Lesson 255: PreAnesthetic Assessment of the Patient Undergoing Office-Based Plastic Surgery

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DISCLOSURE STATEMENT
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NEEDS STATEMENT
As an increasing number of plastic surgery procedures are performed in offices throughout the United States, queries have been received from participants in this series of CME activities regarding criteria for selection. To date, minimal formal instruction in office-based plastic surgery is available in anesthesiology residency programs. This activity offers a current appraisal of the state of office-based anesthesia (OBA).

Office-based anesthesia (OBA) is an innovative and rapidly growing field. When the use of anesthetics was introduced more than 150 years ago, it was not uncommon for a surgeon to attend to elite patients in their homes, 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. Such care was only for the very wealthy, however. John Snow, in his landmark text On Chloroform and Other Anaesthetics, wrote that he had notes on 867 cases of dental extractions (for a total of 3,021 teeth extracted) that he had performed in neighborhood dentists’ offices, particularly that of Mr. West of Broad Street, in the City of London.1 Snow reported no inconvenience to patients from the administration of chloroform, except for rare instances of nausea and vomiting.

His practice of OBA brought Snow to the attention of a leading anesthetist in England. However, after anesthesia became recognized as a legitimate medical therapy, almost all procedures requiring anesthesia were performed in hospitals up until the early 1980s. A change was coming, however, 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, a prednisom evaluation clinic was initiated at a Bronx hospital—a project that had been first proposed in 1949.2,3 Over a 3-year period, more than 3,000 patients attended the clinic. The reduction in patient hospital stay averaged almost 4 days. The clinic was to become an integral part of ambulatory surgery and set the way for anesthesia outside the conventional hospital operating room.

By the year 2000, approximately 75% of all procedures were being performed on an outpatient basis, including 17% in freestanding ambulatory surgery centers and approximately 14% to 25% (8-10 million) in physicians’ offices.5,6 As projected, approximately 82% of all procedures are currently being performed on an outpatient basis—including 24% as office-based procedures.5,7,8 Over the past several years, great strides have been made in improving the safety of OBA. Many medical societies, both in the United States and internationally, have issued recommendations.9,10 In this country, rules and regulations regarding the practice have been passed in several states. Such recommendations and regulations have become increasingly important as more invasive procedures are performed.10,12

Types of Procedures
The procedures performed initially in offices were small, of short duration, and relatively noninvasive. They included the removal of moles and the incision and drainage of superficial abscesses. The development of newer surgical and anesthetic techniques, however, has resulted in quality care for patients undergoing more invasive procedures outside the hospital setting.10,11 Procedures that are now considered

PREANESTHETIC ASSESSMENT
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A COURSE OF STUDY FOR AMA/PRA CATEGORY 1 CREDIT
1) Read this article, review the information presented, then go online and complete the lesson post-test and course evaluation before August 31, 2007. (CME credit is not valid past this date.)
2) You must achieve a score of 80% or better to earn CME credit.
3) The estimated time to complete this activity is 2 hours.

ACCREDITATION STATEMENT
The Mount Sinai School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.
Ketamine (25- to 50-mg bolus) functions as a dissociative anesthetic and an analgesic while maintaining respiratory drive. It has an excellent safety profile and is not associated with PONV. If used in conjunction with glycopyrrolate, an antisialagogue, and midazolam or propofol to decrease the risk for dysphoria, ketamine is less likely to be associated with a hypotensive state decreases blood loss. By itself, clonidine also provides sedation, and its use has been associated with a decrease of up to 50% in the amount of drugs required for monitored anesthesia care.15

Some practitioners add clonidine (0.1-0.2 mg), an α2-adrenergic agonist, to ketamine to inhibit sympathetic tone and limit the hypertension that is associated with ketamine. A hypotensive state may quickly develop into that of a general anesthetic state. Therefore, the office-based practitioner should always have the ability to control an unprotected airway and administer general anesthesia.

Side Effects

The administration of almost any anesthetic or analgesic agent is associated with certain side effects; these can include nausea and vomiting, orohistamine hypotension, and transient memory and cognitive problems. Patients with orohistamine hypotension usually respond rapidly to the administration of fluids. Any office-based practice must address the issue of PONV, which can delay the discharge of patients or result in unplanned hospital admissions. Many investigations have recommended a multimodal approach to the treatment of PONV,20,22 including the use of metoclopramide, dexamethasone, promethazine, droperidol, and 5-HT3 receptor antagonists—such as ondansetron, dolasetron, and granisetron.

