OFFICE-BASED SURGERY: EXPANDING THE ROLE OF THE ANESTHESIOLOGIST

LAURENCE M HAUSMAN[*]
AND ELIZABETH AM FROST[**]

Abstract

Office-based anesthesia (OBA) has developed in the United States as an important field for the anesthesia provider. Both the numbers and types of procedures performed in offices around the country have steadily increased, as has the invasiveness of these procedures.

New anesthetic considerations arise. For example, most training programs have not addressed this area of practice. Indeed many practitioners are unfamiliar with practice outside the hospital operating room setting. Information as to how to provide quality care in a location where one may be the sole anesthesiologist must be readily available.

Many of the safety mechanisms we take for granted in a hospital setting are often not present in a surgical office, and it becomes the responsibility of training centers to help in establishing standards. As the 'safety' of many surgical offices where anesthesia care is provided has been challenged, medical societies have begun to issue recommendations as to the standards of care that should exist.

Different anesthetic techniques are also emerging that are appropriate to the office setting. But as office-based anesthesia continues to mature as a specialty, we the anesthesia providers, must be proactive in establishing guidelines and recommendations to ensure safe practice.

From Mount Sinai Medical Center, New York, NY, USA
* Assist. Prof., Medical Director, Ambulatory Surgery.
**Prof., Dept. of Anesthesia.
Correspondence: Dr. Elizabeth A.M. Frost, E-mail: elzfrost@aol.com.

Keywords: office-based anesthesia, safety, regulations, anesthetic techniques.

Introduction and Historical Notes

The practice of office-based anesthesia (OBA) is an innovative and rapidly growing field. With the introduction of anesthesia over 150 years ago, it was not uncommon for the surgeon to attend the elite at home, arriving in a carriage (to prevent the unwelcome attention of spying eyes) with a bag of "laughing gas" or a sponge and container of chloroform. But such care was only for the very wealthy. John Snow in his landmark text on *Chloroform and other Anaesthetics* wrote that he had notes on 867 cases of dental extractions (3021 teeth were extracted) performed in neighborhood dentists' offices, particularly that of MR West of Broad Street, in the City (London)[1]. Snow reported no inconvenience from chloroform administration except for rare instances of nausea and vomiting. His OBA brought Snow to the attention of a Dr. Fuller of Manchester Square who recommended that he be invited to anesthetize patients at St George's Hospital[2]. He began to do so on January 28th 1847 and later was also privileged at University College Hospital where he worked with the preeminent English surgeon, Mr. Robert Liston. Even before he gave anesthesia to Queen Victoria (at the Palace) on April 7th 1853 for the birth of Prince Leopold, Snow was acknowledged as the leading anesthetist in England. But with his change in practice setting, until the early 1980s almost all procedures requiring anesthesia were performed in hospital.

But change was coming, spurred in large part by economics and a greater need to adapt to patients' requirements. In 1972, in an attempt to reduce hospital stay and cost, one of the authors (EAMF), initiated a preadmission evaluation clinic, a project that had been proposed as long ago as 1949[3,4]. Over 3 years, more than 3.000 patients attended the clinic. Patient day reduction averaged almost 4 days. The clinic was to become an integral part of ambulatory surgery and set the way for anesthesia outside of the conventional hospital operating room.

By the year 2000 approximately 75% of all procedures were performed on an outpatient basis; 17% in freestanding ambulatory surgery centers, and approximately 8-10 million 14-25% in physician's offices[5,6]. As projected, now in 2006, approximately 82% of all procedures are performed on an outpatient basis and 24% are office-based[5].

Over the past several years, great strides have been made in improving the safety of OBA. Many medical societies, both in the US and internationally have issued recommendations[7,8,9]. Several states in the US have passed rules and regulations regarding the practice. These recommendations/regulations have become increasingly more important as more invasive procedures are scheduled[10,11,12].

Types of Procedures

Initial procedures performed in offices were small, of short duration and relatively non invasive. They included mole removals or incision and drainage of superficial abscesses. The development of newer surgical and anesthetic techniques, however, has allowed quality care for more invasive procedures to be provided outside the hospital setting[12,13]. Procedures now considered appropriate for OBA include cosmetic surgery (breast augmentation/reduction, rhytidectomies, blepharoplasties, and rhinoplasties), laser surgery, liposuction, endoscopies, colonoscopies, urologic procedures, orthopedic procedures, pregnancy terminations, dental procedures, and microlaparoscopies[16,14].

