Perioperative Implications

Preoperative Preparation

- Assess and correct volume status, hypocalcemia, hyperglycemia, and acidosis.
- For a pt with CP and intractable pain, determine current pain regimen. Consider thoracic epidural for postop pain.

Monitoring

- Consider bladder catheter to monitor urinary output.
- Consider arterial cath if there is need for blood draws or hypovolemia
- Consider CVP or PA cath for monitoring of volume status

Airway

- Routine management

Induction

- Peritoneal irritation frequently leads to ileus and increased risk of aspiration.
- Anticipate hypovolemia.

Maintenance

- CV instability due to massive sequestration of fluid; depending on severity, >10 L of isotonic fluid may be required over 24 h.

Extubation

- Will likely require postop mechanical ventilation

Adjuvants

- Multiple possible interactions of protein-bound drugs, especially if the pt is malnourished or undergoing alcohol withdrawal

Anticipated Problems/Concerns

- Pts with AP presenting for abdominal surgery are typically critically ill and require intensive care postop to manage hypovolemia, ARDS, DIC, acute renal failure, and sepsis.
- Hypoglycemia and hyperglycemia are life-threatening risks after pancreatectomy.
- Alcohol withdrawal can be life-threatening.

Papillomatosis

Christina Iliadis | Lee A. Fleisher

Risk

- Incidence of recurrent respiratory papillomatosis (RRP) in USA estimated at 4.3:100,000 among children and 1.8:100,000 among adults.
- Vertical transmission during delivery is believed to be the major mode of transmission for juvenile-onset recurrent respiratory papillomatosis (JORRP).
- Case reports show malignant transformation of RRP to squamous cell carcinoma.
- Children diagnosed with JORRP at <3 y of age tend to have more aggressive disease.
- Adult-onset recurrent respiratory papillomatosis (AORRP) typically presents in the fourth decade of life.

Perioperative Risks

- Mask ventilation or intubation difficult due to obstruction from papilloma.
- Increased risk of complete obstruction during induction or with muscle paralysis.
- Upper airway obstruction from laryngeal papillomatosis associated with pulm Htn.

Worry About

- Laryngeal papilloma prolapse causing complete airway obstruction; unable to ventilate or intubate, leading to hypoxia and cardiac arrest
- Airway fire from CO_2 laser therapy during surgical resection

Overview

- The term papillomatosis describes multiple papillomas, or benign epithelial tumors found on the epidermis and mucous membranes.
- RRP can be further classified into adult onset (>18 y of age) or juvenile onset (age <10 y).
- Papillomas are caused by HPV.
- The hope with HPV vaccine is to prevent transmission of the virus to neonates, reducing the incidence of RRP and oropharyngeal cancers associated with HPV.
- Can have highly recurrent nature in children (HPV-11), requiring repeated exposure to anesthesia and surgical treatment
- Laryngeal papillomas may be found on vocal cords, epiglottis, pharynx, or trachea.

Etiology

- Most commonly caused by human papillomaviruses 6 and 11, rarely HPV-16 or HPV-18

Usual Treatment

- No current cure.
- Surgical debulking is the standard treatment, usually requiring multiple procedures.
- CO_2 laser is frequently used. (Laser plumes can contain viral particles.)
- Adjuvant therapy includes cidofovir injections; interferon therapy (topical versus IV).
- Prevention/treatment of gastroesophageal reflux may improve control of RRP.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Vocal cord dysfunction Obstruction of airway	Dysphonia, stridor Hoarseness	Stridor with no change with position RR, cyanosis, increased respiratory effort	Exam with flexible fiberoptic nasopharyngoscope Endoscopy, biopsy
RESP	Tachypnea, cyanosis if impending respiratory failure, extralaryngeal spread can present as lung nodules, pneumonia, bronchiectasis	Declining pulmonary status	Decreased BS, use of accessory muscles	CXR or CT may provide additional info
GI	Malnutrition, dysphagia	Failure to thrive, feeding difficulties	Malnutrition, dehydration	
CV	Pulm Htn, RV failure		Peripheral edema, hepatomegaly	ECG, ECHO
MS/DERM	Cutaneous lesions	Could have widespread manifestation in immunocompromised host	Warty growths	Biopsy

Key References: Li SQ, Chen JL, Fu HB, et al.: Airway management in pediatric patients undergoing suspension laryngoscopic surgery for severe laryngeal obstruction caused by papillomatosis, *Paediatr Anaesth* 20(12):1084–1091, 2010; Taliercio S, Cespedes M, Born H, et al.: Adult-onset recurrent respiratory papillomatosis: a review of disease pathogenesis and implications for patient counseling, *J Am Med Assoc Otolaryngol Head Neck Surg* 141(1):78–83, 2015.

