

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CNS	CNS malformations Ventriculomegaly Hydrocephaly Elevated intracranial pressure Thermoregulatory disorders Cognitive delay	Developmental delay, nausea/vomiting, headache	Papilledema	CT/MRI
HEENT	Craniosynostosis, midface hypoplasia, nasopharyngeal, and palatal anomalies	Dyspnea Difficulty phonating	Early fusion of cranial sutures Hypertelorism Cleft or V-shaped palate	Radiologic studies
CV	Atrial septal defect/ventricular septal defect Patent foramen ovale Overriding aorta	Dyspnea Lethargy	Heart murmur	ECHO
RESP	Central/obstructive sleep apnea Aspiration Bronchospasm Increased airway secretions	Daytime somnolence Snoring Witnessed apnea Coughing Wheezing	Wheezing Course breath sounds Increased oral secretions	Sleep study
MS	Cervical spine abnormalities (usually fusion at C5-C6) Syndactyly	Limb abnormalities	Decreased cervical ROM	Radiographic studies

Key References: Niraj K, Shubhangi A, Ashish B, et al.: Anesthetic management of craniosynostosis repair in patient with Apert syndrome, *Saudi J Anaesth* 8(3):399-401, 2014; Losee JE, Gimbel ML, Rubin J, Plastic and reconstructive surgery. In Brunnicardi F, Andersen DK, Billiar TR, editors: *Schwartz's principles of surgery*, ed 10, New York, 2014, McGraw-Hill.

Perioperative Management

Preoperative Consideration

- Review imaging to assess for increased ICP and cardiac and airway anomalies.
- Preoperative warming measures.
- Minimize risk of bronchospasm; consider antisialagogue and beta-2 agonist.
- Anticipate difficult IV scenario.
- Discuss with surgical team the risk for admission, especially with a history of sleep apnea.

Monitoring

- Standard ASA monitors
- Arterial line if indicated
- Core temperature when possible

General Anesthesia

- Maintain normothermia.
- Multimodal approach to pain management to minimize opiates.
- Consider intermittent gentle suctioning through ETT to prevent mucus plugs.

Regional Anesthesia

- Due to anatomic anomalies with bone and soft tissues, consider performing all regional techniques under ultrasound.
- Exercise caution with regional techniques known to interrupt innervation of the diaphragm or cough reflexes.

Postoperative Period

- Anticipate prolonged postop ventilation.

- Exercise caution with sedating medications for pain control.
- Monitor and treat for bronchospasm or laryngospasm in PACU.

Anticipated Problems/Concerns

- Anticipate prolonged monitoring or hospitalization for pts with history of sleep apnea.
- Anticipate bronchospasm, especially during periods of light of anesthesia.
- Suction airway and ETT judiciously before extubation and weigh risk/benefit of deep extubation.

Apnea of the Newborn

Shanique Brown Kilgallon | Alan Jay Schwartz

Risk

- Full-term infants with an underlying pathology (i.e., neurologic disorders, metabolic derangements)
- Premature infants, with or without an underlying pathology
- Infants less than 60 wk post conceptual age
- Underweight infants <1000 g
- Anemia

Perioperative Risks

- More prone to apnea during local or neuraxial anesthesia or when additionally administered IV sedative
- More prone to apnea after general anesthesia

Worry About

- Unexpected apnea in recovery room

- Unexpected apnea in hours after outpatient procedures
- Unexpected apnea on ward hours after inpatient procedures

Overview

- Apnea is defined as pauses that last >20 sec without physiologic derangement or that last >10 sec with physiologic derangement (i.e., bradycardia, oxygen desaturation).
- Apnea in term infants is never physiologic.
- Apnea in preterm infants may signal CNS disorder or developmental immaturity.
- Sudden onset of apnea in any infant may also reflect a new-onset sepsis or hypoglycemia.
- Utility of pneumogram screening controversial.
- Indications for home apnea monitoring controversial.

Etiology

- Term or preterm infants:
 - CNS disorders (seizures, bleeds, and structural changes)
 - Systemic disorders (hypoglycemia, sepsis, and GE reflux)
- Preterm infants:
 - Same as term infants
 - If full evaluation is negative, physiologic apnea of prematurity diagnosed

Usual Treatment

- Theophylline or caffeine
- O₂
- Transfusion
- CPAP

Assessment Points				
System	Effect	Assessment By Hx	PE	Test
CV	Congenital heart disease leads to desaturation PDA may cause CHF	CHD, PGE ₁ treatment	Murmur; cyanosis	ECHO
RESP	Children with bronchopulmonary dysplasia may be prone to apnea	Hx of hyaline membrane disease or other parenchymal lung disorder	Abnormal pulm compliance or O ₂ requirement	CXR, ABGs, O ₂ sat
GI	GE reflux may cause vagal overload	Hx of reflux	None obvious	pH study, barium swallow
CNS	Seizures may cause apnea; structural abnormalities may create ineffective respiratory drive	Hx of seizures or change in neurologic development	Exam for seizures or neurologic change	EEG, head US, CT, MRI

Key References: Henderson-Smart DJ, Steer P: Postoperative caffeine for preventing apnea in preterm infants, *Cochrane Database Syst Rev* (2):CD000048, 2000; Balain M, Oddie S: Management of apnoea and bradycardia in the newborn, *Paediatr Child Health* 24(1):17–22, 2014.

