Determining the Appropriate Oral Surgery Anesthesia Modality, Setting, and Team

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INTRODUCTION

Most surgical treatment rendered by oral and maxillofacial surgeons (OMFS) in the United States is completed in a clinical setting. What makes our specialty unique is the training received in the delivery of anesthesia. The ability to provide office-based surgical treatment without pain and anxiety has provided us with a great deal of freedom and an appropriate amount of responsibility. The oral surgery model is complex. The surgeon is expected to make a diagnosis, have the surgical skills and experience to treat the problem, and the medical knowledge to determine if patients are fit to withstand surgery. Finally, the surgeon and patients must agree on the best anesthesia modality. The operator/anesthetist model used in every oral surgeon’s office has given us a great advantage in the provision of individualized patient care.

PATIENT ASSESSMENT

As a surgeon, it is valuable to have a consistent protocol for every patient. The initial focus is on the patient’s chief complaint. Listen carefully to patients and get an accurate history. Continue the investigation with a comprehensive examination of the maxillofacial region to establish the correct diagnosis. Treatment options can then be discussed, and a specific course of action can be determined. Once the surgical procedure has been chosen, the type of anesthesia and the location of the procedure must be determined.

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Before any procedure, patients must be evaluated to determine their fitness to undergo the proposed surgery and anesthesia. This process begins at the initial office visit. There are 3 essential steps necessary to complete a physical evaluation:

1. Medical history questionnaire
2. Physical examination
3. Open discussion with patients about their medical history

The surgeon is obligated to carefully review the patient history, ask appropriate questions, and fill any unanswered gaps. This process can be tedious and time consuming, but it must be done with meticulous precision. If patients cannot answer specific questions, then the surgeon is obligated to find the answers. These questions might be answered by consulting the family physician or a specialist. It is important that the surgeon explain the patient’s diagnosis, planned treatment, and anesthesia choice with the consultant so they can provide focused information and recommendations.

Patients’ social and family history is also important. Smoking and drinking in moderation has little effect on our anesthesia delivery, but any of these habits in excess can severely affect the anesthesia and surgical outcome. Patients must be questioned about drug use, especially street drugs, like cocaine, if the surgeon is suspicious. Finally, questioning patients about family complications during anesthesia can provide valuable information that can be used to determine how and where patients’ treatment will be provided.

The surgeon must have a complete list of each patient’s medications, including herbal remedies. Asking patients why they take a specific medication provides the surgeon with targeted information regarding their medical status. It is difficult to understand the pharmacology of every medication, the potential side effects, and how anesthetic drugs will react in this environment. Fortunately, there are excellent resources that can be accessed online in real time to provide this information.

The surgeon must have a complete list of patients’ drug and food allergies. This information is essential knowledge that directs the anesthesia care as well as the prescribing of medication to strictly avoid patient-specific allergens. Knowing the specific response to an allergen helps the surgeon determine patients’ level of reactivity.

Once the review of systems and patient history has been completed, a physical assessment must be done. Several key observations and questions provide the surgeon with the information necessary to choose the appropriate anesthesia modality. These observations and questions include the following:

1. Height and weight, including body mass index (BMI) if indicated
2. Initial vital signs, including electrocardiogram (EKG) reading if indicated
3. Oral range of motion, jaw size, neck size, and range of motion
4. Mallampati classification
5. Cardiovascular and respiratory reserve (Metabolic Equivalent of Task [METS])

The examination can be completed very quickly. In some patients, this process will expose significant risks, including poor cardiovascular reserve, a difficult airway, poor intravenous (IV) access, and a multitude of other problems. When the examination process is complete, the OMFS should have the knowledge to give patients an American Society of Anesthesiologists’ (ASA) classification and decide on an appropriate anesthesia modality. The ASA classification system is highlighted here:

ASA Physical Status Classification System
1. A normal healthy patient
2. A patient with mild systemic disease
3. A patient with severe systemic disease
4. A patient with severe systemic disease that is a constant threat to life
5. A moribund patient who is not expected to survive without the operation
6. A declared brain-dead patient whose organs are being removed for donor purposes

Traditionally, oral surgeons have limited anesthesia delivery to patients who are classified as an ASA 1 or 2. With changes in reimbursement and a population that is older, frequently obese, and surviving with multiple comorbidities, the surgeon is now challenged to treat patients who are classified as an ASA 3 and even 4 at times. The decision to treat then becomes more complicated. Every surgeon must understand their limits based on training, experience, confidence, and ability.