Little scientific evidence had related the length of a procedure to the suitability for OBA[15,16]. However, a task force convened by the American Society of Plastic Surgeons to promote patient safety has recommended that procedures do not exceed 6 h, and that all procedures be completed by 3.00 pm[16]. A recent study in an accredited office bases facial plastic surgery facility concluded that anesthesia duration was not an indicator of patient morbidity and mortality[17]. The authors analyzed 1200 cases; in 1032 (86%) situations the operative time exceeded 240 minutes. There were no deaths and no cases of myocardial infarction. Four patients had

some complication and 6 experienced delay of return of consciousness. There were no differences in morbidity between patients who had longer or shorter anesthetic times.

Anesthetic Agents

Currently many medical/surgical specialties perform procedures of varying degrees of invasiveness in the office[6,15]. Initially, the sole anesthetic technique employed was conscious sedation, often with an oral sedative. As anesthetic agents and techniques have evolved, however, there has been a progression towards deeper levels of sedation, as well as to regional and general anesthesia. The anesthetic technique chosen should allow rapid recovery, have a high safety profile, and be cost-effective[18]. Commonly used drugs include propofol, sevoflurane, desflurane, midazolam, ketorolac and other nonsteroidal antiinflammatories, ketamine, fentanyl, remifentanil, meperidine and local anesthetics[18].

Propofol

Propofol has been a popular drug for ambulatory surgery since its introduction into the US almost 20 years ago. Use in the office-based setting is a natural progression. The drug has a rapid onset, with induction of anesthesia occurring in one arm to brain circulation time. It has a large volume of distribution and a high metabolic clearance. Recovery, primarily by redistribution, is also rapid. Propofol is not associated with nausea and vomiting, and in addition to its role as an induction agent, it is often used as an infusion for maintenance of both monitored anesthesia care and general anesthesia. One recent study of 41 consecutive patients undergoing full face carbon dioxide laser resurfacing, indicated that the addition of a continuous propofol infusion maintained hemodynamic and oxygenation values close to baseline while decreasing the amount of respiratory depressing opiates administered and without effect on the

length of the procedure[19].

Remifentanil

Remifentanil is a relatively new narcotic agent that has achieved popularity in office-based procedures mainly because of the rapid onset (1-1.5 min), and short clinical half-life (3-4 min). It is metabolized by nonspecific plasma esterases via ester hydrolysis. It can be given as either a bolus or an infusion. It has all the positive and negative effects of other narcotics. Since its half-life is so short, however, it does not provide postoperative analgesia. The pharmacologic properties make it ideal for highly stimulating procedures that are short lived such as the injection of local anesthesia for rhinoplasties. In these cases, injection of the local anesthetic is painful, but once injected, systemic analgesia is no longer needed. Caution should be used because as with other narcotics, apnea is common. The incidence of postoperative nausea and vomiting (PONV) is increased. Bradycardia may also be evident but is of short duration.

Ketamine

Ketamine (a phencyclidine derivative), has recently been favored in office-based practices[14]. Ketamine (25-50 mg boluses) functions as a dissociative anesthetic, and provides analgesia, while maintaining respiratory drive. It has an excellent safety profile, and is not associated with PONV. If used in conjunction with glycopyrrolate, and antisialogogue, and midazolam or propofol to decrease the risk of dysphoria, ketamine is often an appropriate choice[15]. Some practitioners add clonidine (0.1-0.2 mg), an α-2 agonist, to ketamine. The inhibition of sympathetic tone now provided, limits hypertension associated with ketamine. Any hypotension decreases blood loss. Alone, clonidine also provides sedation, and its use has been associated with a decrease in the amounts of drugs required for monitored anesthesia care of up to 50%[15].

Local Anesthetics in Regional Techniques

Use of local anesthetics in regional techniques should always be considered in an office-based practice. These drugs provide excellent post-operative with a good safety profile. Equally as important, local anesthetics are generally not associated with post-operative nausea and vomiting, a significant concern of the office-based practitioner and patient. But anesthesia is a continuum, and even though the anesthesia provider may be planning an anesthetic consisting of local techniques and sedation, the depth of anesthesia may quickly deepen into a general anesthetic state. Therefore, the office-based practitioner should always have the ability to control an unprotected airway, and perform a general anesthetic.