Perioperative Implications

Perioperative Preparation

- Important to coordinate care between ENT and anesthesia.
- Perform thorough preop airway evaluation with a flexible fiberoptic nasopharyngoscope to determine severity of airway obstruction.
- Have advanced airway equipment available.
- Consider anticholinergic meds to decrease secretions and prevent bradycardia from hypoxia.
- Caution with premedication if pt hoarse or has stridor with concern for worsening airway obstruction.
- Minimize risk of gastric content aspiration: H_2 blockers, promotility agents

Monitoring

- Standard monitoring

Airway

- Have ET tubes of several sizes (generally smaller for age) on hand in case a papilloma is obstructing glottic opening.
- Prepare for tracheotomy.
- Spontaneous ventilation is preferred to avoid having to deliver positive pressure when pt is apneic; also provides increased visualization for surgeons.
- Flexible fiberoptic to visualize airway
- Other anesthetic airway techniques include jet ventilation and apneic ventilation techniques; however, there is a risk for hypoxia and hypercarbia.
- Exercise caution with paralytic agents; ensure ability to ventilate via facemask before using.

Induction

- Maintain spontaneous ventilation when possible.
- Mask induction or IV induction with propofol, lidocaine atomizer to help prevent laryngospasm.
- Be prepared for cricothyrotomy or tracheotomy if obstruction occurs.

Maintenance
- Maintain anesthesia with propofol, short-acting opioids, and/or volatile inhalational agents depending on technique used.
- Avoid paralytic agents if possible.
- Pt is usually placed in microlaryngeal suspension for surgical procedures.

Extubation
- Use caution and assess for bleeding or edema.
- Suction thoroughly and extubate awake to prevent aspiration and laryngospasm.
- At the end of procedure, ET tube is usually placed while the pt is given time to wake up from anesthesia.

Adjuvants
- Consider dexamethasone for swelling of airway mucosa from repeated intubations or resections.

Postoperative Period
- Some pts will require humidified oxygen or nebulized racemic epinephrine if stridor occurs in PACU.
- Monitor SpO_2 for desaturation; some pts may require reintubation.

Anticipated Problems/Concerns
- When using CO_2 laser therapy, must use laser-safe ETT to prevent ignition from laser.
- Use of jet ventilation is common for ENT procedures. Concern for dissemination of HPV particles into distal airway and barotrauma from jet ventilator.
- Important to debulk as much pathology as possible while preserving normal tissue to prevent scarring and airway stenosis over time with repeated surgical therapy.

Parkinson Disease (Paralysis Agitans)

Stacie Deiner | Jess Brallier

Risk
- Advanced age
- 1% of population >65 y
- No difference in distribution by gender

Perioperative Risks
- Hemodynamic instability, hypotension, arrhythmias
- Aspiration and upper airway obstruction from poor coordination of upper airway muscles
- Laryngospasm
- Postop confusion and hallucinations

Worry About
- Exacerbation of PD symptoms triggered by dopamine antagonists such as metoclopramide; also phenothiazines, butyrophenones
- Potential drug interactions: MAOIs; meperidine

Overview
- Pathophysiology: Symptoms result from the loss of dopaminergic cells in the pars compacta region of the substantia nigra reticulata. This loss upsets the normal balance between dopaminergic inhibition and cholinergic excitation.
- At least two of the following clinical manifestations are required for the diagnosis of PD: postural instability, bradykinesia, resting tremor, and rigidity. Other common features include depression, anxiety, sensory abnormalities, anosmia, autonomic dysfunction, cognitive impairment, and sleep disturbances.

Etiology
- Etiology unknown; possible genetic predisposition; possible neurotoxin involvement.

