Lesson 237: PreAnesthetic Assessment of the Emergency Obese Patient Requesting a Peripheral Nerve Block

Written by:
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Lesson 237 was reviewed by Meg A. Rosenbliat, MD, Associate Professor, Department of Anesthesiology, Mount Sinai School of Medicine, New York, NY.

Learning Objectives
At the end of this activity, the participant should be able to:
1. Summarize the anesthetic problems presented by the patient with a potentially difficult airway.
2. Describe the options for management of the obese patient for anesthesia.
3. Discuss the potential treatment difficulties associated with the patient with gastroesophageal reflux disease (GERD).
4. Apply appropriate preoperative evaluation and testing of the patient with a potentially difficult airway.
5. Describe the proper technique for performance of a popliteal block.
7. List the indications for use of peripheral nerve blocks.
8. List the potential complications associated with peripheral nerve blocks.
10. Recognize the occurrence of psychosis in the obese patient population.

Obesity is defined as body weight that is 20% to 99% above ideal body weight; morbid obesity is body weight that is more than 99% above ideal for a given height and gender. Such increased body mass puts undue stress on the body’s organ systems and results in increased morbidity and mortality. Body mass index (BMI)—the measure of weight (kg)/height (m²)—is the most widely used formula for estimating relative obesity. A BMI value between 20 and 25 is typical for most individuals. A BMI above 27 is defined as overweight, and a BMI above 30 is considered obese. Individuals with morbid obesity (45 kg above their ideal body weight) will have a BMI greater than 35. A number of medical disorders, including stroke, ischemic heart disease, and diabetes, are 3 to 4 times more common in the obese population; obesity itself has detrimental effects on the cardiovascular, respiratory, and other organ systems. A patient with obstructive sleep apnea is an indication to the anesthesiologist that anesthesia induction may result in a respiratory system that is difficult or impossible to ventilate. In obese individuals, the presence of adipose tissue in the pharynx predisposes to airway narrowing. The collapse and obstruction of an already narrow pharyngeal airway may occur when muscles are relaxed by benzodiazepines or muscle relaxants. It is essential for the anesthesiologist to be aware of this possibility. Sleep apnea is defined as episodes of respiratory cessation of at least 10 seconds’ duration, that occur for a minimum of 11 times per hour during sleep. The etiology of sleep apnea can be central or obstructive. Of the millions of people who snore, only a small percentage have sleep apnea. Although the prevalence of obstructive sleep apnea is about 3%, as many as 99% of those afflicted go undiagnosed. Should potential signs or symptoms of obstructive sleep apnea be uncovered during a pre-anesthetic interview—eg, daytime somnolence or agitation, the presence of snoring (usually reported by a bed partner), systemic or pulmonary hypertension, the use of alcohol or other depressants—or from preanesthetic laboratory tests (eg, polycythemia), further investigation is warranted as soon as possible. The anesthesiologist should assume that the condition exists and take appropriate precautions. Many patients have undergone sleep studies and, if available, such findings should be investigated. If obstructive sleep apnea is determined to exist in a patient who requires anesthesia, care should be taken; these individuals can be overly sensitive to all central nervous system depressants, and may experience an obstructed airway when given even relatively small doses of such medications. Patients who use a biphasic positive airway pressure device or another machine at home should be advised to bring the device with them to the hospital.

Assessment of the Patient
It was unclear whether or not the patient in the case presented had a history of sleep apnea. He had been treated for multiple psychiatric disorders, including psychosis and depression, and it is possible that his occasional agitation was increased by frequent episodes of disturbed sleep. He did not bring a bed partner to the pre-anesthetic interview and a history of snoring could not be elicited. He was clearly obese, however, and therefore at risk for the multitude of medical problems that can complicate the administration of anesthesia.

Gastroesophageal Reflux Disease
Gastroesophageal reflux disease (GERD) is not necessarily implied by the presence of obesity. Many obese patients... see Lesson 237 page 36
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without symptoms of GERD have physiologic parameters that are similar to those of patients with normal body habitus. While gastric volume may be increased in obese individuals, so is gastric emptying time, and the pressure difference between the stomach and the esophagus is similar in patients without GERD, regardless of weight. However, patients with symptoms of GERD or documented disease are at increased risk for aspiration and aspiration pneumonitis. To prevent these complications, following antacid prophylaxis, employ a rapid sequence induction of general anesthesia—maintaining cricoid pressure to prevent reflux of gastric contents—and a rapid-acting neuromuscular blocking agent to facilitate tracheal intubation.