Side Effects

Administration of almost all anesthetic/analgesic agents is associated with side effects. Such problems include nausea and vomiting, orthostatic hypotension and transient memory and cognitive problems. Orthostatic hypotension usually responds to fluids rapidly. Any office-based practice must address the issue of postoperative nausea and vomiting (PONV), which can delay discharge or even precipitate an unplanned hospital admission. Many investigators recommend a multimodal approach to the treatment of PONV[20,21,22], including metoclopramide, dexamethasone, phenergan, droperidol, and 5-HT3 receptors, such as ondansetron, dolasetron or granesitron. A recent study by Tang et al.[23] questioned the efficacy of the 5-HT3 receptor antagonists, noting that the addition of dolasetron (12.5 mg) or ondansetron (4 mg) failed to improve the antiemetic efficacy of droperidol (0.625 mg intravenous) and dexamethasone (4 mg intravenous) when used for routine prophylaxis in OBA in 135 patients. However, the authors did not stratify for patients at high risk for PONV (previous history, female, non smokers, gynecologic surgery). Also, the FDA in the USA has imposed a black box warning on the administration of droperidol, requiring postoperative monitoring with electrocardiography. Certainly the use of the 5HT3 antagonists imposes a higher cost, especially if given routinely. However, judicious use may

well be cost effective when administration is restricted to high risk categories.

Advantages of Office Based Anesthesia (OBA)

The advantages to undergoing a procedure in a physician's office as opposed to a hospital are numerous. While facility fees in a hospital can be expensive and often unpredictable, the costs in an office are more readily controllable and predictable[5,6,14 and 24]. Patients undergoing a procedure in an office can be made aware of all costs prior to consenting to surgery. Costs typically include the surgeon's, and anesthesiologist's fees as well as the facility fee. Medically necessary procedures can be reimbursed by third-party payers[25].

Other clear advantages of an office procedure are ease of scheduling, patient and surgeon convenience, maintenance of patient privacy, decrease in patient exposure to nosocomial infections, and improved continuity of care, since an office is often staffed by a small group of consistent personnel[6,15 and 26]. An attempt to analyze data collected in an outcomes study identified factors as significant predictors of either patient satisfaction or dissatisfaction with deep sedation (DS) or general anesthesia (GA) with OBA[27]. The sample comprised 34, 191 patients of whom 72% received DS/GA. Almost 96% were extremely or moderately satisfied, 3% were neutral and 15 were not satisfied. Increased age, nitrous oxide and memory of postoperative instructions predicted satisfaction. Young age, anxiety, pain, vomiting and the awake state predicted dissatisfaction.

In 1997, Morello et al.[28] reported an excellent safety record for plastic surgical procedures performed in accredited offices by board certified plastic surgeons and concluded that the safety record in those areas is comparable to that of a free standing or ambulatory surgical facility.

Disadvantages of OBA

Data from the above cited study may speak against the authors' glowing recommendation[28]. A survey was sent to 418 accredited plastic surgical offices. The response rate was 75%. Safety issues such as complications, admissions and deaths were addressed. Over a 5-year period, 400,000 office procedures were conducted, 63.2% cosmetic and 36.8% reconstructive. Complications included hemorrhage (0.24%), hypertension (0.1%), wound infection (0.09%), hypotension (0.04%), unplanned hospital admission (0.03%), and re-operation (0.13%), with an overall complication rate of 0.24% or 1:213. Mortality rate was 1:57,000 or 0.0017%. Cause of death was listed as cerebral hypoxia during an abdominoplasty, tension pneumothorax during a breast augmentation, cardiac arrest during a carpal tunnel procedure, stroke 3 days following a rhytidectomy and brow lift, and one unexplained death. During the 1980s surgical mortality was approximately 1 in 100,000 anesthetics. Currently, mortality is about 1 in 250,000 anesthetics administered in a hospital, and 1 in 400,000 in a free-standing ambulatory surgery center. Adding to the significance of these data is that most office-based procedures are performed on young, healthy patients[28].

Candidates for an office-based procedure often include children over the age of 6 months. Dental caries is the number one diagnosis in children who may need surgery in the United States[14]. Commonly used drugs in dental offices include nitrous oxide and chloral hydrate. The practice is not quite as benign as it may appear to be. Hypoventilation occurred in 94% of children 1-9 years of age, given 70 mg/kg of chloral hydrate, in conjunction with 30% nitrous oxide. When chloral hydrate was used in conjunction with 50% nitrous oxide, hypoventilation developed in 97% of patients[14].

Cote et al.[29,30], in conjunction with the Federal Drug Agency (FDA), reviewed 95 adverse sedation-related events in pediatric patients. Neurologic injury and death occurred more often during sedations performed in offices than in hospitals, even though this group of pediatric patients tended to be older and healthier than hospitalized counterparts. Ninety-three percent of the adverse events resulted in permanent neurologic injury or death. Eighty percent of the events presented as

respiratory in nature. Various reasons accounted for the failure to rescue (Table 1).

Table 1
Reasons for failure to rescue

1. Inadequate resuscitation equipment
2. Inadequate monitoring, especially pulse oxymetry
3. Human error
4. Slow recognition of event
5. Slow intervention
6. Lack of experience
7. Drug overdose
8. Inadequate preoperative evaluation
9. Inadequate postoperative evaluation

In cases of neurologic injury or death, the person providing the anesthesia was an oral surgeon, a periodontist or a certified registered nurse anesthetist supervised by a dentist.