LOCAL ANESTHESIA

The American Dental Association (ADA) defines local anesthesia as “the elimination of sensation, especially pain, in one part of the body by the topical application or regional injection of a drug.” The use of local anesthesia is the foundation of pain control in dentistry. It is safe if used correctly and in appropriate doses. It is critical that the surgeon understand the pharmacology of the local anesthesia and the maximum dose allowed per patient. This understanding is especially important in children.
Most oral surgery procedures can be accomplished using local anesthesia. This treatment option is practical and cost-effective. This modality assumes patients can handle the stress of the surgery and tolerate the needle. Topical anesthetics can be helpful to decrease the pain of the injection. A preoperative medical assessment is necessary even for patients treated with local anesthesia. Although rare, there are true allergies to local anesthetic solutions. More frequently, patients are intolerant of the vasoconstrictor drugs like epinephrine, especially those with cardiovascular disease. The surgeon must weigh the risk of using epinephrine against the need to provide profound local anesthesia. Local anesthesia can be deadly, leading to central nervous system depression and even death if overdosed; this is especially true in children who do not tolerate an overdose well.

LOCAL ANESTHESIA WITH NITROUS OXIDE

Nitrous oxide can be used in conjunction with local anesthesia and provide an effective sedative and analgesic effect for many patients. States have specific guidelines as to who can start and supervise the use of nitrous oxide. Be aware of your specific state guidelines. The ADA specifies that you must have a scavenger system to pull off the residual nitrous oxide gases.

There are few disadvantages to using nitrous oxide inhalation. As long as nitrous is accompanied by at least 20% oxygen, it is a safe anesthetic agent. Nitrous is not a potent anesthetic; unfortunately, there will be a percentage of patients who will not achieve the desired effect. This situation is most commonly seen in disruptive children and adults. If the child or adult cannot or will not breath through their nose, the effects of the drug cannot be achieved.

There are no true contraindications to the use of nitrous oxide in combination with adequate O₂ delivery. Nitrous is not, however, an innocuous agent. Chronic exposure to low levels of nitrous oxide has been associated with an increased risk of spontaneous abortion, fetal deformities, and other congenital health concerns. Chronic exposure to high levels of nitrous oxide has been linked to severe sensory neuropathies. This occurrence has been found in overdosing of nitrous and is usually associated with addictive individuals who have direct access to nitrous oxide gas.

MINIMAL SEDATION

The ADA defines minimal sedation (anxiolysis) as “a minimally depressed level of consciousness, produced by a pharmacologic method that retains the patient’s ability to independently and continuously maintain an airway and respond normally to tactile stimulation and verbal command. Ventilatory and cardiovascular functions should be unaffected.” This definition is supported by the American Association of Oral and Maxillofacial Surgeons’ (AAOMS) Parameters of Care.

The ADA is very specific about the dose of drug used to produce minimal sedation. According to the guidelines, a single enteral drug can be given at a dose not to exceed the maximum recommended dose. This dose is the dose adult patients can take for prescribed and unmonitored home use. The ADA further states that “if nitrous oxide is used in conjunction with a single sedative agent, levels of anesthesia deeper then minimal sedation can be reached, so patient’s must be appropriately monitored.”