A recent study by Tang et al23 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 outcomes. However, prophylaxis with droperidol (0.625 mg i.v.) and dexamethasone (4 mg i.v.) when they were administered to 135 patients for routine prophylaxis in OBA. However, the authors did not stratify the patients according to their risk for PONV (ie, high risk associated with history of PONV, female gender, nonsmoker status, previous gynecologic surgery). In addition, the US Food and Drug Administration (FDA) has imposed a “black box warning” for the administration of droperidol, requiring postoperative monitoring with electrocardiography. Certainly the use of 5-HT3 receptor antagonists entails a higher cost, especially if they are given routinely. However, their judicious use may well be cost-effective (ie, restricted to patients in high-risk categories).

Advantages of OBA

The advantages of undergoing a procedure in a physician’s office, rather than in a hospital, are numerous. While the facility fees in a hospital can be expensive and often unpredictable, the costs in an office are more readily controllable and hence more easily calculated.24,26,28 Patients who undergo a procedure in an office can be made aware of all costs before consenting to the surgery. Costs typically include the fees of the surgeon and the anesthesiologist, in addition to the facility fee. Medically necessary procedures can also be billed to the patient by the surgeon. Other clear advantages of an office procedure are the ease of scheduling, convenience for the patient and surgeon, maintenance of patient privacy, decreased exposure of the patient to nosocomial infections, and improved continuity of care (ie, an office is often staffed by a small group of consistent personnel).14,22

In a recent outcomes study, certain factors were identified as being significant predictors of patient satisfaction or dissatisfaction with deep sedation or general anesthesia.
administered in an office setting. The study comprised 34,191 patients, of whom 72% underwent deep sedation or general anesthesia. Almost 96% were extremely or moderately satisfied, 3% were neutral, and 1% were not satisfied. Older patient age, the administration of nitrous oxide, and the recall of postoperative instructions predicted patient satisfaction. Young patient age, anxiety, pain, vomiting, and the awake state predicted patient dissatisfaction.

In 1997, Morello et al reported an excellent safety record for plastic surgery procedures performed in accredited offices by board-certified plastic surgeons and concluded that the safety record in those areas was comparable with that of a freestanding or ambulatory surgical facility.

Disadvantages of OBA

Data from the study of Morello et al may not support the authors' glowing recommendation. The study survey was sent to 418 accredited plastic surgeons; the response rate was 57%. Safety issues such as complications, hospital admissions, and deaths were addressed. Over a 5-year period, more than 400,000 office procedures were performed—63.2% were cosmetic and 36.8% reconstructive.

Complications included hemorrhage (0.24%), hypertension (0.1%), wound infection (0.09%), hypotenison (0.04%), unplanned hospital admission (0.03%), and reoperation (0.13%). The overall complication rate was 1 per 213 cases, or 0.47%. The mortality rate was 1 per 57,000 cases, or 0.0017%. Causes of death were listed as cerebral hypoxia during an abdominoplasty, tension pneumothorax during a breast augmentation, cardiac arrest during a carpal tunnel procedure, and stroke 3 days after a rhinoplasty and brow lift; there was one unexplained death. During the 1980s, the rate of surgical mortality was approximately 1 in 100,000 administered anesthetics. Currently, the mortality rate is about 1 in 250,000 for anesthetics administered in a hospital, and 1 in 400,000 for those administered in freestanding ambulatory surgery centers. Adding to the significance of these data is that most office-based procedures are performed on young, healthy patients.

Candidates for office-based procedures often include children older than 6 months of age. Dental caries is the number 1 diagnosis in children who may need surgery in the United States. Nitrous oxide and chloral hydrate are commonly used drugs in dental offices. The dental surgery may not be quite as benign as it would seem. In a study performed by Ross and Eck in 2002, hypotension occurred in 94% of children ages 1 to 9 years who had received chloral hydrate at a dose of 70 mg/kg in conjunction with 30% nitrous oxide. When chloral hydrate was used in conjunction with 50% nitrous oxide, hypotension developed in 97% of the patients.

Cote et al, in conjunction with the FDA, reviewed 95 adverse sedation-related events in pediatric patients. Neurologic injury and death occurred more often during sedation performed in offices than during sedation administered in hospitals, even though this group of pediatric patients tended to be older and healthier than their hospitalized counterparts. Altogether, 93% of the adverse events resulted in permanent neurologic injury or death; 80% of the events presented as respiratory in nature. Various reasons accounted for a failure to rescue the patient (Table 1).