Although controversy has arisen over the use of cricoid pressure, correct application remains the standard of care. Cricoid pressure between 30 N and 40 N (equivalent to 3-4 kg) has been shown to prevent gastric reflux.4 However, applying cricoid pressure greater than 20 N to the awake patient can cause pain and retching. Applying a pressure of 40 N can actually complicate intubation by changing the relative anatomy of the larynx, or even causing complete obstruction. Therefore, it is recommended to induce anesthesia first, and then apply adequate cricoid pressure—at least 30 N.

In patients at risk for gastric aspiration—such as the patient with GERD—the administration of sedation without securing the airway is a risky and somewhat controversial proposal. It is preferable to use a pure regional technique without supplemental sedation, which allows the patient to protect his or her own airway. The case study patient had a documented history of GERD and was currently receiving treatment for his disease, increasing the importance of the issue and the possible need for supplemental sedation, or induction of general anesthesia should the regional technique fail. Regardless of which technique is ultimately chosen, the patient should be pretreated with a nonparticulate antacid (eg, sodium bicarbonate, 30 mL PO) and an agent to increase gastric emptying (eg, metoclopramide, 10 mg IV.)

Asthma

The patient with asthma presents many issues for the anesthesiologist to consider—an important one being the effectiveness of the patient’s current treatment program. A patient who is actively wheezing is clearly not being treated adequately. However, all wheezing is not asthma—especially in the obese patient. When presented with the wheezing, obese asthmatic patient, care must be taken to rule out other potential causes of abnormal breath sounds: The differential diagnosis ranges from congestive heart failure to poor effort and atelectasis. Effective therapy is determined from the patient’s medical history, in particular the frequency and severity of asthma attacks, the need for rescue inhalers, recent emergency department visits and treatment, hospitalization, and a history of asthma severe enough to require intubation.

Although asthma is categorized as a chronic disease, the amount of airflow obstruction at any given time can vary widely and change rapidly. Since manipulation of the airway is a strong trigger for bronchospasm in patients with reactive airway disease, steps must be taken to medically optimize such patients before proceeding with surgery. Pretreatment with albuterol inhalers (2 puffs, inhaled) before induction of anesthesia, and the selection of an induction agent such as propofol over etomidate or thiopental, makes severe bronchospasm less likely.5 Albuterol, a β-agonist, stimulates the β-receptors in the lungs, resulting in bronchodilation. Albuterol is an effective treatment for patients who are actively wheezing, and a pretreatment for patients about to engage in physical activity (eg, exercise) that may trigger an attack. The propellant, inhaled along with the albuterol droplets, can be irritating, however, and has been known to trigger an asthma attack in some individuals. There are also other methods for reducing the reactivity of the respiratory system. For example, the airway can be anesthetized with a laryngotracheal anesthetizing device (1% lidocaine sprayed topically over the vocal cords) or with IV. lidocaine (100 mg) after induction and before laryngoscopy. Also, a smaller-sized endotracheal tube can be used. Although the use of laryngeal mask airways will also decrease stimulation, their use is not recommended for the obese patient at risk for aspiration.

The adequacy of the case history patient’s treatment was not in question. His asthma was mild and well controlled with fluticasone/salmeterol and albuterol prn, which he had not needed for several weeks before admission for surgery. He had no history of status asthmaticus or asthma severe enough to require intubation. Pretreatment with albuterol was administered via inhaler before he entered the operating room.

Hypothyroidism

Hypothyroidism can develop for a number of reasons, and assessment of the patient with low circulating levels of T4 and T3 should focus on both the etiology of the disease and severity of symptoms. The disease can be either primary (arising from the destruction of the thyroid gland such as is seen in Hashimoto’s thyroiditis) or secondary to hypothalamic or anterior pituitary dysfunction. In either case, symptoms may range from absent with subclinical hypothyroidism, to severe with increased sensitivity to depressant drugs, slow drug metabolism, and postoperative hypothermia.

There is a paucity of literature to support the notion that elective surgery should be deferred in patients with symptomatic hypothyroidism, or that such patients are overly sensitive to anesthesia. Premedication of such patients with a rapid-acting antithyroid medication and then apply adequate cricoid pressure—at least 30 N.

In this situation, a rapid conversion to general anesthesia should be considered to provide a clear airway for intubation. As mentioned previously, patients with a difficult airway, anesthesiologists can potentiate the action of direct-acting sympathomimetics. Also, the efficacy of indirect-acting agents may be decreased.

