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Office-Based Anesthesia

David A. Berman, MD¹
Vernon J. Adams Jr, DMD²
Azeem K. Lakha, DMD³
Terri D. Homer, MD

¹Facial Rejuvenation

²Dental rehabilitation

³Dental implants

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Introduction—Anesthesiologist's Perspective

Terri D. Homer

Definition of Office-Based Anesthesia

The assumption in this chapter is that office-based anesthesia (OBA) is distinct from outpatient anesthesia in a freestanding surgery facility. OBA is used in many medical specialties, including most dental subspecialties, dermatology, plastic surgery, ophthalmology, otolaryngology, and gynecology. The procedures described in this chapter are but a small sampling of the ways in which anesthesia is used in medical/dental offices. Anesthesiologists who carry out anesthetic procedures in the office setting may be sole practitioners or part of a group of anesthesiologists who have a “division” or rotation devoted to OBA. Although anesthesia practiced in an office carries the same risks, burdens of responsibility, and skill requirements as in a fully equipped surgical center, in the office setting, the anesthesiologist may be expected to arrange for the oxygen supply, suction, monitoring, and emergency equipment. They may even bring a portable anesthesia machine with them from site to site. This unique challenge for the anesthesia provider includes: working with personnel unfamiliar with anesthesia concerns, converting the office into a facility appropriate for anesthesia, selecting appropriate patients, providing safe and effective anesthesia/analgesia, and properly preparing and recovering the patients.

State Regulations Regarding Office-Based Anesthesia

Many states have laws listing strict requirements for medical facilities where anesthesia is provided for surgical procedures. Some states have regulations based on the type of surgical procedure performed. Others regulate and credential the facility based on the type of anesthesia used (i.e., GA, iv, local). Still others base regulations on the type of facility itself. In California, for example, dental offices are regulated differently than medical offices. For many years, the California Dental Board has regulated anesthesia in the dental or oral surgery office by credentialing the anesthesia provider and/or the office facility itself. An oral surgeon, dentist, or physician issued a GA permit by the Dental Board goes through a credentialing process by one or two examiners that includes direct observation of an anesthesia case, demonstration of emergency drills, and examination of required monitoring and resuscitation equipment on site. The permit allows the holder to provide GA in any dental office. The Dental Board also issues ‘Conscious Sedation’ permits to those dental practitioners who qualify and want to use this technique. Physicians in California wishing to have I.V. sedation or general anesthesia available in their office must first be accredited as a surgery center by one of several State agencies providing this service such as AAAHC.

Equipment Needed for Office-Based Anesthesia

In the office setting, the anesthesia provider may or may not have the use of an anesthesia machine or other sophisticated equipment that is readily available in a surgical center. In some respects, however, this setting is analogous to other out-of-OR locations. The ASA Guidelines for Nonoperating Room Anesthetizing Locations¹ covers all types of out-of-OR facilities, and these recommendations should be followed. Appropriate monitoring—including pulse oximetry, ECG, and BP—is required. Many

portable monitors have ETCO₂ monitoring capability, which may be useful for the spontaneously ventilating, sedated patient. A precordial stethoscope is quite useful for monitoring respirations, especially in the dental patient, in whom airway obstruction is a frequent occurrence during the procedure. Also in accordance with the ASA guidelines, full resuscitation equipment, an adequate source of O₂ (and backup O₂), a functioning suction, adequate lighting and electrical outlets (with backup battery source), and a telephone with immediate access to a hospital ER also must be available. In the credentialed medical (nondental) facility, these items are required to be on site. In the dental facility, they may or may not be present. It is the responsibility of the anesthesia provider to make sure these items are available in the medical or dental facility before administering an anesthetic.

Anesthetic Goals in the Office Setting

Typically, the primary anesthetic goal in the office setting is to provide moderate-to-deep sedation; however, the definition of ‘sedation’ in this setting varies considerably. For example, in the young or disabled pediatric patient having (*Print pagebreak 1511*) dental restoration work, “conscious sedation” often is not adequate and they will typically require deep sedation or general anesthesia. In the patient having dental implants, minimal or moderate sedation may be all that is required as the oral surgeon may need the patient’s cooperation at times during the procedure. A patient undergoing full-face laser resurfacing most likely will require deep sedation or general anesthesia, since this procedure can be quite painful. Because sedation is a continuum and individual patient responses vary, the anesthesia provider must be prepared to resuscitate any patient receiving sedation in the office.

