

dyscrasias, aplastic anemia, hemolytic anemia, hepatitis, pancreatitis, nephrotoxicity, hypersensitivity pneumonitis, and impaired folate absorption.

### Etiology

- Unknown.
- Genetics, exogenous factors, host factors, and specific environmental factors are all hypothesized to play a role.

### Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Hypovolemia		Tachycardia, hypotension, orthostatic vital signs, delayed capillary refill	BUN/Cr
HEME	Anemia, thrombocytosis	Passing fresh blood	Pallor	CBC
RENAL	Metabolic acidosis, electrolyte abn		Tachypnea, oliguria	Lytes, BUN/Cr, ABG
RESP	Restrictive pulm mechanics (if ankylosing spondylitis) Hypersensitivity pneumonitis from 5-ASA	SOB, DOE	Cyanosis, SpO <sub>2</sub>	CXR, PFTs
GI	Diarrhea, bowel obstruction/perforation Hepatic steatosis, PSC/cirrhosis	Diarrhea, no bowel movements	Abdominal pain only present with toxic colitis Hepatomegaly	Lytes Abdominal x-ray Abdominal CT

**Key References:** Kasper B, Fauci H, Longo J: *Harrison's principles of internal medicine*, ed 16, vol II. New York, NY, 2005, McGraw-Hill, pp 1776–1788; Yuksel I, Uflaz B, Erarslan E, et al.: Ulcerative colitis after anesthesia with desflurane and sevoflurane, *Inflamm Bowel Dis* 17(7):E76, 2011.

### Perioperative Implications

#### Preinduction/Induction/Maintenance

- Fluids, lytes, volume repletion
- Stress-dose steroids if needed
- Special attention to airway if ankylosing spondylitis
- Careful choice of anesthetics if hepatic or renal dysfunction
- Aggressive volume replacement

#### Monitoring

- Standard monitoring.
- Monitor urine output.
- Consider arterial line if there are lyte abnormalities.

### Usual Treatment

- Mild: Sulfasalazine or other 5-ASAs
- Moderate: 5-ASA + glucocorticoid oral and enema, electrolyte repletion, parenteral nutrition
- Severe: 5-ASA, glucocorticoid enema, glucocorticoid PO or IV

- Fulminant: Glucocorticoid IV, cyclosporine IV, azathioprine PO, 6-mercaptopurine PO; TNF-alpha inhibitors or "biologics": Infliximab IV, adalimumab IV, golimumab IV, vedolizumab IV.

- Consider CVP if hypovolemic or anticipating large fluid shifts.

#### General Anesthesia

- Consider renal function for opioid dosing.
- Consider renal and biliary function for NMB dosing.
- Monitor ventilator settings carefully in the presence of restrictive pulm mechanics or toxic megacolon.
- Beware of nitrous oxide owing to risk of perforation.

#### Regional Anesthesia

- Caution with local anesthetic esters; may decrease effects of sulfasalazine

### Postoperative Period

- Maintain normothermia for wound healing and coagulation.
- Early parenteral nutrition.

### Anticipated Problems/Concerns

- Complicated operations with adhesions, obstructions, perforation risk
- Large intraop fluid requirement
- Need for stress-dose steroids
- Correction of lyte abnormalities
- Risk of hemorrhage

## Upper Respiratory Infections

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### Risk

- Most adults will suffer 1 URI per year; this incidence jumps to approximately 6 episodes per year in the pediatric population. Approximately 95% of the infections have a viral etiology.
- URIs are generally self-limiting; however, airway hyperreactivity may persist for several wk.
- Adults are less likely to have URIs due to larger airways enabling them to compensate with edema and increased secretions.
- Those with underlying disease, especially diseases afflicting the airways, are more likely to have complications following anesthesia when confounded with URI.

### Perioperative Risks

- Complications include laryngospasm, bronchospasm, atelectasis, coughing, airway obstruction, hypoxia, stridor, and breath holding.
- A pt with a fever, purulent rhinitis, or productive cough should have elective surgery canceled.

### Worry About

- Lung-specific: Bronchospasm, desaturation, apnea, and atelectasis
- Cancellation of surgery and prolonged hospital stay

### Overview

- To cancel or not to cancel has been the dilemma of many anesthesiologists when confronted with a pt scheduled for elective surgery who has recently had or currently has an URI.
- Several studies have linked URIs to possible morbidity; however, none have linked them to increased mortality.
- Retrospective studies: Children with a recent URI were at higher risk for laryngospasm, bronchospasm, and stridor. Such children had a 2–7 times greater incidence of resp complications. The complication risk increased to 11-fold if the trachea was intubated.
- Prospective studies: Children who developed laryngospasm were twice as likely to have a URI.

### Etiology

- Affect the airway by making them especially susceptible to touch or chemical irritation, such as airway management and inhalational anesthetics.
- It is postulated that viruses release neuraminidases that damage the M2 muscarinic receptors, increasing acetylcholine released at NM junctions and setting off vagally mediated bronchoconstriction.

- Viruses also cause the release of chemical mediators—such as bradykinin, prostaglandins, and histamine—that contribute to bronchospasm.
- URIs increase airway secretions, thus intensifying intraop atelectasis, decreasing diffusion capacities, and increasing closing volumes.