In the cooperative adult population, oral sedation may be useful in oral surgery. This article is not about specific drugs or doses, but the benzodiazepines are the workhorse of this technique. Patients can be maintained in a comfortable, sedated state and, in combination with nitrous oxide, have little recall of the procedure. Profound local anesthesia is essential. These drugs have a margin of safety that allow patients to maintain their airway, respond to position changes, and swallow when surgical irrigation is used. Patients must understand that some recall of the procedure is likely. Unfortunately, the oral sedative drugs can be unpredictable based on the gastric absorption and peak effect of the drug. Triazolam (Halcion) is the most commonly used drug because of its short half-life (1.5–5.5 hours) and the fact that it has no active metabolites. Peak plasma levels are seen at 1.5 hours after oral administration, although this can vary. Typically, these patients will have minimal residual drowsiness.

Patients occasionally ask for medication to calm their anxiety before arriving at the office. The cooperative adult can be given a dose of triazolam or diazepam (Valium) to promote stress-free rest the night before surgery. A single dose is then taken 1 hour before surgery. Nitrous oxide can then be used to assist with the delivery of local anesthesia or the placement of an IV to allow drug titration. The team should expect an accentuated response to titrated medication if oral sedatives have been given. These patients must have a responsible escort to drive them home.

When providing minimal sedation, the ADA and the AAOMS mandate that at least one additional assistant trained in basic life support be present in the room to assist the treating surgeon. The ability to provide positive pressure oxygen must be immediately available in the case of an airway
emergency must have a fail-safe system to prevent the delivery of less than 30% oxygen.

The ADA recommends the use of pulse oximetry, although it is not mandated for minimal sedation. The AAOMS recommends the use of pulse oximetry during all sedation procedures. The blood pressure and heart rate must be evaluated preoperatively, postoperatively, and intraoperatively as needed. An appropriate sedation record that includes the names of all drugs given and the listed vital signs taken for the procedure is mandated.

Pediatric patients are a more complex problem. Pediatric dentists have used a myriad of drugs to sedate children, some with better results than others. For the oral surgeon, oral versed is the most commonly used medication for enteral sedation. Unfortunately, the clinical effect of oral versed can be unpredictable. The child must be cooperative enough to drink the medication. Rectal and nasal versed can also be used based on the tolerance of the surgeon, the parents, and the child. The child’s response to the initial dose may not provide the level of sedation necessary to complete the procedure with local anesthesia and nitrous oxide. Children frequently do not react appropriately to the sedative feeling and may require IV placement to deepen the level of anesthesia via drug titration. Using the initial medication to allow venipuncture seems to be the modality chosen by most oral surgeons, allowing the child to be titrated to moderate or deeper sedation.

MODERATE SEDATION

Moderate sedation is defined as “a drug-induced depression of consciousness during which patients respond purposefully to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.”1 The ADA specifically recommends that the drugs used in the delivery of moderate sedation must carry a margin of safety that would render the unintended loss of consciousness unlikely.

The benefit of moderate sedation is the use of drug titration, most commonly provided by a parenteral route. The ability to give incremental doses of any drug allows you to control the level of sedation. It is essential that the surgeon understand the pharmacology of each drug used and allow the full effect of the drug to occur before administering more medication.

The ADA mandates that at least one additional trained individual must be present in the room during the delivery of moderate sedation. The regulations recommend that the surgeon remain in the room and recover patients until they reach a level of minimal sedation. A trained assistant can then recover patients until discharge.

Monitoring guidelines for moderate sedation include the mandated use of pulse oximetry. The ADA’s guidelines recommend the continuous use of an EKG monitor for patients with cardiovascular disease. The AAOMS’ Parameters of Care and the Office Anesthesia Evaluation Program are more stringent regarding the use of an EKG. The guidelines clearly state the benefits of continuous EKG monitoring of all sedated patients. The blood pressure should be continuously monitored and recorded at appropriate intervals. A time-oriented record must be maintained during the procedure that includes the vital signs at regular intervals as well as all drugs given, including local anesthesia.

Alert to all Oral Surgeons!

As of January 1, 2014, the AAOMS has mandated the use of carbon dioxide (CO2) monitoring (capnography) for any procedure considered to be at the level of moderate sedation to general anesthesia. This decision stems from the collaborative relationship the AAOMS has developed with the ASA. It is clear through research that capnography provides the earliest evidence of respiratory distress or failure. Early diagnosis leads to early treatment. Capnography will allow surgeons to respond to airway concerns expeditiously. The AAOMS intends to continually improve the safety of anesthesia delivery. As of January 1, 2014, capnography will be the standard of care.