Patient Selection

As in all medical facilities, the patient's safety is of paramount importance. In the office setting, the ability to achieve a successful outcome is dependent first of all on appropriate patient selection. The patients presenting for OBA will fall into several categories, depending on the procedure and the patient's age and medical condition. An “appropriate patient” can be an ASA 1 or 2 patient. They may even be an ASA 3, if: (a) their medical problems are stable and well controlled with medication, and (b) the office procedure itself will not pose an undue risk to them.

Preoperative Preparation

An important role of the anesthesiologist is to educate the patient (or patient's parents, as appropriate) about the office anesthesia experience. A preop phone call discussing the patient's medical history, past anesthesia experience (in a hospital, surgery center, or dental office), the npo requirements, the anesthesia technique(s) to be used, postanesthesia expectations, and the anesthesia fees is essential. A written packet describing some of this information can be given to the patient in advance.

Safe and accepted npo requirements on the day of the procedure are as follows:

- A light breakfast (e.g. toast and a clear liquid), up to 6 hours before the appointment.
- Clear liquids (including Gatorade, Jell-O, fruit popsicles) up to 3 hours before the appointment.
- The patient's usual medications should be continued on the day of the procedure.

Recovery and Discharge

In a medical or dental office, often there is no separate recovery area designated as such. It is common practice for the patient to be recovered by the anesthesiologist in the treatment room until they can open their eyes and maintain an adequate airway without assistance. At that point, any iv or monitors that may have been used can be removed. If it is a pediatric patient, the parents may be brought into the room, although recovery remains under the supervision of the anesthesiologist. Office anesthesia patients can be discharged when they are well oriented, their pain and nausea are controlled, and they have a responsible adult to accompany them. They may still feel drowsy, but this should not prevent them from being able to walk with assistance.

Discharge instructions regarding appropriate post-op activities should be given to the responsible adult with the patient. Generally, patients are asked to adhere to the following instructions upon discharge:

- NPO except clear liquids in the first 2 hours after arriving at home. (Unless the ride is > 1 hour, we ask the patient not to drink anything in the car on the way home from the procedure facility.)
- A light meal after the first 2 hours, if the patient wishes.
- Adults should take it easy the rest of the day and have a responsible adult companion for at least 4 hours after the procedure.

- No driving for 24 hours.
- Children should stay home for the rest of the day postprocedure, under the direct supervision of a responsible adult.

The anesthesiologist also should give the responsible party (parent, friend, other relative) his/her pager or cell phone number in the event they need to contact the anesthesiologist after patient discharge.

Suggested Readings

1. American Society of Anesthesiologists: *ASA Guidelines for Nonoperating Room Anesthetizing Locations*. American Society of Anesthesiologists, 1994.
2. American Society of Anesthesiologists: *ASA Guidelines for Office-Based Anesthesia*. Available at: www.asahq.org/publicationsAndServices/office.pdf. 2004.
3. American Society of Anesthesiologists: *Continuum of Depth of Sedation, Definition of General Anesthesia and Levels of Sedation and Analgesia*. American Society of Anesthesiologists, 1994.

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Facial Rejuvenation: Lasers and RF Tissue Tightening

Surgical Considerations

David A. Berman

Description: In the last 13 years, a number of medical devices have been approved by the FDA to improve facial imperfections, such as wrinkles, precancerous skin lesions (actinic keratoses), acne scars, and hyperpigmentation. Today, laser skin resurfacing as well as radiofrequency tissue tightening have remained at the top of the list of popular facial rejuvenation techniques. “Super-pulsed” carbon dioxide (CO₂) lasers, erbium: YAG lasers, fractional lasers that treat the skin in a pixilated pattern, as well as deep and superficial radiofrequency (RF) devices all use heat in a controlled fashion to improve the appearance and physiology of the facial skin. Because many of these devices deliver a tremendous amount of heat to the skin surface, previous attempts at using nerve blocks and local infiltration with lidocaine were often considered inadequate, thus requiring either iv sedation or GA. Facial nerve blocks usually are performed to supplement iv sedation (added analgesia). After a Betadine prep, anesthetic eye drops are used, followed by the insertion of protective corneal shields. The treatment then begins with one or more passes performed at various energy levels. Many newer devices do not actually remove the outermost epidermal layers of the skin, but exert their beneficial effects below the surface in the dermis; however, more aggressive lasers do indeed ablate off both the epidermis and a portion of the underlying dermis, requiring postoperative care: some surgeons prefer to use only a Vaseline jelly dressing, whereas others use a more sophisticated, soothing facial dressing to prevent postoperative discomfort.

