Office Based Anesthesia Complications

Prevention, Recognition and Management

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Preface

The simultaneous provision of anesthesia and surgery by the oral and maxillofacial surgeon creates many challenges. However, a robust education and training in anesthesia during residency equips the surgeon with the skill set and experience to manage patients. The use of local anesthesia, conscious sedation, deep sedation, and general anesthesia allow the surgeon to perform invasive and painful procedures with relative ease. However, the provision of anesthesia is not without risk. It remains the responsibility of the oral and maxillofacial surgeon to ensure that both the anesthesia and surgery are completed in a safe and efficient manner. There is no room for complacency in the provision of anesthesia, rather a healthy paranoia is needed. Despite adequate risk stratification and careful preparation, complications can and will occur. It remains paramount that the surgeon approach each and every anesthesia with a mantra to initially prevent, then recognize, and finally manage all complications. This will ensure that the risk associated with the provision of anesthesia is mitigated for every patient. This text and the contents within it are based on the most common anesthesia-related complications that have been documented over more than 20 years of data collection for oral and maxillofacial surgery. This book is dedicated to our specialty, the providers who administer anesthesia and perform surgery, and the patients who choose to place their lives firmly in our hands.

Atlanta, GA, USA — Gary F. Bouloux

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Risk Stratification for Office-Based Anesthesia

1

Stuart Lieblich and Marissa R. Shams

Introduction

The care of the patient involves two considerations: the planned surgical procedure and the appropriate management of the discomfort and anxiety that will accompany that procedure. The provision of these separate aspects of patient care makes our profession unique. The office-based surgery is planned to be minimally invasive with a low potential for significant blood loss and hemodynamic changes. However, the provision of local anesthesia, deep sedation, or general anesthesia, all involve the administration of agents with systemic effects. The responsibility of the oral and maxillofacial surgeon (OMS) is to ensure that the patient can tolerate not only the surgical procedure but also more importantly the local and general anesthesia.

The provision of local anesthesia, deep and general anesthesia in any patient is not without risk. The very essence of risk stratification is to identify patients with varying degrees of anesthesia risk and adjust the anesthesia plan accordingly. Most patients are relatively healthy and will require no particular modification to the anesthesia plan. Other patients will require modification to the anesthesia plan. This may include the choice of local anesthetic, anesthesia medications, drug doses, duration of anesthesia, and post anesthesia recovery. On occasion, it will also necessitate that a patient be treated in an ambulatory surgical center or hospital operating room. The five key elements to enable appropriate risk stratification for office-based anesthesia include the following:

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- American Society of Anesthesiology physical status
- Functional status (METs)
- Mallampati classification
- Body mass index (BMI)
- Airway access

Patient Evaluation

Patient evaluation begins with a thorough medical history that includes specific questions about previous surgical and anesthetic experiences. The initial consultation with a patient provides the opportunity to obtain a thorough medical, social, and surgical history as well as perform a physical examination. This allows the OMS to identify the appropriate surgical plan as well comorbid medical conditions that allow risk stratification prior to determining the most ideal anesthetic technique. On occasion, this will require that the OMS consult with the patients other healthcare providers and/or request additional diagnostic testing to appropriately risk stratify the patient.

It is ideal if patients can complete their medical history intake forms at home prior to presenting to the office. This allows the patient to gather the information at home prior to the consultation. Furthermore, the documents can be submitted electronically ahead of time facilitating an initial review of the patient's medical history.

The initial office visit should include obtaining vital signs including blood pressure and heart rate. It may also be advantageous to record the oxygen saturation (SaO_2) that serves as a good surrogate monitor of cardiopulmonary function. Staff who record these vital signs should have basic training in the recognition of abnormal rhythms including bradycardia, tachycardia, and irregular rhythms. All abnormal values should be flagged for review by the OMS. A review of the patient's past medical and surgical history will allow the patient to be classified using the American Society of Anesthesiologists (ASA) physical status guidelines (Table 1.1).

In an ideal setting, patients within ASA I and II classes are the best candidates for office-based anesthesia as they most likely have acceptable cardiovascular and pulmonary reserves to withstand deep sedation and general anesthesia. Office-based deep sedation and general anesthesia should be approached with caution for ASA III patients. This may require significant modifications to the anesthesia plan to further reduce the potential risk of adverse cardiovascular and pulmonary complications.