Review of the closed claims database, which incorporates information from 35 liability insurers representing about 50% of the practicing anesthesiologists in the United States, revealed that safety deficiencies exist in some offices[28]. Presently there are 5480 claims with dental incidents excluded from the database. Of these, 753 are for ambulatory procedures and 14 are office-based. The low number of cases may reflect the 3-5 year lag in reporting[28]. Most claims were filed on behalf of American Society of Anesthesiologists (ASA) class 1-2 females who underwent elective surgery with general anesthesia, which parallels the profiles of claims made at large. A disturbing trend is seen when comparing injuries that occurred in an ambulatory surgery center with those that were office bases. In ambulatory surgery centers, 62% of the injuries resulted in temporary nondisabling injuries and 21% in death. In an office, however, 21% of injuries were temporary and nondisabling, but

64% resulted in death[28]. Table 2 lists the adverse events that have occurred in an office.

Table 2
Adverse events reported in an office-based anesthetic practice

1. Respiratory 50% (airway obstruction, bronchospasm, inadequate oxygenation/ventilation, esophageal intubation
2. Cardiovascular 8%
3. Equipment related 8%
4. Drug related 25% (incorrect drug/dose, allergy or malignant hyperthermia)
5. Blunt needle trauma

Data from [28]

Reported complications usually happened intraoperatiely. Fourteen percent of the adverse events occurred in the postanesthesia care unit, and 21% occurred after discharge[28]. Of note is that 46% of injuries occurring in an office were considered preventable, as opposed to only 13% in an ambulatory surgery center. Respiratory events in the postanesthesia care might have been avoided if pulse oxymetry had been employed. Care was considered to be substandard in an office 50% of the time, and in an ambulatory surgery center 34% of the time. Finally, in claims that originated out of an office, financial compensation was awarded in 92% of cases, with a median claim of 200,000$ US (range of 10,000$-2,000,000$ US), while only 59% of the claims from ambulatory settings received financial compensation, with a median payout of 85,000$ US (range of 34$-14,700,000$ US)[28].

Liposuction

Tumescent liposuction is a common procedure performed in the office, and one that has received much attention in the media. It involves 'wetting' of the fat cells, by injecting a hypotonic solution to lyse adipose cell walls and emulsify fat[31]. Adding epinephrine (1:100,000) to the solution provides hemostasis, thus allowing the emulsion of several liters

of fat. Lidocaine 0.05-0.1% provides postoperative analgesia. Peak serum levels of lidocaine occur 12-14 h after injection, and decline over the next 6-14 h. Although the use of lidocaine is traditionally limited to 7 mg/kg, since the tumescent technique causes a single compartment theory of lidocaine clearance, similar to a sustained release medication, as much as 35-55 mg/kg of lidocaine has been used safely[32,33].

Presently, liposuction is performed primarily by plastic surgeons and dermatologists. Grazer and de Jong[34] investigated morbidity and mortality by survey sent to 1200 aesthetic plastic surgeons, of which 917 responded. The data revealed 95 deaths out of 496,245 liposuction procedures between 1994 and 1998 (Table 3).

Table 3
Causes of death during liposuction

1. Pulmonary embolism 23.1%
2. Abdominal viscous perforation 14.6%
3. Anesthesia related 10%
4. Fat embolism 8.5%
5. Cardio respiratory failure 5.4%
6. Massive infection 5.4%
7. Hemorrhage 4.6%
8. Unknown or confidential 28.5%
9. Overall death rate 19.1 per 100,000 cases, 1 in 5000

Data from [34].

Complications during liposuction may be secondary to multi-liter infiltration, major third spacing with fluid shifts, pulmonary edema, organ perforation, hypothermia, multiple concurrent procedures, anesthetic effect, lidocaine or epinephrine toxicity, permissive postoperative discharge criteria, or a tight abdominal binder[32-34]. Forty-six percent of the deaths following liposuction were found to occur after an office-based procedure, while 26% followed a hospital-based procedure.

Houseman et al. concluded that liposuction is safer than the media might lead one to believe[35]. A survey sent to 505 of the 517 worldwide members of the American Society for Dermatologic Surgery who

performs liposuction, addressed issues such as location of procedure and specific complications over a 7-year period from 1994 to 2000. Two hundred and sixty-one respondents gave information regarding 66,570 liposuction procedures. The mean number of procedures for each practitioner was 255 (range 0-3014). No deaths were reported. Serious adverse events included hospitalization, massive infection, abdominal/thoracic wall or viscous perforation, hypotension without shock, hemorrhage, pulmonary embolism, lidocaine toxicity, skin ulceration and anesthesia reaction. Serious adverse events were noted in 36 cases with an incidence that was higher in patients cared for in hospitals and freestanding surgery centers. Of the procedures, 71% were performed in nonaccredited offices. These authors also found a higher incidence of adverse events in patients receiving sedation as opposed to local anesthesia only and a correlation with the operative site[35] (Table 4).

