**Update on Ambulatory Anesthesia**

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**Perioperative period:** traditionally, anesthesiologists focus on operating room and postanesthesia care unit (PACU), with goal of minimizing postoperative nausea and vomiting (PONV) and pain; role of anesthesiologist now expanded beyond immediate recovery period to include time to first swallow after discharge from PACU.

Postdischarge pain: Scandinavian study found patients have significant pain 4 wk after ambulatory surgery; persistent postoperative pain associated with presence of preoperative pain; continued opiate use (not associated with preoperative pain) at 4 wk postsurgery results from development of neuropathic pain syndrome; risk factors for chronic pain include breast surgery (incidence 20%-30%) and inguinal hernia repair (incidence 10%); not preventable by intraoperative opioids or neural blockade.

Postdischarge nausea and vomiting: experienced by 20% to 50% of patients, often in those with no nausea and vomiting in PACU; antiemetic should be added to discharge medications; palonosetron long-acting 5-hydroxytryptamine type 3 (5-HT3) receptor agonist; intravenous (IV) agent with 72 hr duration; aprepitant (Emend) neurokinin-1 receptor antagonist; postoperative dose 40 mg orally; scopolamine patch or oral ondansetron may be sufficient treatment.

**Sevoflurane vs desflurane:** most clinicians have preference for one over the other; kinetic profile of desflurane (lower solubility) provides theoretic advantages over sevoflurane; studies show slightly faster emergence and awakening with desflurane, but no difference in time to discharge from PACU or to home.

Cognitive dysfunction: study in United Kingdom evaluated elderly patients undergoing ambulatory procedures with either desflurane or sevoflurane, with infusion of remifentanil; time to eye opening and extubation shorter in desflurane group but no difference seen between groups in rate of postoperative cognitive dysfunction; dysfunction still evident in some patients 66 to 72 hr later; higher ratings of sense of well-being reported in desflurane group.

Postoperative swelling: better with desflurane than with isoflurane; may have implications for airway reflexes; McKay (2010)—studied effect with increasing body mass index (BMI); found time to emergence shorter with desflurane for all patients; time to first swallow increased with increasing BMI, but all BMI groups showed shorter time to first swallow with desflurane than with sevoflurane.

**Dexamethasone:** data show decreased PONV, pain, and fatigue at 6, 12, and 24 hr after laparoscopic cholecystectomy with 8-mg dose; quality of recovery score (QoR-40)—quantifies recovery in 5 domains (physical comfort, emotional state, physical independence, psychologic support, and pain), with potential scores 40 to 200; in study, dexamethasone group reported less PONV, pain with movement, and treatment for pain; QoR-40 scores in dexamethasone group showed significantly higher scores in domains of emotional state, physical comfort, and pain; dose-range studies indicate 0.1 mg/kg as key dose; meta-analysis indicates decreased opioid consumption with mid-range dosing; no studies available addressing wound healing, blood glucose, and effect on development of neuropathic pain.

**Ketorolac:** improves postoperative analgesia, with decreased opioid consumption and reduction of PONV; 30-mg dose effective for treatment of pain, but 60-mg dose required for prevention of postoperative pain; intramuscular route of administration appears more efficacious than IV route.

**Dexmedetomidine:** specific and selective α2-adrenergic receptor agonist with sedative, anesthetic, and anxiolytic properties; causes minimal respiratory depression; intranasal delivery well tolerated, with ≥38 min to peak availability; useful for preoperative sedation of pediatric patients (dose 1 μg/kg 4560 min preinduction; associated with decrease in systolic blood pressure; may require additional monitoring of patient).

**Video laryngoscopy** (eg, Airway Scope, GlideScope, Intubrite): study of morbidly obese patients showed faster intubation with direct laryngoscopy but better view of glottis with GlideScope; data also indicate decreased incidence of sore throat with video laryngoscopy.

**Postoperative sore throat:** area of increased focus in ambulatory anesthesia; decreased in children 3 to 16 yr of age with use of cuffed endotracheal tubes (ETT; possibly related to larger diameter of noncuffed tubes); cuff pressure directly correlated with incidence of sore throat, with 100% incidence at pressures ≥40 cm H2O; filling cuff to pressure without leak not recommended (manometer required); laryngeal mask airway (LMA)—sore throat in pediatric patients directly related to cuff pressure; incidence increased with polyvinyl chloride product (eg, Unique LMA) vs traditional LMA; adult patients showed less sore throat, dysphagia, and dysphonia with lower LMA cuff pressures; use of manometry recommended with LMA (as well as...
ETT) to prevent sore throat; prevention of sore throat—use of lidocaine shows mixed results (most helpful when sprayed directly on vocal cords 10 min before airway instrumentation); data show steroid cream on ETT decreases sore throat at 1 hr and 24 hr; other studies show sulfathiazole (Streptosil) tablets, nebulized steroids, and benzydamine (sprayed on cuff) all effective; licorice gargle for 30 sec, 5 min before induction, results in significant reduction in postoperative sore throat