Practically speaking, moderate sedation is very effective in the oral surgery office. Most surgeons refer to this modality as IV sedation. The Oral and Maxillofacial Surgery National Insurance Company’s (OMSNIC) data for the past 12 years show that oral surgeons use IV sedation approximately 27% of the time in their day-to-day activities. The ability to titrate patients to an appropriate level of sedation and maintain this level with incremental dosing is predictable. Profound local anesthesia to prevent pain during the surgical procedure is essential to allow the smooth delivery of moderate sedation. This technique is ideal for almost any procedure completed in the outpatient setting. Patients must understand the limitations of this technique, realizing they may have some recall of the procedure if sedation is the anesthesia end point.

The value of mild to moderate sedation cannot be understated for patients with a difficult airway. Oral surgeons are faced daily with a population of patients who have a compromised airway. Whether from obesity, obstructive sleep apnea,
poor head and neck mobility, jaw size, or a combination, these patients are at a high risk for airway complications. The surgeon is obligated to explain the risks the difficult airway creates. Deeper levels of anesthesia require that the surgeon be able to maintain or reestablish the airway in the case of respiratory distress. Keeping patients light allows the airway to be maintained spontaneously while allowing patients to respond to direct commands. This ability for the patient to respond to direct commands is the patient’s lifetime. The OMSNIC’s data clearly show that the difficult airway is a primary factor in many death cases in the oral surgeons office. Choosing this modality takes discipline and understanding on both the surgeon and the patients’ part. If sedation is not acceptable to patients, and the surgeon is uncomfortable providing a deeper plane of anesthesia, another location, like the hospital or outpatient surgery center, should be considered.

Children are a unique part of every day oral surgery, occasionally becoming disruptive. Some tolerate local anesthesia with or without nitrous oxide very well. Other children cannot be managed in this fashion and require some level of sedation. Moderate sedation requires the child to tolerate the placement of an IV for titration. Most children handle this well if they understand what is going to happen. Nitrous oxide can be very helpful for the venipuncture. Some surgeons use combination preparations of lidocaine and prilocaine cream to prevent the pain of venipuncture. EMLA (Eutectic Mixture of Local Anesthetics) is the trade name of the preparation marketed by APP Pharmaceuticals. Some surgeons will choose an oral sedative like versed to assist with patient management. The advantage of having good IV access to allow titration of the medication is paramount.

Our population is aging. People are living longer, and many people have significant medical comorbidities. They are educated and desire comprehensive treatment. Age has significant physiologic effects on the body, so the elderly may have a unique and sometimes abnormal response to anesthesia drugs. Sedation must be undertaken with care, allowing the full effect of each small incremental dose to reach its peak effect before giving more. The elderly metabolize drugs differently and are prone to more rapid cardiovascular and respiratory depression. Proceed slowly with elderly patients.

Every oral surgeon has a list of preferred anesthetic medications. Most medications are drugs that were studied and used during residency training. The drugs most commonly used in oral and maxillofacial surgery for moderate sedation are fentanyl as a narcotic and versed for its amnesic and sedative effects. Regardless of the surgeon’s choice of medication, the slow titration of each drug and the use of profound local anesthesia are the key elements in the delivery of moderate sedation.

DEEP SEDATION

By definition, the ADA describes deep sedation as “a drug-induced depression of consciousness during which patients cannot be easily aroused, but respond purposefully following repeated or painful stimulation. The patient’s ability to independently maintain ventilatory function may be impaired, and the patient may require assistance in maintaining a patent airway. Cardiovascular function is usually maintained during deep sedation.”