Psychiatric Illness

Psychiatric illness in a patient complicates matters when the anesthesiologist is making the decision between an awake patient with regional anesthetic, the addition of sedation to a regional anesthetic, and general anesthesia. Psychosis that is well controlled with medication should not cause a problem in the patient who is to remain awake, providing treatment has been effective and follow-up directions as needed (eg, for positioning and during surgery). Sedation that does not render a patient unconscious, however, may result in a patient who is uninhibited and not easily controlled. In this situation, a rapid conversion to general anesthesia may be necessary. In such patients with a difficult airway, complications may ensue; the prevention of complications requires careful planning.

If the patient’s history suggests that he or she may not be able to tolerate regional anesthesia without significant sedation, induction of general anesthesia after the airway has been secured is more appropriate. As is the case with any regional anesthetic, general anesthesia remains the backup plan and the anesthesiologist must be ready to induce anesthesia at a moment’s notice. Just as a failed regional anesthetic may result in the conversion to general anesthesia, so may the development of psychosis in a previously well patient necessitate conversion from one form of anesthetic to another. If a patient begins to respond or behave inappropriately during the procedure, the first concern is for patient safety. If the patient’s behavior threatens his or her safety, a conversion to general anesthesia is indicated. If it is determined that the patient has developed a psychosis or some other psychiatric illness, postoperative evaluation by a psychiatric team is indicated.

In addition to the possibility that underlying psychiatric problems may manifest during surgery, the very real possibility that drug–drug interactions between psychoactive medications and anesthetic or other agents will occur during surgery must be considered. The most significant interactions associated with selective serotonin reuptake inhibitors involve the inhibition of warfarin metabolism and development of clinically significant coagulopathy. Tricyclic antidepressants block the uptake of catecholamines and can potentiate the action of direct-acting sympathomimetics. Also, the efficacy of indirect-acting agents may be decreased.
Monoamine oxidase inhibitors have potentially lethal interactions with many drugs. By potentiating the action of sympathomimetic agents, monoamine oxidase inhibitors may produce severe hypertension. Older (typical) antipsychotics exhibit relatively less D2 dopamine receptor antagonism, and therefore fewer extrapyramidal effects—eg, dystonic reactions, pseudoparkinsonism, akathisia, tardive dyskinesia, or neuroleptic malignant syndrome, which may be confused with a reaction to the anesthetic or another agent given intraoperatively. All antipsychotic agents can increase the effect of sedatives and analgesics. In addition, the β-adrenergic blocking action of some antipsychotics may reverse the effect of epinephrine. It is also important to note whether the patient has ingested any herbal medications, because these agents may also interact with sedative and hypnotic drugs. For example, St. John’s wort is said to have antidepressive actions.

The patient in the case presented was compliant with his antipsychotic medication regimen, but had no experience with sedation or general anesthesia. His request was that every attempt be made to avoid placing him under general anesthesia.

The Difficult Airway

The suspected or documented difficult airway in the patient requesting regional anesthesia presents a number of problems. For example, there is the very real possibility that a regional technique either may be inadequate for surgery, or may become inadequate at a point when emergency induction of general anesthesia becomes necessary. At that point, the anesthesiologist is faced with the task of establishing the airway under less than optimal conditions—the patient is in pain, uncooperative, and moving—and tension may quickly develop in the operating room. The decision has to be made whether or not to allow the procedure to be done under regional anesthesia with general anesthesia as a backup, or to induce general anesthesia initially. Both options have advantages and disadvantages; much of the decision will be based on how comfortable the individual anesthesiologist is with performing the regional technique and/or handling the difficult airway—and, of course, on patient preference. In this case, the decision was made to proceed with regional anesthesia.

Regional Versus General Anesthesia

The advantages of regional anesthesia, and specifically a peripheral nerve block, include a potentially awake and alert patient, the avoidance of general anesthesia, reduction in postoperative pain, a more rapid recovery time, and the potential for earlier discharge from the postanesthesia care unit (PACU). While the use of neuraxial blocks can result in longer stays in the PACU, all the aforementioned benefits are realized with the use of a peripheral nerve block. By avoiding general anesthesia or oversedation, the patient is able to maintain control of his or her airway.

Regional anesthesia may be combined with general techniques to provide analgesia both intraoperatively and postoperatively, or used as the sole anesthetic technique. In the latter situation, heavy sedation is contraindicated and patient cooperation and commitment to the procedure are essential for success. The patient must be well educated about the procedure—specifically, what to expect for levels of sedation and alertness, what sounds may be heard during the procedure, and what, if any, sensations may be experienced. In addition, the patient needs to know about the hazards of sedation and the possible need to secure the airway in an emergency.