Contemporary pre-anesthetic evaluation has greatly reduced the need for routine laboratory testing. Significant information about pulmonary and cardiovascular reserve can be obtained by determining the patient's metabolic equivalents (METs). This reflects the patients exercise tolerance with one MET equivalent to 3.5 mL of oxygen per kilogram consumed per minute (3.5 mL O_2/kg/min). METs offer the best insight into a patient's ability to withstand changes in pulmonary and cardiovascular function that may occur during anesthesia. Low METs or a recent decline

Table 1.1 American Society of Anesthesiology Physical Status guidelines

ASA PS classification	Definition	Explanation
ASA I	Normal healthy patient	No smoking and moderate alcohol
ASA II	Patient with *mild* systemic disease	Mild disease without functional limitations
ASA III	Patient with *severe* systemic disease	Severe disease with functional limitations
ASA IV	Patient with *severe* systemic disease that is a constant threat to life	Severe disease, e.g., recent MI, CVA, or TIA ACS, severe valvular heart disease, and sepsis
ASA V	Moribund patient who will not survive without the operation	NA
ASA VI	Brain dead patient having organs harvested	NA

MI myocardial infarction, *CVA* cerebrovascular accident, *TIA* transient ischemic attack, *ACS* acute coronary syndrome

Table 1.2 Functional status assessment (MET) examples

Excellent (>7 METs)	Moderate (4–7 METs)	Poor (≤4 METs)
Squash Tennis Jogging Cleaning floors	Cycling Climbing a flight of stairs Walking 4 mph Yardwork	Walking 2 mph Activities of daily living

Adapted from: Hlatky MA, Boineau RE, Higginbotham MB, Lee KL, Mark DB, Califf RM, et al. A brief self-administered questionnaire to determine functional capacity (the Duke Activity Status Index). Am J Cardiol. 1989;64:651–4

in METs should alert the OMS to the potential for adverse anesthesia-related complications that require further work-up and risk stratification. Patients that report a functional status of less than 4 METs are not candidates for an office-based deep sedation or general anesthesia due to their lack of cardiac and respiratory reserve (Table 1.2).

The ability to establish an airway remains critical to office-based anesthesia. The Malampati classification remains a robust tool for predicting difficulty related to establishing and maintaining an airway in addition to intubating patients. Although it is not possible to adjust a patient's Malampati score, the anesthesia plan should be modified according to the relative airway risk associated with different scores (Fig. 1.1).

The BMI is a useful parameter to help predict anesthesia-related complications. It is calculated by dividing the patient's weight (kg) by their height (m^2). Patients that fall into a normal or overweight category pose little anesthetic risk. A BMI that places a patient in the underweight category increases the anesthesia risk due to electrolyte abnormalities and cardiac arrhythmias. A BMI that places a patient in the obese and morbidly obese categories also places the patient at increased risk due to the potential for loss of airway; decrease functional residual capacity (FRC) and

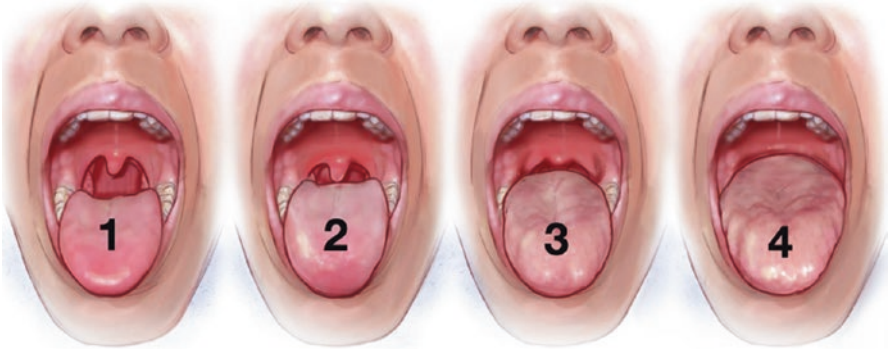

Fig. 1.1 Mallampati classification (1–4)

Table 1.3 Body mass index

<18.5	Underweight
18.5–24.9	Normal
25–29.9	Overweight
30–40	Obese
>40	Morbidly obese

difficulty with establishing an airway or intubation. Adjusting the anesthesia regime by avoiding apnea-producing drugs maybe beneficial (Table 1.3).

Challenges related to maintaining a patent airway or establishing one when it is lost are compounded not only by the BMI but also the length and diameter of the neck. The sternomental distance extends from the sternal notch to the menton with a distance of less than 12.5 cm having a positive predictive value of 82% for a difficult intubation (Fig. 1.2).