Deep sedation is the workhorse anesthetic technique in most oral and maxillofacial surgery offices. According to the OMSNIC’s statistics from 2000 to 2011, the average surgeon provides approximately 670 anesthetics every year, with 73% of these being either deep sedation or general anesthesia. This technique is ideal for most short-duration procedures, including wisdom teeth removal and placement of dental implants. Because of the depth of anesthesia, the team concept of anesthesia delivery that has been pioneered in oral surgery is a must. The oral surgery operator/anesthetist model has been challenged on multiple occasions, yet our record of safety is unmatched.

Every patient should be appropriately evaluated medically and given an ASA classification before deep sedation. Patients who are classified as an ASA 1 and 2 are considered to be of minimal risk. The AAOMS’ Parameters of Care discusses the treatment of patients classified as an ASA 3 and 4 and recommend a physician or medical specialist consultation before treatment if clinically indicated. It is important to recognize that the higher the ASA classification, the higher the BMI, and the higher the Mallampati scale, the more risk we incur when the patient is under deep sedation.

The anesthesia team for deep sedation must consist of at least 3 individuals. This guideline is clearly spelled out in the ADA’s guidelines and supported by the AAOMS’ Parameters of Care. The OMFS must be current in advanced cardiovascular life support training. At least 2 other individuals who are current in basic life support must be in the treatment room at all times. Using the operator/anesthetist model, one of the assistants must be designated for patient monitoring.

The AAOMS has developed a staff certification training program called Dental Anesthesia Assistant National Certification Examination (DANCE). This 2-part program consists of 36 hours of
self-study material with associated quizzes followed by a computer-based competency examination. The program must be completed over a 6-month time period. This is an amazing program further preparing your team members for their day-to-day activities and for anesthesia emergencies. The AAOMS is also strongly suggesting that the surgeon and team take part in simulation training (Sim-Man [Laerdal, Wappingers Falls, NY, USA]) or in office emergency training on a regular basis.

In some states, registered nurses and licensed practical nurses can legally place IVs and predate patients under the doctor’s supervision. Regardless, the designated assistant or nurse is given the responsibility of monitoring patients and maintaining the airway. This individual is responsible for maintaining a time-accurate record of the anesthetic, including periodic monitoring of vital signs. Hiring nurses is an additional employee expense, but the comfort of having highly trained individuals to assist with patient management and emergency care cannot be overlooked. Nurses who have had intensive care unit (ICU) experience provide a unique skill set, including airway management and IV placement, that can be critical in an emergency situation.

During the delivery of deep sedation, the following monitors are mandated by the ADA:

- Oxygenation must be continuously monitored using a pulse oximeter.
- End tidal CO₂ was previously mandated for intubated patients only. As of January 1, 2014, CO₂ monitoring will be mandated in all patients from moderate sedation to general anesthesia.
- EKG must be used to evaluate the heart rate and rhythm.
- Continuous blood pressure monitoring must be used.
- The ability to take patients’ temperature must be available, especially when using agents that could trigger malignant hyperthermia (MH).

The monitoring technology we use today is unbelievable, and yet patient monitoring is much more than watching numbers on a screen. The doctor and the assistants must be acutely aware of patients. Teach the team to watch the patients’ respiratory pattern, the color of the skin, the color of the blood, and feel for a pulse as needed. Monitors cannot provide us with this information. A precordial stethoscope is an extremely valuable tool used to auscultate the patients’ respirations and heart rhythm and rate. This technique may seem like old-school technology, but in children especially, this is a great monitoring technique.

In the case of an emergency during deep sedation, the OMFS must have the following equipment available for appropriate resuscitation:

- The ability to provide positive pressure oxygen must be available.
- The anesthesia equipment must have a fail-safe system that will not allow less than 30% oxygen delivery.
- A scavenging system must be available if nitrous oxide or halogenated gasses are used.
- The ability to place an IV must be available.
- The equipment to provide a patent airway must be immediately available for both children and adults. The use of the laryngeal mask airway (LMA) is now included in the airway management algorithm and has become mainstream in the management of the difficult airway.
- Medications necessary for resuscitation and a defibrillator must be immediately available. Most offices have moved toward using an automatic external defibrillator (AED) rather than the traditional defibrillator. Dosing guidelines for emergency medication should be immediately available for both children and adults.