A well-established regional block can avoid the need for supplementary medications that might produce dangerous levels of sedation, especially in a patient who is already taking psychoactive medications. It is important to consider the polypharmcology and any drug–drug interactions that may result. Considerable residual analgesia in the postoperative period is to be expected.

There are relatively few absolute contraindications for using a regional technique; in most cases, the benefits far outweigh the risks. Local infection at the site of injection and patient refusal are 2 major contraindications. The presence of a coagulopathy that is severe enough to cause development of an epidural hematoma may also contraindicate a peripheral nerve block if a transarterial technique is to be employed. The expertise of the operator, the site and duration of surgery, and the presence of anatomical variations that would make the block technically difficult are factors that must also be considered. Systemic toxicity of injected local anesthetics presents a very real concern, especially when an unintentional overdose could result in the loss of consciousness and subsequent loss of the airway. A concern about systemic toxicity was the primary disadvantage of using a regional technique in this case study patient.

If a patient receives a toxic level of local anesthetic, either through inadvertent arterial or venous injection or through systemic absorption, the resulting seizure is not difficult to handle; in this situation, however, it may not be possible to urgently secure the airway. Should the need arise for immediate airway support, the task of securing the airway—which even under controlled conditions can be difficult—may become next to impossible.

When the decision has been made to employ a regional technique, the question then becomes whether to choose a peripheral or neuraxial block. Anesthesia and analgesia that are adequate for surgery may be obtained with either a peripheral nerve block or a spinal or epidural anesthetic. In this case, the advantages of a peripheral nerve block outweigh the disadvantages of a neuraxial block. By choosing a peripheral nerve block over a spinal or epidural technique, the patient will benefit from prolonged residual analgesia and more hemodynamic stability, in addition to avoiding the problems of urinary retention, delayed ambulation, and potential postdural puncture headache. If the peripheral block should fail, an attempt can be made to provide anesthesia via a neuraxial technique, as long as the procedure is not under way and positioning is not a problem.

The advantages of general anesthesia include definitive control of the airway before the start of the procedure. In a case such as the one presented, if the patient or anesthesiologist had decided that regional anesthesia was not an option, the decision then has to be made regarding methods for securing the airway. A fiber-optic intubation in an awake patient has the advantage of maintaining airway reflexes until the airway has been secured. With adequate patient preparation, this procedure can be performed with minimal patient discomfort, but again, patient cooperation is essential. The GlideScope video laryngoscope (Saturn BioMedical Systems, see Lesson 237 page 38)

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<td>3% 2-Chloroprocaine (+ HCO3−)</td>
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<td>3% 2-Chloroprocaine (+ HCO3− + epinephrine)</td>
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HCO3−: bicarbonate ion

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Inc; Burnaby, British Columbia) can be used to introduce the endotracheal tube under direct vision, but may require the prior induction of anesthesia.

When the anesthesiologist makes the decision to proceed with general anesthesia, the potential hazards of securing a difficult airway in an emergency situation are avoided. The task of securing the airway in the more controlled setting of general anesthesia should proceed according to institutional standards. The presence of emergency equipment is determined by the operator and current standards, keeping in mind the American Society of Anesthesiologists' difficult airway algorithm. It is reasonable to have an assortment of difficult airway tools available, including a fiberoptic bronchoscope, and standard and intubating laryngeal mask airways. As long as the patient is agreeable, there are very few disadvantages to general anesthesia. There does exist the potential for increased postoperative nausea and vomiting, and a longer recovery. Nausea and vomiting can also be caused by narcotics given adjunctively with a regional technique, but in the case presented we would avoid the use of narcotics as an adjunct because of the aforementioned problems with oversedation. Sore throat and possible dental injury are more likely to be associated with general anesthesia.

In the case presented, given the patient's refusal to undergo general anesthesia and the need for surgery, the decision was made to proceed with a regional block. For this procedure, a popliteal block with a femoral block supplement was chosen. Even with an obese patient it is possible to locate the femoral nerve block and perform the inguinal crease, as the saphenous nerve is the extension of the femoral nerve below the knee. For such a block, the patient is in the supine position with both legs extended. The femoral crease is located and the femoral artery palpated in the inguinal crease. The needle is inserted lateral to the femoral artery pulse. After proper preparation of the skin using aseptic technique, a 5-cm needle is inserted at the lateral border of the femoral artery and directed slightly cephalad through the skin wheal. Once the nerve is located—either through the use of a nerve stimulator or by stimulation technique—the needle is fixed in place and 10 mL of local anesthetic is injected. If the onset and duration of the block depends on the local anesthetic agent chosen (Table, page 37).

