



Anxiolysis in dental practice: A report of three cases

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While general dentists have used many modalities to reduce fear and anxiety in the dental office, including iatrosedation (calming words), distraction techniques, conditioning techniques, and empathy, there still are patients who need pharmacologic management of fear and anxiety to receive dental care. Anxiolysis, the lightest level of sedation, can be employed by all dentists and is safe and effective when used properly. This article presents three cases to introduce the anxiolysis technique as an in-office sedation procedure that can be used by all general dentists.

Received: March 31, 2003 Last revisions: June 24, 2003 Accepted: July 3, 2003

Dentists have employed the practice of in-office sedation for many years but only recently has it gained widespread usage for all types of dental care. As a result, patients now can receive in-office sedation for all types of dental procedures while displaying little or no anxiety or discomfort.

The general dentist performs many of dentistry's routine procedures and must deal with much of the population's dental fear. Unfortunately, many general dentists have not received the formal anesthesia training necessary to provide in-office sedation to patients. For the

majority of general dentists, the practice of administering diazepam to anxious patients preoperatively has been the mainstay of in-office sedation. With the ADA's introduction of new guidelines for in-office sedation, the technique of giving diazepam preoperatively to reduce anxiety now is known as *anxiolysis*.¹ This article describes the technique of anxiolysis and its applications in routine dental care.

Several types of in-office sedation can be used to help the anxious patient, including anxiolysis, conscious sedation, intramuscular sedation, intravenous se-

dition, and general anesthesia. Of these techniques, anxiolysis remains the only one that all general dentists can employ without an additional permit. Anxiolysis is defined as simply the diminution of anxiety, a drug-induced state that allows the patient to respond appropriately to verbal commands and does not affect the ventilatory and cardiovascular functions.^{1,2} Anxiolysis is the first and lightest level on the continuum of sedation (Fig. 1).

Because all dentists can practice anxiolysis, it must carry an inherent safety margin that allows for safe administration. The dentist's intent is the key point that distinguishes anxiolysis from other levels of sedation. The definition of anxiolysis applies if the dentist intends to provide medications for reducing the patient's anxiety without deviating from normal vitals and without a concurrent loss of consciousness or the patient's ability to think and respond. A deeper level of sedation (called *conscious sedation*) might apply if the dentist administers medications that could depress consciousness further, cause a significant change in baseline vitals, and/or limit the patient to verbal responses only through repeated stimuli.

While the dentist's intent often plays a vital role in the type of sedation being administered, health care providers must always know the potential risks and benefits of any medications that are prescribed. The technique of anxiolysis must always include medications that carry a wide margin of safety to protect the patient from unintentional oversedation. The dentist must always follow the manufacturer's recommended dosages and be aware of any possible drug interactions. Table 1 lists the drug classes that may be used for anxiolysis.

Patient selection is the first step in providing any in-office sedation. Collecting a thorough medical history allows the dentist to determine if the patient is an acceptable candidate for anxiolysis.

Table 1. The drug classes that may be used for anxiolysis.

Most common	Less common	Least common
Nitrous oxide	Narcotics	Barbituates
Benzodiazepines	Alcohols	Antidepressants
Antihistamines	Phenothiazines	Anticholinergics

Table 2. Information that must be collected before anxiolysis is administered.

Complete medical history
Baseline vitals (blood pressure, pulse, respiration rate)
Appropriate consultations with physicians
Physical examination (for example, potential airway problems)
Research into any potential drug interactions
ASA classification
Informed consent
Emergency contacts and the designation of a companion for transporting the patient

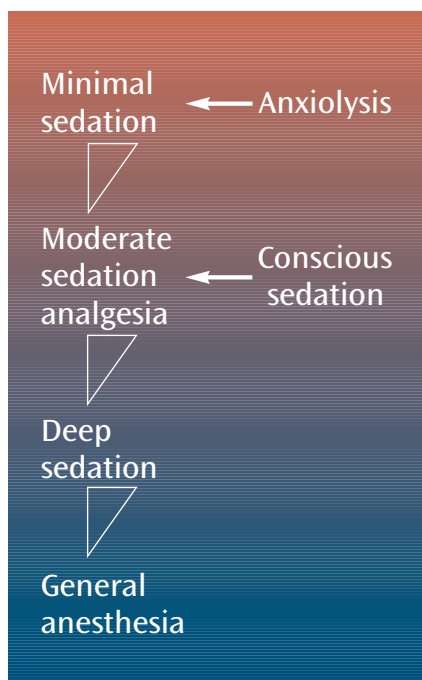


Fig. 1. The continuum of sedation.²²

The dentist also should determine the severity of the patient's dental anxiety; for example, a patient who feels anxious about receiving local anesthesia but reports no other dental fear may be a candidate for anxiolysis. Conversely, if the patient reports paralyzing fear simply by stepping into the dental office, anxiolysis will not be effective and an appropriate referral will be necessary (see Tables 2 and 3).