Because of the deeper level of sedation delivered, the recovery of patients after surgery becomes more labor intensive. The ADA and AAOMS recommend the following guidelines:

- Oxygen and suction must be immediately available if a separate recovery area is used. Practices may have different means of recovery, including using the treatment room for the recovery process. Regardless, appropriately trained assistants must have direct contact with recovering patients. A recovery checklist like the Modified Aldrete Scale is useful to document the patients’ fitness to leave the office.

Deep sedation is likely the most common form of anesthesia provided in the OMFS office. Most oral surgery procedures are short in duration (<30 minutes), so deep sedation provides patients with the satisfaction of excellent pain control, amnesia of the surgical event, and a comfortable arousal usually with minimal side effects. With a skilled team providing the anesthesia, the risks are very low for patients classified as an ASA 1 and 2. Again, the risk becomes greater as the ASA level increases and the depth of anesthesia increases. The surgeon must be comfortable with the choice of anesthesia and understand potential limitations.
Deep sedation of the small child is a more complex subject. The ADA defines the child as someone aged 12 years or younger. The ADA’s guidelines clearly support the use of the American Academy of Pediatrics/American Academy of Pediatric Dentists’ guidelines for the management of pediatric patients during and after sedation for diagnostic and therapeutic procedures. Practically speaking, each surgeon must determine their ability to manage the anesthesia needs of children. Based on their training, experience, and comfort level in providing advanced anesthesia techniques, the appropriate decision can be made as to the modality and location of the anesthesia. Children are less tolerant of moderate sedation, so frequently we are forced to deepen the level of anesthesia for control purposes. The surgeon must be acutely aware of the anatomic (airway) and physiologic differences in children. Children also decompensate quickly, so the team must respond rapidly to every emergency. Some OMFS are simply not comfortable with the risk of treating children. In that situation, taking the child to an outpatient surgery center or local hospital is a better option.

In the cooperative child, the use of nitrous oxide can be extremely valuable to assist in the placement of an IV. EMLA cream can also be stocked in the office and used for comfortable venipuncture. If a sedative is desired before deep sedation, oral versed is still the drug of choice. These children must be directly monitored to watch for potential respiratory depression, so providing this medication at home under parent supervision is not recommended.

Deep sedation in patients with a difficult airway is a significant concern. Looking at the OMSNIC’s data for the past 12 years, it is clear that airway compromise can be the beginning of the end. We see patients daily who have complex medical problems and airways that are suspect at best. The deeper the anesthesia, the more likely an airway event will occur. It is essential that the surgeon can recover or reestablish an airway quickly and efficiently. The presurgical evaluation can give you clues as to the patients’ airway status; but in the end, it is the training and skill level of the surgeon that will be tested. The difficult airway patient might best be treated with a lighter form of sedation, or by securing the patient’s airway with endotracheal intubation at an outpatient surgery center depending on the length and complexity of the surgical procedure.

**GENERAL ANESTHESIA**

The ADA defines general anesthesia as “a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to independently maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug induced depression of neuromuscular function. Cardiovascular function may be impaired.”

Deep sedation and general anesthesia are closely linked in the continuum of anesthesia. Clinically they are almost identical. Both techniques require that the surgeon have the skill and knowledge to manage the patient’s airway, maintain cardiovascular stability, and be able to resuscitate patients in case of an emergency. For this reason, the delivery of deep sedation/general anesthesia is restricted to only those dentists who have completed an oral and maxillofacial surgery residency or a dental anesthesia residency.

The ADA’s guidelines for the facility, training, team, and emergency response is identical to the guidelines for deep sedation. Because the depth of general anesthesia places patients in a more compromised state, the OMFS and the team must be well trained in airway management and emergency care. The AAOMS’ Parameters of Care (2012) and the Office Anesthesia Evaluation Manual clearly specify everything from the team makeup to the room size. It is recommended that the emergency medications and algorithms be meticulously organized. Drug doses and emergency airway equipment specific for both children and adults must be immediately available. These documents are an excellent resource for the surgeon and staff and can be accessed on the AAOMS' Web site at aaoms.org.