Usual preop diagnosis: Wrinkles, precancerous skin lesions (actinic keratoses), acne scars, and traumatic scars.

Summary of Procedures

Position	Supine, with shoulder roll. Surgeon at head of table.
Antibiotics	None during procedure. Antivirals and antibiotics started 1 d before procedure, and continued for 1–2 wk following.
Surgical time	45 min for full-face rejuvenation; less for regional areas
Postop care	Supine position, maintenance of facial dressing, occasional ice packs, antiviral medications, antibiotics
Mortality	None reported.

Morbidity

Bacterial infection
Herpes simplex virus reactivation
Delayed re-epithelialization
Hypertrophic or keloid scar formation
Corneal abrasion
Delayed healing with redness
Hyperpigmentation and hypopigmentation
2–5 depending on the type of medical device used.

Pain Score

Patient Population Characteristics

Age range

18–85 yr

Male:Female

1:4

Incidence

Number of cases performed by members of the American Academy of Cosmetic Surgery/yr in the United States: 45,288 (American Academy of Cosmetic Surgery, 1085 members polled, 206 surveys returned, 19% response rate, margin of error +/- 6.15%)

Etiology

Solar radiation, acne, or trauma resulting in scars

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■ Anesthetic Considerations

▲ Preoperative

Many facial rejuvenation procedures are quite painful and can be very stressful to the patient; thus, local anesthesia is often inadequate. For these procedures, it is important to make sure that the patient with chronic HTN and/or other cardiovascular or respiratory disease is being adequately treated for these problems before undergoing either laser resurfacing or RF tissue tightening. A preop ECG (taken within the last yr) is recommended for those patients > 60 yr old or those being treated for HTN.

Premedication

In the adult patient, an oral premed can be given, if necessary, before the patient arrives in the office for the procedure.

Diazepam 10–20 mg, or lorazepam 0.5–1.0 mg po 1 h before the appointment will help relax the severely anxious patient.

◆ Intraoperative

Anesthetic technique: MAC and/or GA

During full-face laser resurfacing procedures, the patient will need to be under deep iv sedation, unless the surgeon is willing to use a large amount of local anesthetic (often RF tissue tightening will require less sedation, depending on the device used). Usually, a combination of intermittent doses of midazolam (1–2 mg iv), meperidine (25 mg iv), ketamine (25–30 mg iv q 1 h prn), and propofol (25–50 mcg/kg/min iv) will provide an adequate anesthetic state. If a nasal airway is inserted, nasal O₂ can be used—if the cannula is placed deep in the airway—at low flows. Otherwise, O₂ should be administered between facial passes if a laser is used. Again, the patient is not electively intubated, but an LMA may be needed if it is difficult to maintain a patent airway. Usually, patients having this procedure will require at least 75–150 mg meperidine (or its equivalent drug) to relieve the painful burning caused by multiple passes of these devices. Patients will shiver and sustain HTN and tachycardia unless an adequate level of analgesia is achieved. Because of the narcotic requirement, they should have prophylactic antiemetics during the procedure. Dexamethasone (8 mg iv) and

MAC/GA

metoclopramide (15 mg iv) are a good combination. In addition, im promethazine (25 mg) is very effective.

IV: 20 ga × 1

NS/LR @ 4–6 mL/kg/h

Standard monitors (see [p. B-1](#)).

and pad pressure points.
eyes (eye shields in place).

Complications

Laser fire Use intermittent, low-flow O₂ Consider wrapping foil around cannula.