After determining that the patient is an acceptable candidate for anxiolysis, the dentist then must select the anxiolytic medication. The factors that dictate the appropriate medication are unique to each patient but may include age, gender, concurrent medications, anxiety level, and length of the procedure that is to be performed. Benzodiazepines (with or without nitrous oxide) have become the drug of choice for anxiolysis in dentistry.³ As a drug class, benzodiazepines possess many properties that make them the ideal choice when selecting a sedation medication (see Table 4).⁴ Common benzodiazepines are compared in Table 5.

As stated earlier, the medications used for anxiolysis must carry a margin of safety that reduces the possibility of oversedation. Typically, the dentist explains the procedure and discusses the patient's expectations before the anxiolysis

Table 3. The American Society of Anesthesiologists' patient classification.²³

<i>Class 1</i>	A healthy patient
<i>Class 2</i>	A patient with mild systemic disease
<i>Class 3</i>	A patient with severe systemic disease that limits activity but is not incapacitating
<i>Class 4</i>	A patient with incapacitating severe systemic disease that is a constant threat to life
<i>Class 5</i>	A moribund patient not expected to survive more than 24 hours with or without an operation
<i>Class 6</i>	Organ transplant donor

Note: An "e" is added to the class if the patient is seen under emergent conditions.

Table 4. Properties of benzodiazepines that make them favorable as a sedation medication.

Sedative/anxiolytic
Certain benzodiazepines have a short half-life and duration (specifically triazolam, midazolam, alprazolam, and oxazepam)
Rapid onset
Wide therapeutic index and margin for safety
Do not depress cardiovascular or respiratory function when given at recommended dosages
Low incidence of adverse reactions; potentiation by other CNS-altering drugs and enzyme interactions are the most common
Availability of effective antagonist/reversal agent (flumazenil)

Table 5. Comparisons of common benzodiazepines. Based on equivalent dosages, the drugs in italics are classified as high-potency.^{24,25}

Drug	Half-life (in hours)	Equivalent dose (in mg)
<i>Alprazolam</i> (Xanax, Pfizer, Inc., New York, NY; 800.223.0182)	6–12	0.50
Chlodiazepoxide (Librium, Roche Laboratories)	5–30	10.00
Diazepam (Valium, Roche Laboratories)	30–100	5.00
<i>Lorazepam</i> (Ativan, Wyeth Pharmaceuticals, 800.882.3845)	10–20	1.00
<i>Clonazepam</i> (Klonopin, Roche Laboratories)	18–50	0.25
Oxazepam (Serax, Wyeth Pharmaceuticals)	4–15	15.00
Temazepam (Restoril, Novartis Pharmaceuticals, East Hanover, NJ; 800.257.3273)	8–22	30.00
<i>Triazolam</i> (Halcion, Pfizer Inc.)	2–5	0.25

Table 6. Discharge criteria.

Normalization of vitals

No potential for airway obstruction (for example, an ill-fitting prosthesis)

Patient is fully responsive and alert, ambulatory without assistance, and able to verbalize appropriately

If patient was NPO, hydration has been re-established

Patient has a responsible companion for transportation

Postoperative instructions are provided in writing and reviewed with patient and companion; emergency numbers are given to the companion

appointment. A prescription for the sedative medication is written; the patient brings the medication to the dental office at the time of the appointment and the medication is administered under the supervision of the dentist and trained staff.

To assess the patient's sedation level, it is vital to monitor the patient after the anxiolysis medications are administered. Direct patient assessment is the most important diagnostic tool the dentist can employ for anxiolysis. The patient must remain conscious and should be capable of responding to verbal commands readily and appropriately. To monitor the patient's vital signs continually during an anxiolysis appointment, a pulse oximeter with an automated blood pressure cuff also is recommended.

Patients must have all pre- and postoperative instructions presented in writing; these instructions should include a warning to avoid all sedating medications unless the dentist is aware of and has instructed the patient to take such medications (for example, narcotics for chronic pain disorders). It may be helpful to have a patient who is NPO (that is, *nulla per os* or nothing by mouth) before the sedation; these instructions should be given to the patient before the day of sedation. When the appointment is completed, the dentist should assess the patient according to established discharge criteria (see Table 6).