**Advances in regional anesthesia:** transversus abdominis plane (TAP) block—popular for surgery involving abdominal wall or gynecologic procedures; nerves run between transversus abdominis and internal oblique muscles across abdominal wall; ultrasonographically guided techniques allow precise placement of local anesthetic into plane; data demonstrate improved QoR-40 scores, with decreased pain and opioid consumption in patients receiving blockade; no difference seen in pain scores at 3 and 6 mo postoperatively; paravertebral block—local anesthetic injected in vicinity of thoracic spinal nerves, with resultant ipsilateral somatic and sympathetic nerve blockade; varying levels effective for breast, shoulder, abdominal, groin, or gynecologic surgery; improved recovery scores reported for pain, opioid consumption, and PONV after breast surgery

**Anesthetic Implications of Obstructive Sleep Apnea**

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**Obstructive sleep apnea (OSA):** increasingly common diagnosis; unclear if incidence increased or recognition improved; data show increased perioperative morbidity and mortality in patients diagnosed with OSA; 4% of men and 2% of women estimated to have clinically significant OSA, with majority undiagnosed; often first recognized in perioperative environment

Definitions: sleep apnea—cessation of breathing for ≥10 sec despite ongoing ventilatory efforts; hypopnea—50% decrease in airflow with intact respiratory effort, usually associated with decreased oxygen saturation; apnea-hypopnea index—number of events per hour, with higher numbers indicative of more severe OSA (<20 mild OSA; >40 severe OSA; can happen hundreds of times nightly)

**Pathophysiology of OSA:** descending inhibition during rapid eye movement (REM) sleep causes deep muscle relaxation and loss of airway tone; pharyngeal walls collapse from negative pressures generated by respiratory efforts; contributing factors include obesity (not present in all OSA patients), large neck circumference, and anatomic abnormalities; cyclic evolution—obstructed airway blocks ventilation and oxygenation despite continued respiratory effort; hypoxemia and hypercarbia occur and lead to arousal; patient wakes and gasps for breath; restored muscle tone allows hyperventilation and resolution of hypercarbia; patient falls asleep and airway again obstructs, with cycle repeating multiple times nightly; sequelae—sleepiness; systemic hypertension; pulmonary hypertension (due to recurrent hypoxia); predisposition to arrhythmias (particularly, atrial fibrillation); myocardial ischemia (in patients with coronary artery disease); exacerbation of congestive heart failure (CHF); often asymptomatic and may go undiagnosed if patients do not complain of sleepiness; Pickwickian syndrome (obesity hypoventilation syndrome)—condition in obese people in whom hypoventilation (OSA) causes retained CO₂ at baseline

**Anesthesia and OSA:** anesthesia drugs reduce upper airway muscle tone and blunt response to hypercarbia and hypoxia; sedation reduces self-arousal and breathing; perioperative disruptions in sleep patterns result in REM rebound (intense REM sleep); American Society of Anesthesiologists (ASA) task force developed practice guidelines for assessment of patients with OSA; criteria include patients with clinical signs and symptoms, historical features, and excessive sleepiness; positive response in 2 categories indicates presumptive OSA; history and physical with discussion of symptoms and sleep habits important

Screening tools: Berlin Questionnaire—classic research questionnaire; time consuming; STOP mnemonic—snoring, daytime tiredness, observed apnea, and elevated blood pressure; STOP-Bang mnemonic—adds BMI >35, age >50 yr, neck circumference >40 cm, and male gender; all tools equally sensitive and specific (~80%), with STOP-Bang slightly more effective

Polysonmography: gold standard for diagnosis; monitors electroencephalography, eye movement, muscle tone of jaw, air flow, respiratory effort, pulse oximetry, and vital signs; promising home kits in development

**Ambulatory surgery for patients with OSA:** controversial; ASA risk stratification score—adds severity of OSA, invasiveness of surgery, and predicted opioid requirement to obtain point score (4 points shows increased risk; >4 points significantly increases risk); patient with >5 points warrants discussion with surgical colleagues (possibly not surgical candidate)