Postoperative

Complications

Pain management

PONV

Oral analgesics (see [p. C-2](#)).

The patient recovering from a full-face procedure usually has received a lot of potent anesthetic medication in a short period of time. They require at least 45–60 min to recover in the office. Vital signs should be stable (↓ BP and tachycardia must be treated). Pain and nausea also should be under control. These patients must be accompanied by a responsible adult who can stay with them at home for a few h after the procedure. A follow-up phone call to the patient by the anesthesiologist that evening is very helpful and appreciated.

Recovery and discharge

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Office Dental Rehabilitation Under Deep IV Sedation

Surgical Considerations

Vernon Adams

Description: Dental rehabilitation includes the restoration of good dental health by removal of caries and decayed teeth, replacement of crowns or bridges, root canals, and periodontal treatment. Prior to treatment, the patient is placed in a supine position with a shoulder roll and the head immobilized. A throat pack is placed and a mouth prop inserted. The throat pack should be placed more anteriorly than normal since, in general, the patient will not be intubated. Dental rehabilitation is usually done in phases, starting with the operative phase. A rubber dam is placed to surgically isolate the teeth that will be treated. All dental caries are removed, the restorations are placed, and all debris is irrigated and suctioned away from the rubber dam, which is then removed. This sequence is repeated in quadrants as needed. After the operative phase of treatment is completed, the next phases (e.g., taking impressions for various appliances or dental prosthetics, dental extractions, or a dental prophylaxis) are undertaken, as necessary. Great care must be taken in maintaining the airway when taking impressions, as the bulk of impression material can compromise airway management.

Usual preop diagnosis: In-office dental rehabilitation usually focuses on treatment of the patient who is unable to be treated in a conventional setting for primarily behavioral/emotional reasons. These include dentophobia; pediatric patients who are excessively apprehensive and/or combative or who have a significant amount of dental caries; “special needs” pediatric patients—autistic, mentally retarded, developmentally delayed—and patients with mild-to-moderate forms of cerebral palsy.

Summary of Procedures

Position

Supine, with shoulder roll, head extended; surgeon at head of table (turned 90°)

Incision

Gingival or intraoral mucosa

Special instrumentation

Dental setup

Unique considerations

Antibiotics

Surgical time

EBL

Postop care

Mortality

Morbidity

Pain Score

Nasal airway recommended; throat pack placed; forward displacement of tongue is important for airway management.

None used routinely.

60–120 min

Minimal

Recover in lateral position.

Rare

Biting of lips or tongue 2° local anesthesia: 1%

Bleeding: 1%

Infection: < 1%

Delayed Bleeding: Rare

1–2; higher for certain procedures (e.g., extraction of impacted tooth)

Patient Population Characteristics

Age range

13 mo +

Male: Female

1:1

Incidence

20,000/yr in the United States

Etiology

Poor oral hygiene and/or dietary habits; lack of continuing periodic dental care

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Anesthetic Considerations

Preoperative

In the pediatric dental office, the patients presenting for iv sedation are those who cannot cooperate due to age (too young) or to a preexisting mental or physical disease. Examples include a 20-month-old child with multiple “bottle caries,” an 8-year-old autistic child, or a 14-year-old with cerebral palsy. Obviously, the anesthetic treatment plan must be tailored to the patient’s individual needs. These patients must be screened in advance for clinical conditions that would put them at undue risk for problems 2° the anesthetic. Specifically, a patient with any cardiac, respiratory, endocrine, or neurologic problem must be evaluated. If the clinical problem is mild, stable, and under good control, the patient may be considered for anesthesia in the office. Examples of such conditions include mild nonsteroid-dependent asthma, corrected congenital heart disease, or a stable Sz disorder. The child with Down’s syndrome may pose a very difficult problem in this setting, because airway obstruction can occur easily under deep iv sedation. Also, these patients frequently have concurrent congenital heart disease. Any child with a Hx of obesity, snoring, and/or sleep apnea can present a problem under iv sedation, due to airway obstruction. The child with a current or recent URI always poses a dilemma. Although there is controversy on this issue, these children generally should have their procedures postponed, because their chances of sustaining periop respiratory problems are higher than normal.