Table 4
Complications during liposuction by operative site

1. Abdomen 72%
2. Buttocks and lower extremities 39%
3. Upper extremities 3%
4. Upper back 14%
5. Lower back 8%
6. Head and neck 6%

Data from [35].

Rules, Regulations and Accreditations

Presently, very few States have regulations in place regarding office-based practices. In office settings, quality of care plans for performance improvement, peer review and emergency preparedness are often missing[6]. Providers of anesthesia care in offices may have varying levels of skills. They may be physician anesthesiologists, nurse anesthetists, surgeons, dental anesthetists, or have no additional anesthetic training[14]. Reports of poor outcomes have sparked a flurry of media attention regarding the potential risks of an office-based procedure[6,25,29]. Many

concerns have been substantiated. Often, many of the safeguards inherent in the hospital system are not present in a surgical office[6,28]. In 2000, the Anesthesia Patient Safety Foundation opined that the level of care in an office should equal that in a hospital[30], an idea was also supported by the ASA in recommendations for setting up an office-based practice[31]. Since regulations do not exist in most States, any physician who holds a valid license may perform any procedure in his or her office[6]. There have been cases of operating surgeons with no formal training in anesthesia and airway management providing anesthetic care. A surgeon may, in fact, have limited experience in performing the surgical procedure, and not be subjected to peer review[6]. Law suits have been filed for cases in which there was no preoperative history and physical, insufficient blood testing, lack of informed consent, failure to monitor intraoperatively or postoperatively, or absence of an operative report. Procedures have been performed in areas that do not employ sterile techniques, and in one case a surgeon's pet was present in the operating room[6]. If the surgeon performing the procedure owns the office, he/she put undue pressure on the person performing the anesthetic to proceed with a patient who may not be adequately prepared for surgery[25]. Furthermore, there have been cases of serious injuries resulting from anesthesia machines and ventilators with outdated service contracts or lack of functioning alarm systems[6].

Approved guidelines regarding liposuction have been issued by the American Society for Dermatologic Surgery, the American Academy of Dermatology, the American Society for Plastic Surgery and the American Academy of Cosmetic Surgery. Liposuction in an office should be limited to 5000 ml of total aspirant to include supernatant fat and fluid. A Foley catheter should be inserted if more than 4000 ml of liposuction is proposed, and concurrent procedures should be avoided if the volume of aspirant exceeds the recommended limit[36].

In most States, accreditation of a surgical office is voluntary, however most third-party payers will not reimburse a facility fee if the office is not accredited[25]. Presently, there are three recognized agencies in the USA that can accredit a surgical office: the American Association for

Accreditation of Ambulatory Surgical Facilities, the Accreditation Association for Ambulatory Health Care and the Joint Commission for Accreditation of Healthcare Organizations (JCAHO). These organizations address issues such as the physical design of the office, emergency power, staffing, policies and procedures, preoperative assessment, patient consent, monitoring (preoperatively, intraoperatively, and postoperatively), documentation, patient recovery and peer review. The agencies all have slightly different criteria and accreditation cycles[39]. For example, JCAHO does not lay down guidelines but rather advises the facility of the outcomes that must be met and requires that a workable plan be put into action that achieves the desired result. Many professional societies encourage their members to perform surgical procedures only in accredited facilities. As of July 2002, the Society for Aesthetic Plastic Surgeons mandated that all its members operate solely in offices accredited by one of the three accrediting organizations or an equivalently recognized accrediting organization certified to participate in the Government health program.

Currently, regulations exist for office-based standards in Alabama, California, Colorado, Florida, Illinois, Louisiana, Massachusetts, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas and Virginia[25]. It is difficult to regulate offices that have been providing care for many years without incident. Also, regulations are often viewed as politically motivated and legal delays may ensue. Occasionally under the guise of patient safety physician anesthesiologists have sought to restrict competition from other providers in an attempt to monopolize an ever expanding market-place for anesthesia services' [13, pp. 113]. California was one of the first states to place safety regulations on offices providing surgical care[6]. An office that fails to comply with the State code may be subjected to sanctions ranging from a reprimand to criminal or monetary charges. The office must have adequate patient monitoring facilities and a system for maintaining records. California regulations require that practicing physicians have either admitting privileges in a local hospital or that a written transfer agreement is in place with a physician who does. There must be an

emergency transfer policy in place with a local hospital, which is consistent with the hospital's peer review and a performance improvement plan. California law only applies to patients undergoing a general anesthetic (loss of airway protection, and/or consciousness), and not to patients undergoing straight local, conscious sedation or nerve blocks.