In the cases of neurologic injury or death, anesthesia was administered by an oral surgeon, a periodontist, or a certified registered nurse anesthetist supervised by a dentist. In a review of the database of the American Society of Anesthesiologists (ASA) Closed Claims Project (which incorporates information from 35 liability insurers representing about 50% of the practicing anesthesiologists in the United States), it was found that safety deficiencies existed in some offices. Presently, 5,480 claims for dental interosseus are excluded from the database. Of these, 753 are for ambulatory procedures and 14 are for office-based procedures. The low number of cases may reflect the 3- to 5-year lag in reporting.

Most claims were filed on behalf of female patients (ASA physical status I or II) who underwent an extensive surgery with general anesthesia—which parallels the profiles of claims made at large. A disturbing trend is seen when injuries that occurred in ambulatory surgery centers are compared with those that were office-based. In ambulatory surgery centers, 62% of the injuries were temporary and nondisabling, and 21% were fatal. In office-based settings, however, 21% of injuries were temporary and nondisabling, and 64% resulted in death. Table 2 lists adverse events that occurred with OBA.

The complications that were reported usually developed intraoperatively. A total of 14% of adverse events occurred in the immediate perioperative period. There was one unexplained death. Of note is that 46% of injuries reported in an office were considered preventable, as opposed to 13% of those in an ambulatory surgery center. Respiratory events in the postanesthesia care unit might have been avoided if pulse oximetry had been employed. Care was considered to be substandard in an office setting 50% of the time, and in an ambulatory surgery center 34% of the time.

Finally, of claims that originated from an office-based procedure, 92% received financial compensation, with a median claim of $200,000 (range, $10,000-$2,000,000). Of claims from ambulatory settings, 59% received financial compensation, with a median payout of $85,000 (range, $34-$14,700,000).

Liposuction

Tumescent liposuction is a procedure commonly performed in the office, and one that has received much attention in the media because of its association with reported complications. The procedure involves “wetting” the fat cells by injecting a hypotonic solution to lyse adipose cell walls and emulsify fat. The addition of epinephrine to the solution (1:100,000) provides hemostasis, thus allowing the emulsion of several liters of fat. The administration of lidocaine 0.05% to 0.1% provides postoperative analgesia. Peak serum levels of lidocaine occur 12 to 14 hours after injection and decline over the next 6 to 14 hours. Although the dose of lidocaine is traditionally limited to 7 mg/kg, because the tumescent technique is based on a single-compartment theory of lidocaine clearance (similar to the clearance of a sustained-release medication), doses of lidocaine as high as 35 to 55 mg/kg may have been used safely.

Currently, liposuction is performed primarily by plastic surgeons and dermatologists. Grazer and de Jong investigated the morbidity and mortality associated with liposuction by sending a survey to 1,200 aesthetic plastic surgeons, of whom 917 responded. The data revealed that between 1994 and 1998, there were 95 fatalities among 496,245 liposuction procedures (Table 3). Complications during liposuction may be secondary to multiliter 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. Altogether, 46% of the deaths following liposuction were found to occur after an office-based procedure, while 26% occurred after a hospital-based procedure.

Houseman et al concluded that liposuction is safer than the media might lead one to believe. A survey, sent to 505 of the 517 worldwide members of the American Society for Dermatologic Surgery who perform liposuction, addressed issues such as procedure location and specific complications over a 7-year period (1994-2000). A total of 261 respondents provided information regarding 66,570 liposuction procedures. The mean number of procedures for each practitioner was 255 (range, 0-3,014). No deaths were reported. Serious adverse events included hospitalization, massive infection, abdominal/thoracic wall or visceral perforation, hypotension without shock, hemorrhage, pulmonary edema, lidocaine toxicity, skin ulceration, and anesthesia reaction. Serious adverse reaction events were noted in 36 cases, with a higher incidence in patients in hospitals and freestanding surgery centers. Of the procedures, 71% were performed in nonaccredited offices. The authors found a higher incidence of adverse events in patients who received sedation than in those who had local anesthesia only; they