Because there is no possibility of an inhalation induction in the office setting, as described here, the pediatric patient should receive adequate sedation as an “induction” that will allow placement of an iv with little or no emotional trauma. There are several options available for preprocedure sedation. In the older child (> 8 yr) who is psychologically mature, an iv can be placed without premedication. In a dental office that is equipped with N₂O, the patient can breathe a high-flow N₂O/O₂mix through a nasal mask for 10 min before iv placement. If the patient accepts the mask, this technique can help lessen the patient’s fear of the iv. The use of a 30-ga needle for infiltration of buffered local anesthetic and, sometimes, the use of EMLA cream (placed 30 min in advance) also can be very helpful.

Premedication

Oral premedication is used commonly in children 4–8 yr old. Midazolam (0.5–0.7 mg/kg; maximum = 20 mg) mixed in an appropriate dose of liquid acetaminophen, given in the office 20 min before the procedure, can provide adequate sedation. In some, the addition of oral ketamine 2–3 mg/kg to the midazolam solution may result in a better sedating effect, especially in older pediatric patients.

For those children who cannot cooperate with an oral premed (too young or emotionally or physically unable to do so), an im premedication is very effective. This can be administered 5 min before the procedure, in the treatment room, with the parents present. Ketamine 3 mg/kg, midazolam 0.2 mg/kg, atropine 0.02 mg/kg (or glycopyrrolate 0.01 mg/kg) can be mixed in the same syringe and given in the anterior thigh with a 23-ga needle. This has the benefits of rapid uptake and reliable achievement of an adequate level of amnesia and sedation. Because of the rapid onset, the anesthesiologist must be prepared to begin monitoring the patient immediately after injection. Additionally, the parents usually require some reassurance as they watch their child become sedated so rapidly.

Intraoperative

Anesthetic technique: MAC. These patients are not intubated electively. A flexible LMA can be used for airway management, if needed. Following sedation, the patient is placed in the dental chair, with the head positioned to maintain an open airway. A shoulder roll may be needed to help with head extension. Monitoring—including pulse oximeter, ECG, BP cuff, and precordial stethoscope—is attached. O₂ is supplied, and ETCO₂ can be measured through a nasal cannula. An iv is started if not previously placed. A nasal airway is positioned with care (to avoid epistaxis) after the dental x-rays are taken. To prevent aspiration, a throat pack with a piece of dental floss attached—which remains outside the mouth—is placed, and minimal irrigation with constant suctioning is used. A rubber dam acts as a barrier between the teeth and the back of the throat. The anesthesiologist must be constantly vigilant in maintaining an open airway in these patients in the face of an oral procedure. Placing a flexible LMA may make airway management easier without interfering with the dental procedure. A propofol infusion can be started at a rate of 100–150 mcg/kg/min. Administration of a small amount of meperidine (e.g., 5–15 mg iv) may be useful in alleviating emergence delirium, especially if there is not adequate local anesthesia. Routine use of prophylactic antiemetics is (*Print pagebreak 1516*) recommended. In children, the use of metoclopramide (0.2 mg/kg) with dexamethasone (0.1 mg/kg) is very effective as a prophylactic antiemetic combination.

Emergence

No special considerations, except that throat packs must be removed.

Blood and fluid requirements

IV: 20–22 ga × 1

NS/LR @ 4–6 mL/kg/h

Standard monitors (see [p. B-1](#))

and pad pressure points.
eyes.

Monitoring

Positioning

Postoperative

Complications

PONV

These patients may swallow blood, with consequent PONV.

Pain management

Oral analgesics (see [p. C-2](#)).

In the dental office, there may not be a separate, designated recovery area. Usually, the pediatric patient is recovered by the anesthesiologist in the treatment room for at least 30 min, or until the patient is opening his/her eyes and maintaining a normal airway without assistance. At this point, the iv and monitors can be removed and the patient can continue recovering in the parents' arms, under the supervision of the anesthesiologist. The patient may need to stay another 30 min or until he/she opens his eyes without prompting, recognizes his parents, and has no nausea. Postop instructions

Recovery and discharge

given to the parents include: no outside or unsupervised activities for the rest of the day, no drinking or eating in the car on the way home, clear liquids for the first 1–2 h, followed by light food. The anesthesiologist should give the parents his/her pager or cell phone number so they can call with any questions that arise after they are at home. Regardless, a follow-up phone call from the anesthesiologist is always a good policy.