New Jersey has regulations in place that apply to offices providing all levels of anesthetic care. The provider of general anesthesia must be credentialed by a hospital. Only a credentialed physician may supervise certified registered nurse anesthetists. New Jersey law permits only ASA 1 or 2 patients to undergo general anesthesia. Conscious sedation is used for ASA 3 patients[2]. Specific requirements cover monitoring and emergency equipment/drugs, policies and procedures, physician credentialing, documentation and peer review. Violations are considered professional misconduct and could subject the physician to reprimand, license revocation or fines. Severe violations may result in criminal prosecution.

Safety Recommendations

In August 2000, the state of Florida, in response to several well publicized deaths and injuries involving patients undergoing office-based procedures, imposed a 90-day moratorium on offices performing anesthetics more invasive than conscious sedation[8,10,16]. A safety panel consisting of surgeons, anesthesiologists, and other health care professionals was formed and charged with the responsibility of developing recommendations to improve the safety of office surgery. The panel made recommendations regarding selection of patients, with an emphasis on history and physical (including stratification of the risk of thromboembolism), as well as preoperative laboratory testing[26]. Recommendations were also made regarding surgeon qualifications and facility standards. Finally, identification of procedures appropriate for OBA, and complications to anticipate, including hypothermia, blood loss and concurrent procedures, were made[16]. A follow up review was

conducted from January 2000 to November 2004[8]. A total of 36 deaths were reported related to office procedures were reported, 18 during plastic surgery. All patients survived until transport. Causes of death were deep sedation and/or inadequate monitoring, and fat or thromboembolism. The authors concluded that the location of the procedures may not have been as much a factor as regulators suggested and better patient screening, sedation management, deep venous thrombosis prophylaxis and clinical judgment, might have prevented most fatalities.

Many professional societies in the US have independently developed recommendations. Particularly active are the ASA, the American Society of Plastic Surgery, and the American Association of Nurse Anesthetists. Each has developed voluntary guidelines[16,26,31,40]. Bridenbaugh has recently summarized the requirements for patient safety in OBA[9]. Generally, all safety recommendations involve the patient, the procedure and the facility. The anesthesiologist should play a vital role in maintaining safe office practice. He/she should ensure an adequate preoperative evaluation including documentation of all pertinent tests results and consultations. An appropriate informed consent (including language understood by the patient) for surgery and anesthesia should be obtained. The office should be equipped with age and size appropriate resuscitation equipment and drugs[32,33]. There should be a means available to deliver positive pressure ventilation, and all equipment, including ventilators should be regularly maintained with service contracts current. Air quality should be tested on schedule and the results posted. All components of the ASA algorithm for the difficult airway should be available. Intraoperative and postoperative monitoring and documentation must adhere to ASA guidelines[31]. The office must have an oxygen supply and suction equipment with back up systems. All drugs must be routinely checked for expiration dates. A defibrillator should be present and undergo daily battery checks.

A policy and procedure manual that outlines issues such as emergency planning, infection control, staffing, documentation, and peer review and quality assurance, is a minimum requirement. The design of the office should have a 1 h firewall present and an emergency generator.

Criteria for discharge should be predetermined and based upon peer reviewed literature[41,42]. Most, but not all, societies agree that the office should be accredited.

The surgeon must also be qualified to do a procedure in an office. He/she must be licensed and credentialed to perform the operation in a hospital, or have training and documented proficiency comparable to that of a credentialed surgeon[16]. The surgeon should be either board eligible or board certified by a recognized member of the American Board of Medical Specialties, and carry malpractice insurance. Many surgeons are also trained to provide conscious or deep sedation with local anesthesia in an office based setting with or without an anesthesiologist. Again, policies and procedures must be in effect and adhered to. A study of > 34,000 patients who received OBA in offices of maxillofacial surgeons, indicated an overall satisfaction rating of 94.3% with anesthetic care[43].

Not all patients or procedures are suitable for an office setting. Inappropriate patients include those classified as ASA 4, patients with brittle or poorly controlled diabetes, substance abusers, patients with a seizure disorder or who are malignant hyperthermia susceptible or have other major familial problems such as Tay Sachs disease or familial dysautonomia. Morbidly obese patients, premature babies and those who have a history of obstructive sleep apnea (OSA), are also not good candidates[14,26,44,45]. However, a recent study of the hemodynamic responses and oxygen saturation during midazolam/fentanyl sedation with local anesthesia for office based laser assisted uvuloplasty, showed variations from baseline recordings within +/- 20% (-5% + 7.5%) which were considered insignificant[46]. All 15 patients were obese, snored and had OSA. The nature of the procedure mandated that oxygen supplementation be avoided. Postoperative complications were not reported. Most offices do not consider patients who cannot provide escorts to accompany them to home as acceptable for OBA. Patients are advised against driving for 24 hours.