Preoperative management: refer patients with suspected OSA for sleep study and optimization, if time permits, or treat presumptively; treatment focuses on maintaining open airway with continuous positive airway pressure (CPAP) to counteract negative inspiratory pressure; use of CPAP associated with improvements in well-being, cognitive function, hypertension, and symptoms of CHF in nonsurgical population; American College of Chest Physicians recommends CPAP for patients with apnea-hypopnea index ≥20 or active symptoms; other nonsurgical treatments—oral appliances to shift mandible forward and open airway (less effective than CPAP); surgical treatment—oral appliances to shift mandible forward and open airway (less effective than CPAP); surgical treatment—oral appliances to shift mandible forward and open airway (less effective than CPAP);

Intraoperative management: invasiveness of procedure more important than choice of anesthetic agent; ASA recommendations—“common sense”, local or regional anesthesia, when possible; minimize sedation and opioids; monitor end-tidal CO₂ during sedation; consider use of CPAP; general anesthesia (GA) with secure airway often preferred over deep sedation for more invasive procedures; difficult intubation—incidence high among patients with severe OSA, high Mallampati score, and/or large neck circumference; awake intubation with well-anesthetized airway and minimal sedation often prudent; dexmedetomidine helpful due to low potential for respiratory suppression; have emergency airway equipment available; proper positioning with elevation of head helps to open airway; short-acting and adjunctive agents (eg, nonsteroidal anti-inflammatory drugs, acetaminophen, regional blockade or infiltration with local anesthetic, steroids, ketamine, dexmedetomidine) beneficial; emergence—most dangerous period (requires full attention of clinician); beware of residual neural blockade and use reversal agents; extubate when patient fully awake and strong (counseling of patients to expect recall of extubation helpful); maintain elevation of head
Postoperative management: complications in PACU (e.g., obstruction of airway with desaturation, need for reintubation, increased hypertension and arrhythmias, unanticipated admission, sudden death) more likely in patients with OSA; maintain positioning with elevation of head, administer O₂ (be mindful of potential to mask hypoxoventilation), and continue (or add) CPAP: ASA guidelines recommend 3 hr of observation (7 hr if obstruction or hypoxemia occurs on room air); following these guidelines may necessitate admission (not considered failure when done to ensure patient safety); guidelines for postoperative monitoring after such admissions or after inpatient procedures not established.

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Suggested Reading

1. Which of the following statements about postdischarge pain is true?
   (A) It is often a complaint of narcotic-seeking patients
   (B) It is fully resolved by day 14 in the majority of patients
   (C) It is not preventable by giving intraoperative opioids or neural blockade
   (D) Orthopedic surgery is a major risk factor

2. Which statement about postdischarge nausea and vomiting is incorrect?
   (A) Patients often have no symptoms of nausea or vomiting in the postanesthesia care unit (PACU)
   (B) Antiemetic medications may mask other symptoms and should not be prescribed
   (C) Palonsetron is a long-lasting intravenous drug that can be administered in the PACU before discharge
   (D) Oral ondansetron can be prescribed with other discharge medications

3. Which of the following is an advantage of desflurane over sevoflurane?
   (A) Less time to discharge from PACU
   (B) Less time to discharge home
   (C) Less postoperative cognitive dysfunction
   (D) Patients report a greater sense of well-being

4. Choose the correct dose of ketorolac for the prevention of postoperative pain.
   (A) 15 mg
   (B) 30 mg
   (C) 60 mg
   (D) None of the above (ketorolac does not prevent postoperative pain)

5. Which of the following is directly correlated with postoperative sore throat?
   (A) Age
   (B) Weight
   (C) Cuff pressure
   (D) Mallampati score

6. The majority of patients with obstructive sleep apnea (OSA) are under treatment and optimized when presenting for surgery.
   (A) True
   (B) False

7. All the following are contributing factors to OSA, except:
   (A) Obesity
   (B) Large neck circumference
   (C) Increased thyromental distance
   (D) Anatomic abnormalities

8. Which of the following is not a screening tool for OSA?
   (A) Berlin Questionnaire
   (B) STOP test
   (C) STOP-BANG test
   (D) St. George’s Respiratory Questionnaire

9. General anesthesia should be avoided in patients with OSA, when possible.
   (A) True
   (B) False

10. Which of the following postoperative complications is not increased in patients with OSA?
    (A) Postoperative nausea and vomiting
    (B) Reintubation
    (C) Hypertension
    (D) Arrhythmias

Answers to Audio-Digest Anesthesiology Volume 55, Issue 07: 1-B, 2-C, 3-A, 4-C, 5-A, 6-D, 7-A, 8-B, 9-D, 10-D