Preoperative, Intraoperative, and Postoperative Anesthesia Assessment and Monitoring in Oral Surgery

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KEYWORDS
- Preoperative evaluation
- Medical history
- Physical examination
- Monitoring
- Discharge

KEY POINTS
- Preoperative history and physical examination are critical before anesthesia is induced.
- An evaluation of the airway for potential obstruction is essential.
- Laboratory testing and radiographic studies need to be customized to the clinical situation.
- Physiologic monitoring must be done throughout anesthetic administration.
- Postoperative monitoring is critical.
- Discharge criteria and standards must be used.

PREOPERATIVE EVALUATION

The statement is often made, “do not operate on a stranger”. The same statement also is applied to providing anesthesia services. Many offices require elective surgery patients to visit the office for a preoperative consultation and evaluation, which allows a detailed medical and dental history and appropriate physical examination. An anesthesia history should also be obtained as well as a description of the benefits and risks of the proposed procedure, allowing a comprehensive and appropriate surgical consent to be obtained. Preoperative medication alterations can be discussed, postoperative medications can be prescribed, and nothing by mouth (NPO) status can be addressed. Postoperative instructions can be presented and discussed with the patient and family.

A thorough discussion of the patient’s symptoms and a limited or complete physical examination is necessary to establish a diagnosis. Once this diagnosis is decided upon, a discussion about the various modalities to treat the problem must occur. This discussion must be done to arrive at an Informed Consent. The practitioner must have various consent forms that are available for each type of procedure. There are many sources to obtain informed consent forms that are available to the practitioners that have been customized for the various surgical and anesthesia procedures.

Offices with experienced screening staff can obtain much of the pertinent information necessary to allow surgery and anesthesia to be performed without a separate preoperative consultation. The scheduling can be done on American Society of Anesthesiologists 1 and stable 2 patients. Many times emergency patients are treated in this manner. A drawback to this type of practice is there may be times that surgeries have to be postponed and rescheduled when information obtained compromises patient safety.

In the past routine adjunctive testing was done on all patients preoperatively. This practice has changed and only appropriate studies are ordered. Appropriate radiographic studies must be...
ordered and diagnosed when appropriate. These studies include the following:

Intraoral studies
- Extraoral studies
- Cone beam scans
- Other computed tomography studies
- Angiograms
- Magnetic resonance imaging
- Arthrograms

When a patient presents with specific medical conditions that require laboratory testing or radiographic studies, one should use these modalities. One specific challenge is how to provide anesthesia to women of childbearing age. Some individuals require pregnancy testing before any type of anesthetic delivery. Most practitioners will ask if there is a chance of the patient being pregnant. If there is not a likelihood of this, no specific laboratory testing is necessary.

Many patients are taking anticoagulants such as warfarin and their anticoagulation status can be accurately measured by using the International Normalized Ratio the day of surgery. In many cases minor treatment can be accomplished without discontinuing the warfarin. If more involved surgery is anticipated, medical consultation is in order. In high-risk cases a bridging therapy with low molecular weight heparin can be used.

There are new classes of anticoagulants including thrombin inhibitors that an increasing number of patients are taking that require specific types of laboratory tests that are not available in many locations. The drugs in this class do not have any way to be reversed should there be an overdose. One should consider a consultation with the patient’s prescribing physician when there are questions about treating patients taking these drugs.

Patients undergoing sedation or anesthesia are asked to fast preoperatively. The American Society of Anesthesiologists has a publication entitled Practice Guidelines for Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of Pulmonary Aspiration: Application to Healthy Patients Undergoing Elective Procedures. Patients that have gastric motility disorders, gastroesophageal reflux disease, metabolic disorders such as diabetes mellitus or physical situations such as pregnancy or obesity should fast for increased lengths of time.

The routine use of gastrointestinal stimulants to decrease the risk of pulmonary aspiration in patients that have no obvious risk for aspiration is not necessary.

Airway evaluation of the patient before inducing sedation or anesthesia is essential. The Mallampati Classification is one of the most widely used scales used to assess the airway. There are increasing numbers of morbidly obese patients with body mass indices of 40 or more that are at significant risk for elective office surgery. There are patients with enlarged tonsils or adenoid tissue that are at increased risk for anesthesia. The patient with a short thyromental distance or who are severely retrognathic is at increased risk of airway problems. The patients that report or appear to have obstructive sleep apnea are at increased risk for airway obstruction during anesthesia. A child with a recent upper respiratory illness needs to be evaluated thoroughly before anesthesia.