Dental Implants and Bone Grafting

Surgical Considerations

Azeem K. Lakha

Description: A dental implant consists of a tooth-root-shaped titanium post that is used to support a crown, bridge, or denture. Dental implants are inserted surgically into the mandibular or maxillary alveolar bone where teeth are missing. Single implants may be done with local anesthesia, but multiple or complex procedures are best accomplished with iv sedation. After the local anesthetic is administered, a mucoperiosteal flap is raised over the edentulous alveolus and the bone is exposed. Precise drill holes are made in the bone and the implants are screwed or tapped into place. Bone grafting may be necessary around the implants to fill in defects and is carried out using autologous, allogenic, xenogenic, or synthetic materials. In most cases, the gum tissue is closed over or around the implant. The bone is allowed to heal around the implant and 2–6 mo later the implant can be used to attach crowns, bridges, or dentures. In cases where there is insufficient bone, a bone graft is necessary **before** implants can be placed. Typically, bone grafts are allowed to heal for 6 months before implant insertion. Most minor grafting procedures are accomplished in the dental office under iv sedation and local anesthesia. Major grafts requiring extraoral donor sites may have to be done under GA via nasal ETT intubation.

Usual preop diagnosis: Acquired or congenital absence of dentition

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Summary of Procedures

Position	Supine, with head tilted back, using an articulating headrest in the dental chair
Incision	Intraoral mucoperiosteal flaps
Special instrumentation	Precordial stethoscope
Unique considerations	Throat packs are used to prevent aspiration of teeth, crowns, blood, and irrigation fluids. Ensure that they are removed at the end of the case.
Antibiotics	Prophylactic antibiotics, given orally before surgery
Surgical time	1–3 h
EBL	25–100 mL
Mortality	Rare
Morbidity	Infection: 1% Bleeding: Rare Delayed Bleeding: Rare Aspiration: Rare
Pain Score	1–4, depending on procedure

Patient Population Characteristics

Age range	17+ yr
Male: Female	1:1
Incidence	Becoming more common as technology improves
Etiology	Tooth loss

Anesthetic Considerations

Preoperative

Many patients having dental implant procedures are elderly and/or have multiple medical problems. The anesthesiologist should be consulted in advance about these patients so that questions about their medical conditions can be answered and a current list of medications can be obtained. Sometimes the patient's primary care physician needs to be contacted to discuss details of medical Hx. If chronic medical conditions are stable, patients often can receive "conscious sedation" and monitoring by the anesthesiologist for this procedure in the office.

Premedication Usually not necessary

Intraoperative

Anesthetic technique: MAC. These patients are not intubated electively. In the adult patient having dental implants, the maintenance of a lightly sedated state is achieved using a combination of iv midazolam, fentanyl (or meperidine), and small amounts of ketamine (20–30 mg/dose). A pulse oximeter, ECG, BP cuff, precordial stethoscope or ETCO₂ monitor, and nasal O₂ should be in place. Glycopyrrolate (0.1–0.2 mg) should be given to decrease secretions. Dexamethasone 8 mg and metoclopramide 15 mg are useful as an antiemetic combination. Usually, the oral surgeon needs the patient's cooperation at some point during the procedure; therefore, propofol is not an ideal drug to use. It can be given, however, in small doses to the patient who requires more than the other drugs for sedation. Occasionally, the adult patient in this setting will require a nasal airway.

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Emergence

No special considerations, except that throat packs must be removed at end of procedure.

Blood and fluid requirements

IV: 20–22 ga × 1
NS/LR @ 4–6 mL/kg/h

Monitoring

Standard monitors (see [p. B-1](#))
and pad pressure points.
eyes.

 Postoperative

Complications

PONV

These patients may swallow blood, with consequent PONV.

Pain management

Oral analgesics (see [p. C-2](#)).

Recovery and discharge

See [Recovery and Discharge for Office Dental Rehabilitation \(p. 1516\)](#)