Perioperative Implications

Monitoring

- Routine

Airway

- Not usually a problem; obstructive apnea may occur but is rare.
- Bronchospasm may occur in infants with bronchopulmonary dysplasia.

Maintenance

- Usually no problem during procedure; vigilance required postop

Extubation

- Watch for intermittent inadequate respiratory effort for hours.

Adjuvants

- No special concerns

Anticipated Problems/Concerns

- Consider scheduling elective procedures after 60 wk post conceptual age.
- Periop not complex; vigilance regarding care and assessment in postop period.

Appendicitis, Acute

Gaurav Malhotra

Risk

- One of most common abdominal emergencies
- Possible at any age but most common during an individual's teens and 20s
- 11 in 10,000 individuals will experience appendicitis
- M:F ratio 1.4:1
- Most common reason for nonobstetric surgery during pregnancy; Occurs in 1 out of every 800 to 1500 pregnancies; slightly more common during second trimester; incidence of perforation highest during third trimester (70%)

Perioperative Risks

- Risk of intraabdominal perforation or abscess; risk increases with delay in diagnosis and treatment.
- Ileus.
- Sepsis.
- Fecal fistula.
- Mortality is 2-3% for perforated versus 0.1% for non-perforated appendicitis.
- Mortality for perforated appendicitis higher in elderly and pregnant pts.
- In pregnant pts, fetal mortality of approximately 35% for perforated appendicitis compared with 1.5-3% for uncomplicated appendicitis.

Worry About

- Airway and aspiration risk because pt may have full stomach with symptomatic nausea and vomiting
- Tachycardia due to pain, dehydration, or sepsis
- Hypotension due to dehydration or sepsis (poor PO intake, vomiting, diarrhea, or intra-abdominal abscess)
- Preop IV antibiotics
- Appendicitis in pregnancy
 - Possible delay in diagnosis due to atypical symptoms, as well as hesitation in performing imaging and diagnostic studies out of concern for the fetus
 - Awareness of anatomic and physiologic changes of the parturient
 - Avoidance of teratogenic agents and risk factors for intrauterine fetal asphyxia

Overview

- One of the most common abdominal emergencies in children, adults, and pregnant women.
- Increased risk of perforation if diagnosis delayed over 24 h.
- Increased morbidity/mortality with perforation.

- Pts may present with right-lower-quadrant or diffuse abdominal pain, nausea and vomiting, diarrhea, anorexia, malaise, fever, or mild leukocytosis.

Etiology

- Primarily due to appendiceal obstruction (80%); obstruction most commonly due to fecaliths, hyperplasia of lymphoid follicles (commonly in pediatric pts), stones, or tumors.
- Obstruction of the appendix causes increased intraluminal pressure, which leads to thrombosis and occlusion of blood vessels and lymphatics supplying it: this causes organ inflammation and ischemia, which can further progress to perforation, intraabdominal abscess, and peritonitis.
- Appendiceal inflammation leads to bacterial proliferation, most commonly anaerobic and gram-negative organisms.

Usual Treatment

- Appendectomy is standard of care. Pt should be taken to OR as soon as possible to avoid perforation or disease progression.
- Periop antibiotics may need to be continued postop, especially in cases of perforation.
- Laparoscopic or open appendectomy performed.

Assessment Points				
System	Effect	Assessment by Hx	PE	Test
CV	Tachycardia; hypotension	Vomiting; signs of dehydration	Vital signs; orthostatic signs	BP and HR ECG as indicated by H&P
RESP	V/Q mismatch	Dyspnea; tachypnea	Splinting due to abdominal pain, diminished breath sounds	Pulse oximetry and RR, increased A-a gradient
GI	Ileus, perforation, abscess	Abdominal pain, vomiting, diarrhea	McBurney point tenderness, abdominal guarding Peritoneal irritation: rebound tenderness; Rovsing and psoas signs	Abdominal x-ray, CT, US, barium enema WBC count
RENAL	Dehydration, electrolyte disturbances	Oliguria	Vitals signs; orthostatic signs	UA, BUN, creatinine

Key References: Backius M, McGrath B, Monk J, et al.: Changing epidemiology of acute appendicitis in the United States: study period 1993–2008, *J Surg Res* 175(2):185–190, 2012; Gadalla F: Appendectomy for a pregnant patient. In Yao F, Malhotra V, Fontes ML: *Yao and Artusio's anesthesiology: Problem-oriented patient management*, ed 7, Philadelphia, 2012, Lippincott Williams & Wilkins, pp 778–792.