One needs to evaluate the airway during a preoperative evaluation carefully and, if the risk to the patient seems to be great, be willing to postpone an elective surgery until the risks can be minimized or the surgery can be performed at another location where the difficult airway can be more adequately managed. Emergency treatment can also be performed using local anesthesia.

Baseline vital signs should be obtained and recorded at the initial consultation as well as the treatment appointment before sedation or anesthesia is induced. The minimal evaluations are blood pressure, pulse rate, respiratory rate, pulse oximeter reading, and temperature, if indicated. If any of these are significantly elevated or decreased from normal, one should continue to monitor the patient to see if the readings will become closer to a range that one could consider performing the anesthesia and procedure. One needs to consider whether the abnormal readings are a cause of some treatable condition (such as, pain or anxiety). One should not continue with sedation or anesthesia unless the abnormal readings can be explained or treated. Referral to the patient’s attending physician or emergency department should be done at the earliest time available.

If a consultation appointment is made or the consultation is done by telephone and the treatment performed at the first visit, it is often appropriate to prescribe medications before surgery to
eliminate a pharmacy stop after the surgery and anesthesia with the patient being left unattended in the car.

**INTRAOPERATIVE ASSESSMENT AND MONITORING**

On the day of the procedure one of the first things to assess is the NPO status. The office staff person seating the patient in the operatory or operating room can simply ask the patient when he/she last ate food or drink, or can ask the simple question, “what did you have for breakfast.” The parents of a minor should be asked as well. Once the NPO status has been established, the patient can be connected to the monitoring devices.

Before the anesthesia team begins the procedure, a “time out” should be done. The patient should be positively identified. The exact procedure should be discussed with the patient or guardian. The medical history should be reviewed including medications being taken and allergies. The type of anesthesia to be delivered should be discussed. During the “time out” no other preparation should be done and the entire anesthesia and care team must be in attendance.

Once the “time out” is complete, the airway assessment should be performed as described earlier in the article. At the least a limited physical examination consisting of auscultation of the heart and lungs should be performed.

Intravenous access should be obtained by someone permitted by state law to do this. An appropriate size catheter should be introduced and stabilized and the fluid of choice should be attached and the patency of the catheter checked. The intravenous line must be secure because it may be a lifeline should an emergency occur. Straight steel needles and in most cases butterfly needles should not be used. In some patients it may be necessary to induce anesthesia using inhalation agents such as sevoflurane or intramuscular ketamine before starting the intravenous line. Before the induction of anesthesia many surgery teams will preoxygenate the patient using either a nasal canula or a nasal hood.

Preparation of the medications to be used in the anesthesia should be done by a member of the anesthesia team that is legally permitted to draw the drugs. Each state has individual regulations that describe who can withdraw the medications from the vial. In most jurisdictions the person withdrawing these medications is licensed by the state. Most states do not permit dental assistants to perform these tasks. The syringes should be labeled appropriately and stored according to the manufacturer’s directions. The expiration dates must be checked. Single-dose vials should be used on only one patient.

The anesthesia team should consist of a minimum of 3 individuals. The surgeon is the member that generally administers the anesthetic drugs. There must be one trained individual that monitors the patient’s condition, vital signs, and respirations. If the patient is not breathing spontaneously or has some degree of obstruction, support of the airway can be accomplished by this individual. The third person on the team is the surgical assistant. There can be other members of the anesthesia team as well. On more challenging anesthesia cases or surgery cases another oral surgeon, nurse anesthetist, or dental or medical anesthesiologist will be in attendance. On more involved surgical procedures a circulating nurse or dental assistant will be present.

There are several monitoring devices that should be used on the patient to be anesthetized. Monitoring of the cardiovascular system should be done on most patients when appropriate. A baseline blood pressure, pulse rate, and respiratory rate should be obtained and recorded before the administration of any anesthetic agents. Blood pressure should be monitored and recorded at least every 5 minutes. The pulse rate and the SPO2 should also be recorded on an anesthesia form or on a printout that can be stored in the patient chart.