Under no circumstances should patients who have undergone anxiolysis be permitted to drive themselves home. While patients may appear coherent after receiving anxiolysis medications, they

still may lack the quick responses needed to operate a motor vehicle. The authors recommend that anxiolysis patients not operate cars or machinery for the remainder of the day following the dental visit. Remember this simple rule: no companion, no anxiolysis.

Case report No. 1

A 21-year-old woman came to the dental office complaining of pain in the lower right mandible. The medical history was completed and found to be insignificant. The patient was taking no medications and had no allergies. The patient was considered Class 1, based on the American Society of Anesthesiologists (ASA) patient classification (see Table 3). Upon radiographic examination, it was noted that tooth No. 29 had a deep temporary restoration and associated periapical radiolucency. The patient said that she'd had a toothache a year earlier and sought treatment from a local dentist, who had given her numerous injections of local anesthesia but was unable to achieve adequate pain control. The patient stated that she tried to endure the drilling but had to ask the dentist to stop. The dentist placed a temporary and the patient did not return for further treatment.

Further discussion revealed that although the patient was not anxious about the actual dental treatment, she could not tolerate pain. By her account, dentistry would be no problem provided she could be made numb. It was determined that she would be an acceptable candidate for anxiolysis. Preoperative data collection was completed and the patient received instructions and a prescription for an anxiolytic medication. The patient agreed to have her mother drive her to the office, wait in the reception area, and drive her home.

The patient appeared on the day of her appointment as scheduled and the anxiolysis medication was administered. Orally administered midazolam was selected as the anxiolytic medication due to its quick onset, short duration, and wide margin for safety. According to the literature, midazolam dosage for oral conscious sedation is based on weight, at an average of 0.5 mg/kg with a relative maximum of 20 mg.^{5,6} The patient weighed approximately 50 kg and the decision was made to administer 10 mg of oral Versed (Roche Laboratories, Nutley, NJ; 800.

526.6367) for the anxiolysis procedure.

In this case, the IV form of midazolam was mixed with apple juice to yield a concentration of 2.0 mg/mL. Apple juice was selected as a taste-masking liquid because of pH and the relationship with bioavailability. Midazolam can either be delivered via a premixed syrup (such as Versed Syrup) or mixed with a more palatable liquid via the IV form. It has been suggested that the more lipid soluble form of the drug predominates when the pH is greater than 4.5, resulting in increased absorption and bioavailability.^{7,8} Chair-side testing with pH paper (Fisher-Scientific, Pittsburgh, PA; 800.640.0640) showed the pH of the apple juice to be 4.0–4.5.

Approximately 20 minutes after the anxiolytic medication was administered, the procedure began and continued without incident; the dentist experienced no difficulties in achieving profound anesthesia and root canal therapy was uneventful. The patient was monitored with direct assessment and placed on a pulse oximeter for the duration of the treatment. During the treatment, the patient's SaO₂ was 98–99% and her pulse ranged from 81–94 bpm. The patient's blood pressure was 131/87 mmHg at the start of the visit and 116/70 mmHg at the end of the visit. Total treatment time was 90 minutes.

The patient's mother was given appropriate postoperative instructions and emergency contact numbers at the conclusion of the visit. Prior to discharge, the patient was determined to be ambulatory and fully responsive, with unaffected cognitive ability. The patient was contacted that evening and reported no pain or discomfort and no memory loss during the anxiolysis appointment.

Case report No. 2

A 59-year-old woman had a chief complaint of "decay in my teeth." The medical history revealed that the patient was being treated for depression and was taking fluoxetine (Prozac, Eli Lilly and Company, Indianapolis, IN; 800.545.5979). She also suffered from fibromyalgia and was taking 25 mg rofecoxib (Vioxx, Merck, Whitehouse Station, NJ; 888.637.2502) daily.

The patient reported no drug allergies and was assigned an ASA classification of 2. Her treatment plan included the restoration of multiple carious lesions



Fig. 2. A preoperative photograph of a 55-year-old woman.



Fig. 3. A postoperative photograph of the patient in Figure 2, with a temporary prosthesis.

and root canal therapy on tooth No. 3. After discussing her options, the patient stated that she often felt anxious in the dental chair. Usually, she would take an anti-anxiety medication before her dental work to “take the edge off.” The technique of anxiolysis was discussed and agreed upon and the patient was given appropriate preoperative instructions and a prescription for an anxiolytic medication.