General anesthesia can take on many forms in the OMFS office. For the surgeon who is comfortable with children and less cooperative adults, mask ventilation anesthesia is a reliable technique. Since the development of sevoflurane, the use of mask anesthesia induction for short procedures in children, adults, and even patients with special needs has become more predictable. In longer procedures, a mask induction can be followed with IV placement and transition into a parenteral technique, or an endotracheal tube or LMA can be placed. The rapid onset, favorable aroma, and relative lack of cardiac ectopy seen in sevoflurane when used in conjunction with local anesthesia make this a reliable and relatively safe technique. The surgeon must be comfortable and experienced in this procedure to make it a viable and predictable modality.

Some surgeons are comfortable with the use of intramuscular ketamine for the uncooperative child or adult. Ketamine given at a dose of 2 to 4 mg/kg
will create a cooperative patient in several minutes, allowing venipuncture and further titration of medication. The airway must be evaluated carefully based on the patient’s response to the medication, but typically ketamine supports the cardiovascular and respiratory parameters. Postoperative hallucinations, especially in the absence of benzodiazepines, can complicate the recovery period.

The LMA is emerging as a viable option in the outpatient setting. The ability to place this airway blindly without the need for paralytic agents is advantageous. As the LMA has matured, different versions of this airway, like the flexible LMA, allow placement and improved vision of the surgical field. These patients can be maintained with an inhalation agent or a parenteral (propofol) pump titrated to allow for spontaneous ventilation. In the case of an emergency, the airway is already in position. The LMA does not protect the airway from emesis and aspiration. Once again, the surgeon must feel comfortable and confident with this specific technique.

Intubated general anesthesia is still used in the modern OMFS practice, although it seems to be less popular. The surgeon must have the skill, training, and confidence to be able to place the endotracheal tube both orally and nasally. This technique is superb for procedures that require unimpeded access to the mouth and oropharynx, like osteotomies and advanced dentoalveolar procedures. The doctor and team must protect and maintain the patients’ airway and cardiovascular status. Intubated anesthesia is more complex and stressful, especially during induction and arousal. The surgeon who uses this technique in the operator/anesthetist fashion must be absolutely confident with their own abilities and the ability of their team. When performed in the office, the assumption is that patients will be discharged to home, so the length, complexity, and postoperative needs of patients must be taken into consideration before using this technique.

When potential triggers of MH like the halogenated agents (sevoflurane) and succinylcholine are used, the surgeon must have dantrolene immediately available to manage an MH emergency.

Some surgeons choose to use the services of a certified nurse anesthetist or a medical or dental anesthesiologist to provide general anesthesia and even moderate and deep sedation in their office. This choice depends on the training, skill level, and comfort of the oral surgeon as well as the complexity of the procedures completed in the office setting. Obviously, this team choice has both professional and economic concerns that must be discussed with patients.

**OUTPATIENT SURGERY AND ANESTHESIA**

It is appropriate to take certain patients to an outpatient surgery center for both surgical and anesthesia services. Factors affecting this decision include:

- Patient health status: ASA 3 or higher
- Difficult airway
- Complexity of the surgical procedure
- Management problems (children/patients with special needs)
- Length of surgery
- Surgeon preference

Every surgical procedure is unique in its own way. More importantly, every patient has unique needs based on their health, size, and level of cooperation. Occasionally the simplest of procedures cannot and should not be completed in the office. The benefit of the outpatient facility is the anesthesiologist or certified registered nurse anesthetist who will manage your patients’ anesthesia needs, which allows the surgeon to focus on the surgery at hand without the stress of also providing the anesthesia.

Young children are occasionally very difficult to manage in the office setting. Every surgeon has a comfort level with children. If the surgeon is not comfortable with a specific child in the office, then an outpatient surgery center is an appropriate setting, depending on the health of the child and the complexity of the surgical procedure. Most of these procedures are of short duration and minimal complexity and do not require a hospital stay. Most anesthesiologists are very willing to use a mask induction to breath a child down for tooth extraction without intubating or placing an LMA, similar to the technique used in the oral surgeons office.