The checklist for a patient evaluation for office-based anesthesia should include the following:

- Blood pressure, heart rate, and rhythm
- Height and weight (body mass index)
- Past medical, social, surgical, and anesthesia history
- Current medications including recent changes in medications
- Allergies
- Risk factor evaluation for obstructive sleep apnea
- Salient laboratory results review
  (a) ECG for patients with cardiac disease (within 6–12 months)
  (b) Blood glucose levels and hemoglobin A1C for diabetics (type I and type II)
  (c) INR reports for patients taking warfarin (within 7 days of planned surgery) or suspected hepatic disease
  (d) SaO_2 on room air for patients with respiratory disease
- Recording of ASA status
- Recording of functional status

There are specific aspects of the patient physical examination that are critical for office-based anesthesia. These include the following:

Fig. 1.2 Sternomental distance

- Focused airway examination
  (a) Mallampati score recorded
  (b) Maximum incisal opening
  (c) Risk factors that contribute to difficulty with positive pressure ventilation including facial hair, edentulism, short and thick neck, increased BMI
- Auscultation of lungs
- Observation of extremities for venipuncture sites

It remains controversial whether pregnancy testing is appropriate for females of childbearing age who undergo office-based deep sedation or general anesthesia. The American Association of Oral and Maxillofacial Surgeons (AAOMS) Parameters of Care does not endorse routine testing for pregnancy. Exceptions may be indicated if there is an equivocal history of sexual activity with a possibility of pregnancy due to an uncertainty regarding the time of the last menstrual period. A point of care (POC) urine testing kit for pregnancy is available and usually positive within 14 days of conception. Minors (<18 years of age) can be offered a urine pregnancy test in the office after dismissing the parents from the treatment room. The procedure should be postponed if the test is positive.

Body Systems and Disease

Cardiac Disease

A history of cardiac disease will require further evaluation in order to appropriately risk stratify the patient. Many patients that are good historians can provide adequate information about their status to allow the OMS to determine what further information and/or tests are needed for review. Consultation with the patient's primary care physician or cardiologist may be indicated.

Coronary Artery Disease and Myocardial Infarction

The OMS should inquire about angina or shortness of breath (SOB) with exercise that may suggest ischemic heart disease (IHD). Determining the functional status of the patient using METs is particularly important to assess disease severity. The use of chronic and episodic vasodilator medications including nitroglycerine will also provide insight. A history of myocardial infarction (MI) requires additional information. A history of an MI within the last 6 weeks is a contraindication to all elective surgery. An MI that occurred more than 6 weeks ago and that is not associated with reduced functional status is not a contraindication to proceeding with the anesthesia and surgical plan. However, the longer the time period since the MI, the less the risk related to adverse cardiac events. Many patients with a recent MI undergo percutaneous coronary angioplasty (PCA), which has significantly reduced mortality and morbidity. Following PCA, most patients are treated with dual anti-platelet therapy (DAPT). This invloves the use of aspirin and either a glycoprotein IIb/IIIa inhibitor (e.g., abciximab or eptifibatide) or an ADP antagonist (e.g., clopidogrel). The glycoprotein IIb/IIIa inhibitor or ADP antagonist should be continued for a minimum period of 14 days, 30 days, and typically 3 months for balloon angioplasty, bare metal stents, and drug-eluting stents, respectively. ECG monitoring is indicated and by using a modified V5 lead (move the left arm lead to the mid axillary position and set the machine to monitor lead I), a higher sensitivity for detecting ST segment changes can be obtained. Even with the use of local anesthesia alone, supplemental oxygen with/without nitrous oxide may provide additional benefit.

Cardiac Arrhythmias

Cardiac arrhythmias can result in significant morbidity during anesthesia. The use of epinephrine-containing local anesthetics, endogenous epinephrine, and certain anesthetic agents such as ketamine and inhalational agents, can result in arrhythmias. Patients with Wolff-Parkinson-White syndrome, second-degree type II, and third-degree heart blocks are not candidates for office-based deep sedation or general anesthesia. Atrial fibrillation (AF) is a common arrhythmia that should be recognized relatively easily upon taking vital signs. The use of medications such as warfarin or other direct-acting oral anticoagulants (DOACs) may provide further information regarding the potential for AF. Concerns with AF relate to the potential for a rapid ventricular rate (RVR) that can lead to acute decompensation and heart failure. The anesthetic plan should limit use of epinephrine and avoid excessive fluid replacement. Patients with chronic AF and a rate greater than 90 BPM should be considered for cardiology referral to achieve optimal rate control. Patients with implanted pacemakers and internal defibrillators (ICDs) warrant cardiac consultation, and anesthesia should be considered in an ASC or hospital OR.

Congestive Heart Failure

Congestive heart failure (CHF) is a progressive loss of the normal cardiac output. Symptoms of non-compensated heart failure may include shortness of breath,