The respiratory system should be evaluated and monitored with the pulse oximeter that measures the SPO2 levels. There is a lag time in the actual SPO2 level and the displayed numbers on the monitor. A historical method to monitor the rate and depth of respiration is by using a pretracheal stethoscope. There are traditional stethoscopes that are attached to the surgeon’s ear and there are newer bluetooth-enabled electronic devices that will allow more than one individual to monitor the respirations. These devices can be left on the patient in the recovery area for monitoring of respiration. Monitoring of the color of the patient’s blood is a primitive measure of the oxygenation but should still be used.

The use of a capnograph has been recommended for use in intubated patients for several years. It is also used for patients when a laryngeal mask airway (LMA) has been placed to administer inhalational agents. For several years practitioners have been using capnography on open airway anesthetics. A nasal cannula can be used that has been modified to accept a capnograph connection, which can be attached to obtain a relative carbon dioxide level and see a respiration wave. When a nasal hood is used, an attachment is available to connect it to the capnograph. The numbers
displayed on the capnograph are used to detect changes in the rate and depth of respiration. When one sees an increase in the carbon dioxide level, airway manipulation may allow the rates to return to previous levels or more advanced airway management may be necessary.

Because the medical and dental anesthesia communities realized the importance of the rapid detection of respiratory depression or obstruction with the capnograph, in 2012 the American Association of Oral and Maxillofacial Surgeons (AAOMS) Office Anesthesia Evaluation Manual and the AAOMS Parameters of Care document were updated to recommend the capnograph be used on patients undergoing moderate sedation or deep sedation/general anesthesia in an open airway anesthetic. AAOMS members were informed of these recommendations, which will become effective in 2014.

The practice of using supplemental oxygen in patients undergoing sedation or general anesthesia is still not universally accepted. Generally it is thought to be a good practice to preoxygenate patients before the induction of anesthesia. A nasal hood or nasal prongs should be placed unless a full mask is used before the induction of general anesthesia and LMA or endotracheal anesthesia is to be administered. Oxygen should be administered throughout the procedure as well as in the post operative recovery area. A backup oxygen supply must also be available in the post anesthesia care area should the primary supply fail.

One device that is sometimes used to monitor the patient’s consciousness during anesthesia is the Bispectral Index monitor. This piece of equipment allows the provider administering the anesthesia to see a numerical level of brain wave activity to assess the level of consciousness during sedation or general anesthetic.

There should be a crash cart with emergency drugs and devices immediately available in the operatory suite. This cart should be inventoried weekly or daily to assure that the drugs are available and within the expiration date. Primary Advanced Cardiovascular Life Support (ACLS) drugs should be readily available and more advanced drugs can be stored. The ACLS protocols should be in this cart and readily available for immediate use. These templates can also be laminated and displayed on the walls of the operating suite. Before ACLS drug administration, basic cardiopulmonary resuscitation should be started and performed without delay or pause. Plans should be made as to how each individual on the anesthesia and office team will carry out their assigned tasks in an emergency. In addition to the resuscitation team, one person should be assigned to record the event and contact the emergency medical services team when the leader determines such a call is necessary.

If one is using malignant hyperthermia triggering agents, a supply of dantrolene (Dantrium) should be readily available. There is now a newer formulation of dantrolene for injection (Revonto) that is supplied in vials containing 20 mg dantrolene and 3000 mg mannitol in a formula that is easily reconstituted with 60 mL of sterile water in approximately 20 seconds. An emergency call should be made to Malignant Hyperthermia Association of the United States for additional instructions after the emergency medical services call has been made.

There should be a defibrillator readily available if a cardiac crisis occurs that can be treated with defibrillation. The automated external defibrillator can be used to treat cardiac defibrillation or pulseless ventricular tachycardia; however, a traditional cardiac monitor should be used when the patient is being sedated or undergoing general anesthesia because there are numerous other cardiac arrhythmias that can be diagnosed and treated. If an automated external defibrillator is not available, a cardiac monitor-defibrillator could be used. A printout from cardiac monitor could be attached to the patient chart. A rhythm strip can also be used to document a cardiac event.