<table>
<thead>
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<th>Table 3. Causes of Death During Liposuction</th>
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<td>- Unknown or confidential, 28.5%</td>
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<tr>
<td>- Pulmonary embolism, 23.1%</td>
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<tr>
<td>- Abdominal visceral perforation, 14.6%</td>
</tr>
<tr>
<td>- Anesthesia-related, 10%</td>
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<tr>
<td>- Fat embolism, 8.5%</td>
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<tr>
<td>- Cardiorespiratory failure, 5.4%</td>
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<tr>
<td>- Massive infection, 5.4%</td>
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<td>- Hemorrhage, 4.6%</td>
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Overall mortality rate, 19.1 per 100,000 cases (about 1 in 5,000).
In 2000, the Anesthesia Patient Safety Foundation recommended that the level of care in an office setting should be equal to that in a hospital—an idea that has also been recommended by the ASA for setting up an office-based practice. Because applicable regulations do not exist in most states, any physician who holds a valid license may perform any procedure in his or her office. 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 a specific surgical procedure and not be subjected to peer review. Lawsuits have been filed in cases in which no preoperative history was obtained and no physical examination of the patient was performed; other lawsuits have been based on insufficient blood testing, lack of informed consent, failure to provide intraoperative or postoperative monitoring, and failure to compile an operative report.

There are reports of surgical procedures having been performed in areas without sterile techniques; in one case, a surgeon’s pet was present in the operating room. There are also reports of surgeons owning the office in question performing a procedure and putting undue pressure on the anesthesia provider to proceed when the patient may not have been adequately prepared for surgery. There have also been cases of serious injuries resulting from the use of anesthesia machines and ventilators with outdated service contracts or lacking functioning alarm systems. Approved guidelines regarding liposuction have been reissued by the American Society for Dermatologic Surgery, the American Academy of Dermatology, the American Society of Plastic Surgeons, and the American Academy of Cosmetic Surgery. For example, when liposuction is performed in an office, the total aspirate—including supernatant fat and fluid—should be limited to 5,000 mL. A Foley catheter should be inserted if the removal of more than 4,000 mL of aspirant is proposed, and concurrent procedures should be avoided if the volume of aspirate exceeds the recommended limit.

In most states, obtaining accreditation of a surgical office is voluntary. Most third-party payers, however, will not reimburse a facility fee if the office is not accredited. Presently, there are 3 organizations recognized in the United States that can accredit surgical offices: the American Association for Accreditation of Ambulatory Health Care, and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). These organizations address issues such as the physical design of an office, the availability of emergency power, staffing, policies and procedures, preoperative assessment, patient consent, perioperative monitoring, documentation, patient recovery, and peer review. Each organization has slightly different criteria and accreditation cycles. For example, JCAHO does not establish guidelines for OBA and complications to anticipate, including hypothermia, blood loss, and complications of concurrent procedures.

In a follow-up review of data from January 2000 to November 2000, a total of 36 deaths were reported to be related to liposuction—18 of which occurred during plastic surgery. All patients survived until transport. The causes of death were deep sedation and inadequate monitoring, and fat embolism or thromboembolism. The

### Table 4. Rates of Complications During Liposuction by Surgical Site

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<thead>
<tr>
<th>Area</th>
<th>Rate (%)</th>
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<tbody>
<tr>
<td>Abdomen</td>
<td>72%</td>
</tr>
<tr>
<td>Buttocks and lower extremities</td>
<td>39%</td>
</tr>
<tr>
<td>Upper back</td>
<td>14%</td>
</tr>
<tr>
<td>Lower back</td>
<td>8%</td>
</tr>
<tr>
<td>Head and neck</td>
<td>6%</td>
</tr>
<tr>
<td>Upper extremities</td>
<td>3%</td>
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![Image](image.png)

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Also found a correlation between adverse events and the site of surgery (Table 4). also found a correlation between adverse events and the site of surgery (Table 4).

### Rules, Regulations, and Accreditations

Currently, 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. In offices, the providers of anesthesia care may have varied skill levels; they may be physician anesthesiologists, nurse anesthetists, surgeons, or dental anesthetists, or they may have no additional anesthetic training.

Reports of poor outcomes have sparked a flurry of media attention regarding the potential risks associated with office-based procedures. In fact, many of the concerns raised have been substantiated. For example, safeguards inherent in a hospital system are often not present in a surgical office. In 2000, the Anesthesia Patient Safety Foundation suggested that the level of care in an office setting should be equal to that in a hospital—an idea that has also been recommended by the ASA for setting up an office-based practice. Because applicable regulations do not exist in most states, any physician who holds a valid license may perform any procedure in his or her office. 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 a specific surgical procedure and not be subjected to peer review. Lawsuits have been filed in cases in which no preoperative history was obtained and no physical examination of the patient was performed; other lawsuits have been based on insufficient blood testing, lack of informed consent, failure to provide intraoperative or postoperative monitoring, and failure to compile an operative report.