Patients with special needs may at times be best managed at an outpatient facility, depending on their level of cooperation and health status. The complexity and length of the surgical procedure must also be taken into consideration. If patients are unable to cooperate for the surgery or for the anesthesia, an outpatient setting is a good option, assuming the patients will not need overnight hospital care.

The surgeon should communicate directly with the anesthesiologist to determine the best airway and anesthesia technique regardless of the facility. This information is usually determined by the anatomic requirements of the procedure and the surgeons need for access.

**HOSPITAL-BASED ANESTHESIA**

Not every procedure can or should be handled in the office. Some patients do not belong in an
outpatient center either. Taking patients to the hospital is usually based on several factors:

- Patient diagnosis
- Complexity and length of the procedure
- Patient health
- Need for comprehensive hospital services, including extended admission
- Need for critical care
- Patient is already in the hospital

Orthognathic surgery, cancer surgery, severe maxillofacial infections, temporomandibular joint surgery and cleft and craniofacial surgery require a level of surgical skill and a depth of anesthesia that may necessitate hospital admission. Typically these procedures require careful planning and coordination with our medical colleagues. The surgeon must have an anesthesia plan and clearly communicate it with the anesthesiologist. This plan includes the choice of an airway (nasal versus oral endotracheal intubation), patient positioning, and specific needs like relative hypotension when bleeding is expected.

Intubated anesthesia is still the standard of care, although the LMA is being used more frequently for shorter cases, especially with children. Occasionally a surgical airway will be necessary for long-term hospital care. Placing a tracheostomy requires precise coordination with the anesthesiologist and an experienced surgeon. In most intubated cases, patients are extubated before leaving the surgical suite and anesthesia services end when the anesthesiologist transfers the patients to the postanesthesia care unit. Occasionally it is appropriate to leave the endotracheal tube in place for several days to allow swelling to resolve or to allow patients to be completely awake before extubation. Orthognathic surgery for patients with severe obstructive sleep apnea and severe maxillofacial infections are cases when extended intubation is appropriate. Anesthesia will assist with the ICU transfer and coordinate care with the intensivist before signing off from patients.

Cases completed in the hospital have the benefit of postanesthesia care and good medical/surgical treatment as the patients begin to recover. In the case of a complication or mishap, the patients and surgeon have direct access to all services provided by the hospital, including immediate anesthesia. Depending on the specific geographic area, some hospitals will have more goods and services available to your patients.

Children who need surgery and overnight hospital care will require general anesthesia. Consultation with the anesthesia staff should be considered if the child presents unique medical or anatomic challenges that might affect the delivery of anesthesia. If intubation is necessary, this plan should be coordinated with the anesthesiologist, specifying the type of airway and anesthesia needed to best accomplish the surgery.

Depending on the size of your community, anesthesia will be provided either by a board certified anesthesiologist or a certified nurse anesthetist who is supervised by the anesthesia staff. Regardless of your provider, open communication is the key to excellent anesthesia care.

CHOOSING THE CORRECT MODALITY

Anesthesia delivery for the control of anxiety and pain has a rich history in dentistry. Our forefather’s tested the waters, pushed the limits, and perfected the techniques of the anesthesia delivery we use today. Oral surgery is the most painful specialty in dentistry. Fortunately, we have the gift of anesthesia to provide patients with pain-free care in a safe environment. The operator/anesthetist model that is the standard of care for oral surgeons throughout the United States has stood the test of time. Many of our medical colleagues are copying our model as they are forced to manage more patients in an outpatient setting. Our safety record is second to none.

This article is about anesthesia options and the different modalities available to the OMFS. It is not a comprehensive review of the techniques and drugs. Every surgeon brings a unique skill set to the delivery of anesthesia. The guidelines are clearly spelled out by the AAOMS and the ADA. In the end, the choice of anesthesia modality, team, and location is left to the surgeon and the patients.

REFERENCES


FURTHER READINGS