Potential complications associated with all peripheral nerve blocks include infection, local anesthetic toxicity, hematoma formation, inadvertent vascular puncture, and new onset extremity injury. Strict aseptic technique can avoid infection in most cases, and needles should not be placed through any skin that is obviously infected. Systemic absorption is slow from less vascular areas, such as the popliteal fossa; thus, although systemic toxicity is rare, the anesthesiologist should be aware that the possibility exists. The use of a stimulator to locate the nerve can usually avoid vascular puncture, hematoma formation, and nerve injury. To avoid postoperative injury of the insensitive extremity, carefully instruct the patient regarding proper protection of the limb.

Management of the Case

During the preanesthetic evaluation of the case presented, the expectations involving treatment were discussed with the patient. His wish was to avoid general anesthesia at all costs. After explaining the risks and benefits of doing the procedure under general anesthesia or with a regional technique, the decision was made to go ahead with a regional technique, specifically a peripheral nerve block.

Appropriate monitors were placed and supplemental oxygen administered. The patient was placed in the prone position and the popliteal fossa block was performed using the posterior approach. The sciatic nerve was located in the manner previously described, using a nerve stimulator. Once dorsiflexion of the foot was observed with stimulation at 0.36 mA, 20 mL of 1.5% mepivacaine and 20 mL of 0.5% bupivacaine were injected. The patient was then asked to turn into the supine position and a femoral block was performed at the level of the femoral crease using a nerve stimulator technique and observing quadriceps twitches. A solid regional block was established. The patient was able to tolerate the procedure without the requirement of supplemental analgesia or sedation; he was discharged from the PACU after 1 hour.

Summary

The patient with the potentially difficult airway and multiple medical problems presents the anesthesiologist with a number of issues to consider when developing the anesthetic plan. When the patient requests regional anesthesia, the decision to proceed with an unsecured airway must be made with adequate anesthetic at the every variable. Patient factors such as size and comorbid conditions, access to the patient, type of surgery, and the potential need for supplemental analgesia or sedation must be taken into account. Patient safety must remain the No. 1 priority, and the benefit of using a technique must outweigh the risk of losing the airway intraoperatively. Since every patient is unique, the anesthesiologist's experience and comfort level with a given technique is the determining factor when making the final decision.
Lesson 237: Post-test
Select the single-letter response that most correctly answers the question or completes the sentence.

1. A patient is considered to be morbidly obese if his or her weight is more than ____ % above ideal body weight.
   a. 20
   b. 50
   c. 75
   d. 99

2. The presence of obstructive sleep apnea suggests that:
   a. the patient is morbidly obese
   b. ventilation may be difficult
   c. all depressants must be avoided
   d. general anesthesia is contraindicated

3. Which of the following statements is true regarding a patient being treated for gastroesophageal reflux disease (GERD)?
   a. The patient does not require a rapid sequence induction of anesthesia.
   b. The patient should receive aspiration prophylaxis.
   c. The patient is not at greater risk of aspiration.
   d. The patient should be free of GERD symptoms prior to surgery.

4. The best information for determining the efficacy of a particular treatment for a patient’s asthma comes from:
   a. the patient’s medical history
   b. physical examination findings
   c. spirometry testing
   d. blood theophylline levels

5. Conversion from a regional technique to a general anesthetic during a case may result from:
   a. an inadequate regional block
   b. loss of the airway
   c. an acute episode of psychosis
   d. all of the above

6. The popliteal block can be performed:
   a. with the patient in the lithotomy position
   b. while the patient is in the prone position
   c. with the patient in the supine position
   d. all of the above

7. Supplementation of the popliteal block by injecting local anesthetic around the saphenous branch of the femoral nerve is needed to block sensation from:
   a. the plantar surface of the foot
   b. the posterior calf
   c. a small patch of skin overlying the Achilles tendon
   d. none of the above

8. Absolute contraindications to the use of regional anesthesia include all of the following except:
   a. patient refusal
   b. local infection at the site of injection
   c. the presence of obstructive sleep apnea
   d. severe coagulopathy

9. General anesthesia must be avoided in the morbidly obese patient when he or she:
   a. has a difficult airway
   b. has obstructive sleep apnea
   c. refuses
   d. has GERD

10. The benefits of providing anesthesia using a peripheral nerve block include all of the following except:
    a. the occurrence of residual analgesia during the postoperative period
    b. no need to support or maintain the airway
    c. a potentially shorter stay in the postanesthesia care unit
    d. the avoidance of general anesthesia

I certify that I completed this CME activity; the actual time I spent on this activity was:

____ HOURS _______ MINUTES

SIGNATURE