985). These, as with most adverse anesthetic reactions, can be related to oversedation, inadequate patient monitoring, or both. A difficulty arises in that medication dosing is usually empirical, so titration to a desired end point is not possible except with inhalation or intravenous administrations. Due to the variability in patient responses, oversedation may occur even within recommended dosage ranges. Fortunately, most adverse reactions are minor if evaluated and treated quickly and appropriately, but tragic results may occur in the hands of an untrained or unobservant practitioner.

The following is a case report involving accepted pharmacologic agents in appropriate doses that resulted in an unpredictable response.

Case Report

A 4-year-old, 20-kg male was moderately apprehensive and unmanageable in the dental office. A history and physical evaluation were performed preoperatively. The patient was healthy, was not taking any medications, and did not have any known allergies. The review of systems was within normal limits; consequently, he was classified as physical status I according to the American Society of Anesthesiologists classification (Stoelting and Miller 1984). The most appropriate method of sedation was determined to be a combination of oral and inhalation sedation.

One hour prior to the dental appointment, the patient was administered oral agents consisting of 20 mg meperidine (Demerol,TM 1 mg/kg) and 45 mg pentobarbital sodium (Nembutal,TM 2 mg/kg) in elixir forms (Goodman et al. 1985; *Facts and Comparisons* 1986). Nitrous oxide/oxygen inhalation sedation then was administered throughout the appointment at a titrated level of 30% nitrous oxide and 70% oxygen. An inferior alveolar nerve block was performed using 1.8 ml of lidocaine hydrochloride 2% with 1:100,000 epinephrine. A rubber dam was placed around teeth K and L for amalgam restorations.

According to the current *Guidelines for the Elective Use of Conscious Sedation, Deep Sedation, and General Anesthesia in Pediatric Patients* (1986), the patient was consciously sedated as he had a minimally depressed level of consciousness, but was able to maintain a patent airway and respond rationally to verbal command. Personnel included the operating dentist, his assistant, and a dental student who was performing the nitrous oxide/oxygen sedation. The patient's respirations were constantly monitored while the blood pressure and pulse were taken every 5 min. After the initial 45 min, the patient abruptly became unconscious. Efforts to awaken the patient by shaking, shouting, and sharply pinching the trapezius muscle were unsuccessful. The patient's airway became partially obstructed, signified by "tracheal tug" and inspiratory stridor.

According to the *Guidelines*, the patient was now in a level of deep sedation or general anesthesia as he was unresponsive and unable to maintain a patent airway. The dental procedure was stopped immediately, the rubber dam removed, and 100% oxygen was administered via the nasal mask with appropriate airway management to maintain a patent airway. In this case — as with most obstructed airways — management consisted of tilting the head backward and lifting the chin with a finger (Bennett 1984) as the obstruction was due to the tongue's blocking the oropharynx rather than a foreign body obstruction. During this maneuver the posterior aspect of the tongue was pulled away from the wall of the oropharynx, thus enabling adequate air-flow. Vital signs (blood pressure, pulse, and respiration rate) were monitored constantly with no change from baseline values noted for 5 min at which time the patient regained consciousness and became responsive and coherent. No reversal agent was administered.

Nitrous oxide/oxygen administration was resumed and the remaining 45 min of the dental treatment was completed without further incident. The patient was administered 100% oxygen for 7 min upon completion of the appointment and dismissed in satisfactory condition. The parent was informed of the incident and given appropriate postsedation instructions. Postoperative follow-up revealed no adverse sequelae due to either the dental treatment or sedation.

Discussion

Many conditions and factors involving the dental environment as well as the patient may produce unpredictable results. Therefore, important decisions must be made as to the type of pharmacologic agents, dosages, and route of administration used prior to sedation. When the oral route is chosen, the rate of drug absorption and resulting blood levels are unpredictable. When an additional agent such as nitrous oxide is added, sedative effects may be exaggerated as shown in this case.

Due to the synergistic effects of the narcotic, barbiturate, and nitrous oxide the patient lost consciousness. By administering 100% oxygen, the effects of the nitrous oxide were negated rapidly and the patient quickly regained consciousness. The nitrous oxide/oxygen agents then were retitrated to an appropriate level of sedation and the procedure was resumed safely.

The ability to recognize loss of consciousness is important and cannot be overly stressed. This patient became unresponsive to verbal command as well as to physical stimulation, could not keep his mouth open, or maintain a patent airway.

As noted in this case, even though accepted protocol and medication doses are employed, drug effects still may vary significantly among patients and lead to unpredictable results.

Recommendations

Dentists utilizing sedation have an increased responsibility to ensure that all patients under the influence of sedative drugs be continually observed and appropriately monitored to avoid being placed in a compromised situation. The dentist must have a thorough understanding of both desirable and undesirable drug effects (Goodson and Moore 1983) and, in the event of an adverse reaction or emergency situation, must be prepared to evaluate and manage the problem (Trapp 1982). Finally, all dentists should be trained in basic cardiac life support and be familiar with the administration of necessary emergency drugs when these situations arise.

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Pioneer in Pediatric Dentistry: Benjamin Kletzky

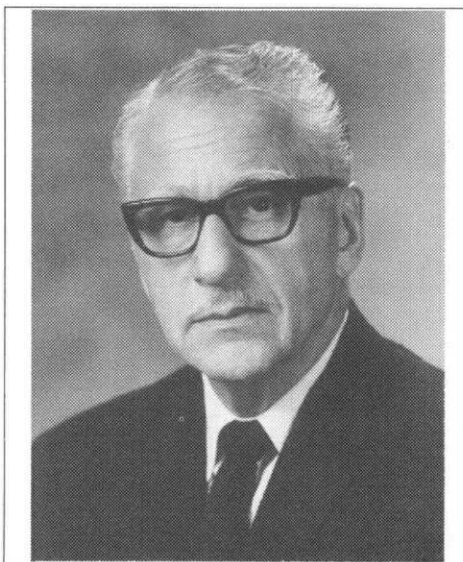
Dr. Benjamin Kletzky was born in Pueblo, Colorado, on April 15, 1904. He died on March 12, 1977, after a long illness.

Dr. Kletzky attended elementary and high school in Pueblo, Colorado, and then received the DDS degree in 1925 from the University of Denver Dental School. From 1925 to 1926 he attended the Forsyth Dental Infirmary for Children.

Dr. Kletzky practiced general dentistry in Pueblo until 1932 and then was associated with the Children's Clinic in Denver where his practice was limited to pediatric dentistry (1932-74).

During World War II he served in the Navy Dental Corps in the South Pacific where he attained the rank of commander.

For many years Dr. Kletzky promoted pediatric dentistry at both the local and national levels. In 1976 the American Society of Dentistry for Children gave him an Award of Excellence for achievements in administration, teaching, publications, and dental practice.



He was a past president of the Pueblo Dental Society, the Denver Dental Association, and the Colorado Dental Association. He was a member of the American Dental Association (ADA) 1965-74, its House of Delegates, and was a member of several ADA reference committees.

Dr. Kletzky served the American Academy of Pediatric Dentistry as president, as a member of the Board of Directors, and for four years as parliamentarian.

From 1967 to 1977 he served on the Board of Directors of the Dental Foundation of Colorado. This agency was chiefly responsible for

the creation of the School of Dentistry at the University of Colorado. Dr. Kletzky retired from active practice in September, 1977.

On November 9, 1980, the dental clinic at the Children's Hospital in Denver was dedicated to the memory of Dr. Kletzky.

Dr. Kletzky is survived by his wife Naomi.