Fluoxetine can function as a liver microsomal enzyme inhibitor, specifically affecting the cytochrome p450 isoenzyme 2D6. As a result, the concurrent use of diazepam with fluoxetine may have increased the accumulation and toxicity of the diazepam.⁹ Triazolam was selected as the anxiolytic medication because it is metabolized by a different isoenzyme (3A4) and is not subject to the enzyme inhibition caused by fluoxetine.¹⁰⁻¹⁴

The patient was instructed not to eat or drink anything (except water) on the morning of the sedation and was asked to go NPO to make more predictable absorption possible; maximizing drug absorption allows the dentist to use the smallest effective dose for anxiolysis.¹⁵ When the patient arrived for treatment, she received 0.25 mg triazolam and was escorted to the operatory. Continuous visual assessment was performed to ensure a sedation level of anxiolysis; vital signs were monitored with a pulse oximeter. The treatment was completed without incident and the patient remained conscious and was able to respond normally to verbal commands during the entire appointment.

During the three hours of dental treatment, the patient's SaO₂ ranged from 95–98%, while her pulse rate ranged from 81–97 bpm. The blood pressure was 153/96 mmHg at the start of the vis-

it and 125/85 mmHg afterward. The discharge criteria were met and the patient was released into the care of her spouse. When the patient was contacted that evening, she reported mild discomfort but was elated that her dental visit was so smooth and painless.

Case report No. 3

A 55-year-old woman came to the dental office complaining of “multiple problems.” Her medical history involved mitral valve prolapse and prosthetic joint replacement of her right knee and hip. She was taking cyclobenzaprine for muscle stiffness and reported adverse reactions to codeine and hydrocodone. She admitted to smoking a pack of cigarettes every day for 30 years. She was assigned an ASA classification of 2.

The patient had not sought dental care for 20 years due to fear and embarrassment. When questioned about her dental history, she recounted memories of painful dental treatment. The experienced resulted in dental fear, which led to dental neglect. This resulted in the patient “not smiling even though I love to smile” and feeling as though people were “judging me because my teeth were ugly.” Her treatment plan included a full anterior reconstruction with fixed prosthetics (Fig. 2).

After consulting with the patient's physician and performing research regarding any potential interactions with cyclobenzaprine, it was determined that the patient was an acceptable candidate for anxiolysis.¹⁶ She was given the appropriate preoperative instructions and a prescription for anxiolytic medications as well as an antibiotic prophylaxis.

For this case, the intended drug regimen included the benzodiazepine triazolam and the antihistamine hydroxide.

The patient was instructed to eat a light breakfast on the morning of the surgery and take her prophylactic antibiotics one hour before the scheduled appointment. Gastrointestinal upset and nausea are common adverse events associated with antibiotic use; also, smoking can function as a central nervous system (CNS) stimulant and liver microsomal enzyme inducer, antagonizing the sedative effects of the anxiolytic medications. In addition to providing emesis protection, hydroxyzine may prolong the sedative effects of triazolam and reduce the total dosage of both medications. For these reasons, the anxiolytic combination of hydroxyzine and triazolam was selected to overcome the stimulative effect of smoking and decrease the likelihood of perioperative nausea and vomiting.¹⁷⁻¹⁹

At the start of the appointment, the patient received 0.25 mg triazolam and 25 mg hydroxyzine. Although the patient experienced anxiety during the appointment, the work proceeded smoothly for approximately 2.5 hours; at that time, the patient became increasingly anxious and an additional dose of medication was required to complete the treatment. Because the safest way to prolong a drug's action is to administer another small dose (rather than start with a larger dose), an additional 0.125 mg triazolam was administered.²⁰ The patient received a small increment of additional sedative medication and was relaxed for the remainder of the treatment.

The patient was able to respond to verbal commands throughout the five-hour procedure. Her SaO₂ ranged from 93–97% and her pulse rate ranged from 84–102 bpm. Her blood pressure was 139/84 mmHg at the start of the appointment and 124/76 mmHg at the conclusion.

When the procedure was completed, the patient was given liquids and assessed for release. After the discharge criteria were met and postoperative instructions were given, the patient was released into the care of her spouse. During the follow-up call that evening, the patient reported no pain or discomfort. At a follow-up visit five days later, the patient described how she was no longer embarrassed to speak and smile in the company of her friends and family (Fig. 3).

Summary

Anxiolysis makes it possible to treat anxious and fearful patients comfortably. The technique not only allows many patients to have a healthy mouth but it can change the self-image and quality of life of these patients. With careful attention given to patient selection, patient monitoring, and risk assessment; anxiolysis is a technique that can be performed safely and predictably in all dental offices. Estimates suggest that approximately 30% of people in the U.S. are anxious about going to the dentist and that 55% of anxious patients would visit the dentist more frequently if they could receive a sedative drug.²¹ Translating these figures to a U.S. population of 290 million people means that 87 million people are anxious about receiving dental care and 50 million would visit the dentist more often if they could receive a sedative drug. Anxiolysis can offer a means for providing dental care to this underserved portion of the population.