Training

There is no scientific evidence to exclude many procedures from OBA. Thus, it is inevitable that more surgery will be moved to the office setting. Clearly, this change in venue from the traditional operating room setting requires flexibility in anesthetic management. It is essential that training programs adapt and allow residents to explore this new environment. Curricula should be enlarged to include teaching in patient selection, and current guidelines and State regulations as well as the mechanics of an office based practice.

Conclusion

OBA is a rapidly developing field of medicine. It is convenient for the patient and the physician, and is cost effective. As the system matures it is our responsibility as anesthesiologists to ensure that patient safety is never compromised.

Acknowledgement

We would like to acknowledge Meg Rosenblatt MD, Associate Professor of Anesthesia, Director, Orthopedic Anesthesia, the Mount Sinai School of Medicine, for help in preparing this manuscript.

References

1. SNOW J: *On Chloroform and other Anaesthetics*. John Churchill, London 1858, pp. 314-5.
2. KEYS TE: *The History of Surgical Anesthesia*. Krieger, New York 1945, pp. 32-5.
3. FROST EAM: Outpatient Evaluation: A New Role for the Anesthesiologist. *Anesth Analg*; 55(3):307-310, 1976.
4. LEE JA: The Anaesthetic Out-patient Clinic. *Anaesthesia*; 4:169-74, 1949.
5. WETCHLER BV: Online shopping for ambulatory surgery: let the buyer beware! [Editorial]. *Ambulatory Surg*; 8:111, 2000.
6. QUATTRONE MS: Is the physician office the wild, Wild West of health care? *J Ambulatory Care Manage*; 23:64-73, 2000.
7. PELEGRI D, BENATAR J, FERNANDEZ C, ET AL: Office based anesthesia: consensus report. Spanish Society of Anesthesia and Reanimation. *Rev Esp Anestesiol Reanim*; 52(10):587-8, 2005.
8. CLAYMAN MA, CAFFEE HH: Office Surgery Safety and the Florida Moratoria. *Ann Plast Surg*; 56(1):78-81, 2006.
9. BRIDENBAUGH PO: Office Bases Anesthesia: Requirements for Patient Safety. *Anesthes Prog*; 52(3):86-90, 2005.
10. COLDIRON B, SHREVE E, BALKRISHNAN R: Patient injuries from surgical procedures performed in Medical Offices: three years of Florida data. *Dermatol Surg*; 1435-43, Dec (12 Pt1), 2004.
11. KOCH ME, DAYAN S, BARINHOLTZ D: Office based anesthesia: an overview. *Anesthesiolog Clin North America*; 21(2):417-43, 2003.
12. HORNSBY LG: Anesthesia's new frontier: ensuring patient safety in the office setting. *Plast Surg Nurs*; 22:112-114, 2002.
13. TWERSKY RS: Anaesthetic and management dilemmas in office-based surgery. *Ambulatory Surg*; 6:79-83, 1998.
14. ROSS AK, ECK JB: Office-based anesthesia for children. *Anesthesiol Clin North America*; 20:195-210, 2002.
15. BING JB, MCAULIFFE MS, LUPTON JR: Regional anesthesia with monitored anesthesia care for dermatologic laser surgery. *Dermatol Clin*; 20:123-134, 2002.
16. IVERSON RE: ASPS Task Force on Patient Safety in Office-based Surgery Facilities. Patient safety in office-based surgery facilities: I. Procedures in the office-based surgery setting. *Plast Reconstr Surgi*; 110:1337-1342, 2002.
17. GORDON NA, KOCH ME: Duration of anesthesias as an indicator of morbidity and mortality in office-bases facial plastic surgery: a review of 1200 consecutuve cases, *Arch facial Plast Surg*; 8(1):47-53, 2006.
18. WHITE PF: Ambulatory anesthesia advances into the new millennium. *Anesth Analg*; 90:1234-1235, 2000.
19. CILLO JE JR, FINN R: Moderate intravenous sedation for office based full face laser resurfacing using a continuous infusion propofol pump. *J Oral Maxillofac Surg*; 63(7)903-7, 2005.
20. KOVAC AL: Prevention and treatment of postoperative nausea and vomiting. *Drugs*; 59:213-243, 2000.
21. SCUDERI PE, JAMES RL, HARRIS L, MIMS GR: Multinodal antiemetic management prevents early postoperative vomiting after outpatient laparoscopy. *Anesth Analg*; 91:1408-1414, 2000.
22. WATCHA MF, WHITE PF: Postoperative nausea and vomiting: its etiology, treatment and prevention. *Anesthesiology*; 77:162-184, 1992.