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### Safety Recommendations

In August 2000, the state of Florida—in response to several well-publicized deaths and injuries involving patients who underwent office-based procedures—imposed a 90-day moratorium that restricted offices from performing anesthetic procedures more invasive than conscious sedation. A safety panel comprised of surgeons, anesthesiologists, and other healthcare professionals was charged with the responsibility of developing recommendations to improve the safety of office surgery. The panel’s recommendations pertained to patient selection (with an emphasis on medical history and physical examination findings, including risk stratification for thromboembolism) and preoperative laboratory testing. Recommendations were also made regarding surgeon qualifications and facility standards. Finally, the panel identified emergency power, staffing, policies and procedures, preoperative assessment, patient consent, perioperative monitoring, documentation, patient recovery, and peer review. Each organization has slightly different criteria and accreditation cycles. For example, JCAHO does not establish guidelines for OBA and complications to anticipate, including hypothermia, blood loss, and complications of concurrent procedures. In a follow-up review of data from January 2000 to November 2000, a total of 36 deaths were reported to be related to liposuction—18 of which occurred during plastic surgery. All patients survived until transport. The causes of death were deep sedation and inadequate monitoring, and fat embolism or thromboembolism. The
Training

In the case of many procedures, there is no scientific evidence that would exclude patients undergoing them from having OBA. Thus, it is inevitable that more surgery will be moved to the office setting. Clearly, such a change in venue from the traditional operating room setting will require flexibility in anesthetic management. It is essential that training programs adapt and allow residents to explore this new environment. Curricula should be expanded to address patient selection, current guidelines, and state regulations, in addition to the mechanics of an office-based practice.

Management of the Case

Several considerations were discussed. The patient had a BMI of 26.6, a history of snoring without obstructive sleep apnea, borderline hypertension, and possible borderline diabetes. Otherwise, she was healthy and eager to avoid a hospital stay. She had a good support system in a family member who would accompany her home and stay with her for at least 24 hours. Thus, the decision to proceed was made with the understanding that she would return to her internist within the week for an evaluation of her cardiovascular status and investigation of possible early diabetes. She was premedicated with 2 mg of midazolam after the initiation of supplemental oxygen. Fentanyl 50 mcg was administered, and a propofol infusion was started at a rate ranging between 40 and 90 mcg/kg per minute. During the 2-hour procedure, the dosing of fentanyl 50 mcg was repeated twice. Ondansetron 4 mg was also administered. The patient’s vital signs were stable throughout the procedure. She was transferred to a recovery area and discharged to home 3 hours later in satisfactory condition and without pain or nausea.

Conclusion

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

References

9. Bridenbaugh PO. A manual of policies and procedures that outlines such issues as emergency planning, infection control, staffing, documentation, peer review, and quality assurance is a minimum requirement. The design of the office should include a 1-hour fire wall and an on-site emergency generator. Criteria for the discharge of patients should be predetermined and based on findings in peer-reviewed literature. Most, but not all, societies agree that the office should be accredited.

The surgeon must also be qualified to perform procedures in an office. He or she must be licensed and credentialed to perform the operation in question in a hospital, or have train- ing and documented proficiency comparable with that of a credentialed surgeon. The surgeon should be board-eligible or board-certified by a recognized member of the American Board of Medical Specialties and should carry medical insurance. Many surgeons are trained to provide conscious or deep sedation with local anesthesia in an office-based setting with or without the presence of an anesthesiologist. In a study by Perron et al, more than 34,000 patients who had undergone procedures in the offices of maxillofacial surgeons indicated an overall satisfaction rating of 94.3% with office-based anesthetic care.

Not all patients or procedures are suitable for an office setting. Inappropriate patients include those classified as ASA physical status IV, those with brittle or poorly controlled diabetes, substance abusers, those with a seizure disorder or susceptibility to malignant hyperthermia, and those with a major familial disorder, such as Tay-Sachs disease or familial dysautonomia. Patients who are obese or morbidly obese (body mass index [BMI] >30), who are ex-premature babies, or who have a history of obstructive sleep apnea are also not good candidates. However, in a recent study of patients undergoing office-based laser-assisted uvuloplasty, the hemodynamic responses and oxygen saturation during sedation with midazolam-fentanyl and local anesthesia varied 20% from baseline (range, -27% to -7.5%)—which was considered insignificant. All 15 patients were observed, snored, and had obstructive sleep apnea. The nature of the procedure mandated that oxygen supplementation be avoided. Postoperative complications were not reported.

Patients who do not have someone to escort them to their home are considered unacceptable for OBA by most offices. Patients who undergo OBA are advised not to drive for 24 hours.
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