Usual Treatment
- Pharmacologic: The goal of current medical therapies is to maintain motor function and quality of life by restoring the dopaminergic/cholinergic balance in the striatum and blocking the effect of Ach.
  - Dopamine precursors
    - l-Dopa (a prodrug converted to dopamine in the brain): Mainstay of therapy, ameliorates all major clinical features of parkinsonism. Often helpful for hyperkinesias. Levodopa treatment is characterized by "on" periods of symptom amelioration and possible dyskinesias followed by "off" periods with decreasing therapeutic levels of dopamine and return of symptoms.
    - Carbidopa: Inhibits dopa decarboxylase, the enzyme responsible for the conversion of levodopa to DA. Limits breakdown of levodopa outside the CNS and increases the effectiveness of levodopa while also minimizing side effects.
    - Sinemet: Combination of carbidopa/levodopa.
  - DAs: Less effective than levodopa in relieving signs/symptoms of PD but less likely to cause dyskinesia and the on-off phenomenon. These drugs include ergot alkaloids (bromocriptine, cabergoline, lisuride), and nonergot alkaloids (pramipexole, ropinirole, rotigotine).
  - Anticholinergics: Trihexyphenidyl benztropine—more helpful for tremor and rigidity; generally less effective than DA drugs.
  - Antivirals: Amantadine—given for mild parkinsonism. Used alone or in combination with anti-Ach. Unclear mechanism of action. Improves all clinical features of PD.
  - MAO-B inhibitors: Selegiline—inhibits breakdown of DA and enhances antiparkinsonian effect of levodopa. May reduce the on-off phenomenon.
  - COMT inhibitors: Entacapone and tolcapone—help sustain plasma levels of levodopa. Decreases the dose and response fluctuations due to carbidopa/levodopa (Sinemet).

Surgical
- Lesioning: Historically, surgical intervention was primarily limited to lesioning of deep brain structures. The idea was that permanent lesioning would remove stimuli due to abnormal CNS activity (thalamotomy, used to treat tremor; pallidotomy, used to treat levodopa-induced dyskinesia/antiparkinsonian effects).
- Although affording some clinical benefits, such operations were also shown to result in permanent side effects, such as paresis, confusion, quadrantanopsia, gait disturbances, dysarthria, and hypersalivation.
- Such surgeries were associated with high complication rates and no possibility of lowering anti-PD drugs. These procedures are rarely performed today, having been replaced by DBS.
- DBS: In the late 1980s it was discovered intraop that high-frequency electrical stimulation could produce the same functional effect as surgical lesioning. This introduced DBS as a primary treatment modality. DBS has revolutionized the treatment of PD.
- The CNS targets of DBS include the ventralis intermedius nucleus (VIM), the subthalamic nucleus (STN), and the globus pallidus (GPi). However, the effects of VIM DBS on the other symptoms of PD (akinesia, rigidity, bradykinesia, etc.) are short-lived or nonexistent. GPi or STN DBS is used to treat these other symptoms.

Assessment Points

System	Effect and Assessment by Hx and PE	Test
ANS	Difficulty with salivation, micturition, temperature regulation, GI function	
CNS	General muscle rigidity, akinesia, tremor, confusion, depression, hallucination, speech impairment	CT, MRI
RESP	Upper airway dysfunction: Retained secretions, atelectasis, respiratory infections, aspiration pneumonia (most common cause of death) Other complications: Postextubation laryngospasm, postop respiratory failure	CXR, CT lung
GI	Dysphagia, esophageal dysfunction, constipation, weight loss, sialorrhea	
ENDO	Abnormal glucose metabolism	Glucose metabolism

Key References: Deiner S, Hagen J: Parkinson's disease and deep brain stimulator placement, *Anesthesiol Clin* 27(3):391–415, 2009; Osborn IP, Kurtis SD, Alterman RL: Functional neurosurgery: anesthetic considerations, *Int Anesthesiol Clin* 53(1):39–52, 2015.

Perioperative Implications of Deep Brain Simulation Surgery

Preoperative Preparation
- A complete assessment of the extent of the pt's PD and other medical comorbidities should occur.
- A full explanation of what to expect with each step of the procedure is imperative and, when possible, should occur prior to the day(s) of surgery. DBS procedures are most often staged, with lead placement performed on one day and the generators placed on another.
- The pt's ability to cooperate should be assessed, and he or she should be mentally prepared to have part of the procedure performed while awake.
- Hold Parkinson medications on the morning of surgery.
- Avoid or limit medications that can affect the microelectrical recordings (MER) used to guide DBS lead placement or suppress PD tremor (i.e., benzodiazepines).