23. TAN J, CHEN X, WHITE PF, ET AL: Antiemetic prophylaxis for office-based surgery: Are the 5-HT3 receptor antagonists beneficial? *Anesthesiology*; 98:293-298, 2003.
24. SCHULTZ LS: Cost analysis of office surgery clinic with comparison to hospital outpatient facilities for laparoscopic procedures. *Int Surg*; 79:273-277, 1994.
25. ANELLO S: Office based anesthesia: advantages, disadvantages, and the nurses role. *Plast Surg Nurs*; 22:107-111, 2002.
26. IVERSON RE, LYNCH DJ: ASPS Task Force on Patient Safety in Office-based Surgery Facilities. Patient safety in office-based surgery facilities: II. Patient selection. *Plast Reconstr Surg*; 110:1785-1790, 2002.
27. COYLE TT, HELFRICK JF, GONZALEZ, ET AL: Office bases ambulatory anesthesia: Facotrs that influence patient satisfaction or dissatisfaction with deep sedation/general anesthesia. *J Oral Maxillofac Surg*; 63(2):163-72, 2005.
28. MORELLO DC, COLON GA, FREDERICKS S, ET AL: Patient safety in accredited office surgical facilities. *Plast Reconstr Surg*; 99:1496-1500, 1997.
29. COTE CJ, NOTTERMAN DA, KARL HW, ET AL: Adverse sedation events in pediatrics: a critical incident analysis of contributing factors. *Pediatrics*; 105:805-814, 2000.
30. COTE CJ, KARL HW, NOTTERMAN DA, ET AL: Adverse sedation events in pediatrics: analysis of medications used for sedation. *Pediatrics*; 106:633-644, 2000.
31. KLEIN JA: The tumescent technique for liposuction surgery. *Surg*; 4:263-267, 1987.
32. KLEIN JA: Tumescent technique for regional anesthesia permits lidocaine doses of 35 mg/kg. *J Dermatol Surg Oncol*; 16:248-263, 1990.
33. OSTAD A, KAGEYAMA N, MOY RL: Tumescent anesthesia with lidocaine dose of 55 mg/kg is safe for liposuction. *Dermatol Surg*; 22:921-927, 1996.
34. GRAZER FM, DEJONG RH: Fatal outcome from liposcution: census survey of cosmetic surgeons. *Plast Reconstr Surg*; 105:436-446, 2000.
35. HOUSEMAN TS, LAWRENCE N, MELLEN BG, ET AL: The safety of liposuction: results of a national survey. *Dermatol Surg*; 28:971-978, 2002.
36. DOMINO KB: Office-based anesthesia: lessons learned from the closed claims project. *ASA Newsletter*; 65-9-11, 2001.
37. ANESTHESIA PATIENT SAFETY FOUNDATION: APSF Newsletter, 15:1, 2000.
38. American Society of Anesthesiologists: 2000 Directory of Members. Park Ridge, IL: ASA; 2000, pp. 480-510.
39. YATES JA: America Society of Plastic Surgeons office-based surgery accreditation crosswalk. *Plastic Surgical Nursing*; 22:125-132, 2002.
40. TUNAJEK SK: Office based anesthesia standards. *AANA J*; 67:115-120, 1999.
41. WHITE PF: New criteria for fast tracking after outpatient anesthesia: a comparison with the modified Aldrete's scoring system. *Anesth Analg*; 88:1069-1072, 1999.
42. CHUNG FF, CHAN VFW, ONG D: A postanesthetic discharge scoring system for home readiness after ambulatory surgery. *Ambul Surg*; 189-193, 1993.
43. PERROTT DH, YUEN JP, ANDRESEN RV, ET AL: Office based ambulatory anesthesia: outcomes of clinical practice of oral and maxillofacial surgerons. *J Oral Maxillofac Surg*; 61(9):981-2, 2003.
44. LOFSKY A: Creation of observational unit may decrease sleep apnea risk. *Anesthesia Patient Safety Foundation Newsletter*; 17:24-25, 2002.
45. BNEUMOF JL: Obstructive sleep apnea in the adult obese patient: implications for airway management. *Anesthesiol Clin North America*; 20:789-811, 2002.
46. CILLO JE, FINN R: Hyemodynamics and oxygen saturationd uring intravenous sedation for office-based laser-assisted uvuloplasty. *J Oral Maxillofac Surg*; 63(6):752-5, 2005.