Emergency airway devices should be readily available for use. The simple oral or nasal airways can easily be inserted when an obstruction is detected. The bag-valve-mask devise can also be used when necessary. This device, with a gauge that allows one to measure the millimeters of water pressure used, will allow one to keep from introducing an excessive amount of air into the stomach. Some of the newer second-generation LMA devices allow air to escape from the stomach or to have a nasogastric tube inserted to decompress the stomach during resuscitation. Endotracheal intubation equipment should be readily available. Periodically practicing intubating patients in the hospital or surgical center will help keep one’s skills intact. Emergency surgical airway devices should be a part of the crash cart and be used if the airway cannot be established by any other approach. This device can be a large-bore intravenous catheter with jet ventilation placed through the cricothyroid membrane. A surgical cricothyrotomy can also be performed. If any advanced airway devise is used, it is necessary to assure the correct placement by checking for the presence of carbon dioxide in the exhaled air. This verification can be done with the capnograph, or by using a device that changes color when carbon dioxide is present in the expired ventilation.
Emergency drills should be staged in the office or clinic on a regular schedule and cover all types of situations from the simple to the complex. Each individual will have an assigned role to play in the simulated emergency so that when the actual situation arises the use of these drills will facilitate resuscitation of the patient.

Transportation of the patient from the primary surgical suite to the recovery area will be dependent on the type of sedation or anesthesia used and the conscious level of the patient. In most cases the patient will be transported to the recovery area on a gurney or operating table, moved in a wheelchair, or will be walked with assistance. Suplemental oxygen may or may not be necessary.

**POSTOPERATIVE MONITORING AND EQUIPMENT**

When deep sedation or general anesthesia is used and a surgical procedure is performed, generally a 2-stage recovery is used. This 2-stage recovery involves an intensive initial observation and treatment and then a less rigorous period after the patient regains consciousness.

At least one trained individual should be assigned to monitor the postoperative patient. Generally when the patient is transferred to the post anesthesia care area of the office or clinic, if general anesthesia has been used, the patient will have supplemental oxygen in place. This supplemental oxygen will be used until the patient has recovered and is able to keep the SPO2 on room air greater than 90. A patent intravenous line must be maintained until the patient is awake.

The monitoring devices in the post anesthesia care unit may be the same as those used in the operating suite. If an endotracheal or LMA general anesthetic has been administered and the patient is still anesthetized, a cardiac monitor will be necessary. Blood pressure measurements should be taken at least every 5 minutes and recorded. The pulse rate, respiratory rate, and SPO2 should be monitored and recorded. Supplemental oxygen must be available. A suction devise must be readily available as well.

During the first stage of recovery, the family members are generally left in the reception area and only the office staff is with the patient. When the patient is recovered to a state that they are conscious, can talk, and are not nauseous and relatively pain free, the responsible parties that accompanied the patient can be brought into the recovery area. This recovery area may be the primary post anesthesia care unit or a second area that is used for secondary recovery. Care must be taken to protect patient identity.

If moderate sedation or deep sedation is used and the primary recovery is done in the operating suite the patient can often walk with assistance to the secondary recovery area. There are also times that the patient may be fully recovered in and dismissed from the operating suite.

There must be defined criteria that can be used to determine if a patient is satisfactorily recovered before they are discharged. There are numerous scales that have been developed to assess the recovery status of a patient and to use to determine when he/she might be discharged. All the scales use a combination of stable vital signs, activity level, presence or absence of nausea and vomiting, pain level, lack of hemorrhage, oxygen saturation, level of consciousness, and rates of respiration to determine when the patient may be discharged.

The Modified Aldrete Scale is one scale that has been used in many oral and maxillofacial offices and clinics; however, there are others. The following lists some of the most commonly used scales:

- Aldrete Scale
- Modified Aldrete Scale
- Visual Analog Scale
- Procedure and Anesthesia Scoring System
- Post Anesthesia Discharge Scoring System
- Ramsey Sedation Schedule
- Pasero Opioid Agitation Scale
- Richmond Agitation Sedation Scale

Once discharge criteria have been satisfied, the patient may be released to a responsible adult that has been instructed with appropriate discharge procedures. A follow-up appointment should be made if necessary. Prescriptions should be given to the responsible adult accompanying the patient as well as contact information for after-hour problems. The properly written postoperative instructions must accompany the patient and responsible adult.

**REFERENCE**