Acknowledgements

The authors would like to thank Eliot V. Hersh, DMD, PhD, Director of Pharmacology and Clinical Therapeutics, University of Pennsylvania School of Dental Medicine in Philadelphia, for his critical reading and comments regarding this manuscript.

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Exercise No. 140
Subject Code: 132
Anesthesia and Pain Control

The 15 questions for this exercise are based on the article, "Anxiolysis in dental practice: A report of three cases" on pages 264–268. This exercise was developed by Thomas V. Dembski, DDS, FAGD, in association with the *General Dentistry* DART Committee.

Reading the article and successfully completing this exercise will enable you to:

- understand the technique of anxiolysis as a sedation procedure that can be used in the dental office;
- become familiar with the risks and benefits of using oral medication to reduce dental anxiety, and;
- recognize three successful applications of anxiolysis in the dental office.



Answer form and instructions are on pages 255-256.

1. Anxiolysis is
 - A. the complete elimination of dental anxiety.
 - B. a drug-induced state.
 - C. a level of conscious sedation.
 - D. a modality that can be applied by trained dental auxiliaries.
2. With anxiolysis, dental patients can
 - A. tolerate noxious stimuli without anesthesia.
 - B. decrease their own level of consciousness.
 - C. utilize multiple practitioners with the same regimen.
 - D. respond appropriately to verbal commands.
3. Anxiolysis allows the dentist to
 - A. prescribe medication with a narrow margin of safety.
 - B. proceed with a patient's decreasing vital signs.
 - C. reduce anxiety without the patient losing consciousness.
 - D. arouse a response only with repeated verbal stimuli.
4. Which class of drugs is *not* used for anxiolysis?
 - A. Barbiturates
 - B. Analgesics
 - C. Phenothiazines
 - D. Antihistamines
5. Which property makes benzodiazepines an ideal choice for anxiolysis?
 - A. A 24-hour half-life
 - B. Slow onset
 - C. Reversal agent available
 - D. Dispensed from the dental office or pharmacy
6. With anxiolysis, when is the medication taken?
 - A. At the time of the appointment after the patient is seated
 - B. On arrival at the office while waiting in the reception room
 - C. Prior to the appointment, without eating
 - D. At bedtime, the day before the appointment
7. What instruction should be given to patients?
 - A. Take the prescribed narcotic medication an hour before the appointment
 - B. Blood pressure and breathing rate may decrease
 - C. It is helpful not to eat before the sedation
 - D. They will need a bus or taxi if no one can drive them home
8. Oral dosage of midazolam for conscious sedation is based on weight and has a relative maximum dose of
 - A. 5 mg.
 - B. 10 mg.
 - C. 20 mg.
 - D. 50 mg.
9. Oral midazolam can be administered by using the syrup or by diluting the IV solution with fruit juice. If midazolam is mixed with apple juice, the lipid soluble form may reduce absorption.
 - A. Both statements are true.
 - B. The first is true; the second is false.
 - C. The first is false; the second is true.
 - D. Both statements are false.
10. Fluoxetine can inhibit liver microsomal enzymes, increasing the toxicity of diazepam if used concurrently. Triazolam is metabolized by a different isozyme, so concurrent use with fluoxetine does not affect its half-life.
 - A. Both statements are true.
 - B. The first is true; the second is false.
 - C. The first is false; the second is true.
 - D. Both statements are false.
11. Which technique can reduce the absorption of oral sedatives?
 - A. *Nulla per os* (NPO)
 - B. Masking it with fruit juice
 - C. Combining it with antibiotics
 - D. Combining it with analgesics
12. What is the safest way to prolong the action of an anxiolytic medication?
 - A. Administer an additional small dose
 - B. Begin with a larger dose of a single agent
 - C. Use combination agents in smaller doses
 - D. Instruct the patient not to eat or drink the morning of the sedation
13. Which ASA class is used to identify a patient with a severe systemic disease that is not incapacitating who is seen for an acute periodontal abscess?
 - A. 2a
 - B. 2e
 - C. 3a
 - D. 3e
14. Which of these common benzodiazepines has the shortest half-life?
 - A. Alprazolam
 - B. Diazepam
 - C. Lorazepam
 - D. Triazolam
15. Which of these common benzodiazepines has the longest half-life?
 - A. Diazepam
 - B. Lorazepam
 - C. Clonazepam
 - D. Temazepam