### Usual Treatment

- If a pt scheduled for elective surgery has a fever, purulent rhinitis, or productive cough, the case is best postponed.
- Laryngospasm treated with PPV or small-dose muscle relaxation.
- Bronchospasm treated by deepening the anesthetic and administering IV bronchodilators or inhaled beta agonists.
- Hypoxemia treated with supplemental O<sub>2</sub>.
- Atelectasis can be decreased with incentive spirometry or sigh breaths intraop.
- Increased secretions can be managed by frequent suctioning.

Assessment Points				
System	Effect	Assessment by Hx	PE	Test
CV	Tachycardia due to infection	Assess for possible CHD, which can complicate the picture	Auscultation: BP, HR	
RESP	Increased secretions, bronchospasm	Quantify cough, secretions	Auscultation: Wheezes, rhonchi	CXR ABG in severe cases
RENAL	Dehydration	Poor intake and UO	Skin turgor, sunken fontanelles	BMP

**Key References:** Tait A, Malviya S: Anesthesia for the child with an upper respiratory tract infection: still a dilemma? *Anesth Anal* 100(1):59–65, 2005; Becke K: Anesthesia in children with a cold, *Curr Opin Anaesthesiol* 25(3):333–339, 2012.

**Perioperative Implications**

**Preinduction/Induction/Maintenance**

- Evaluate whether symptoms are severe or due to an infectious etiology. Examples are copious secretions and fever. If so, consider postponing.
- Minimize secretions by deep suctioning after pt is deeply anesthetized.
- Avoid airway stimulation if possible; consider using an LMA or bag masking.
- If bronchospasm is encountered, an IV line will be needed to provide adequate hydration and potential medications.
- Optimization of resp status is of utmost importance. Preop inhalational therapy with salbutamol should be considered.

**Monitoring**

- Standard ASA monitors absolutely necessary: Heart rhythm, pulse oximeter, and BP.
- Have ABG monitoring available.

**General Anesthesia**

- Depending on the procedure, this may be the best option to allow for deep anesthesia during stimuli, helping to prevent bronchospasm.
- Try to avoid endotracheal intubation. Consider an LMA.
- The agent used for induction can have an effect on the chance of bronchoconstriction: Propofol and sevoflurane are best, thiopental and desflurane are worst.

**Regional Anesthesia**

- Useful as an adjunctive anesthetic. May be preferred over GA.

**Postoperative Period**

- Almost all of the complications cited as possible reasons to cancel surgery can easily be treated by an experienced and diligent anesthesiologist along with proper monitoring and a rapid response in the recovery room.
- Must monitor HR and pulse oximetry.

**Anticipated Problems/Concerns**

- Must have all airway equipment available, such as ETTs and LMAs.
- Have rescue medications available, especially beta agonists, and the ability to administer them in a variety of ways.

## Urinary Lithiasis

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**Risk**

- Annual incidence of stone disease is 16.4 per 10,000.
- Lifetime prevalence is 1–15%, although this varies with age, gender, race, and geography.
- Men are affected 2–3 times more often than women, but this varies with race.
- Racially, prevalence highest among Caucasians, followed by Hispanics, Asians, and African Americans.
- Peak incidence in fourth–sixth decades of life.
- Increased risk of recurrence after first stone.

**Perioperative Risks**

- Morbidity and mortality very low if stone is not obstructing ureter; however, relative morbidity increases with obstructing ureteral stone in setting of UTI, especially if signs of systemic inflammatory response.

**Worry About**

- Urosepsis, possibly septic shock, if surgical procedure is performed in presence of UTI, especially with an obstructing ureteral stone.
- Decreased renal function from partial or complete renal obstruction.
- Perinephric hematoma if kidney is punctured by lithotripter during stone breakdown.

- Pregnancy testing of women of childbearing age because of ESWL. Lithotripsy is contraindicated during pregnancy, although ureteroscopy and lithotripsy of stone under direct visualization is only relatively contraindicated and is often necessary if the stone obstructs drainage to the bladder, especially given excessive urine production during pregnancy.

**Overview**

- An obstructing ureteral stone with signs of infection (tachycardia, hypotension, toxic appearance) is considered a urologic emergency, as the infected/obstructed urine constitutes an abscess.
- Stones are classified as containing calcium: Calcium oxalate (60%), hydroxyapatite (20%), or brushite (2%); or noncalcium: Uric acid (7%), struvite (7%), cystine (1–3%), and other minor contributors.
- Calculi <4 mm in diameter usually pass with conservative management (hydration, NSAIDs, tamsulosin)
- Approximately 20% of stones cause severe enough symptoms to require surgical removal.

**Etiology**

- Intrinsic factors: Renal tubular acidosis, cystinuria, primary hyperparathyroidism, gout, Lesch-Nyhan

- syndrome, Dent disease, Bartter syndrome, hypercalciuria, sarcoidosis
- Extrinsic factors: Hot, dry climates resulting in increased perspiration and thus hyperconcentrated urine (southeastern and southwestern regions of USA); poor hydration resulting in low UO; diet rich in calcium, animal fat (uric acid), or leafy vegetables (oxalate); immobility (e.g., sedentary occupations); obesity or metabolic syndrome; UTI with urease-producing bacteria

**Usual Treatment**

- Trial of passage with hydration, NSAIDs (toradol) for symptomatic pain relief and alpha-1a antagonist (tamsulosin/flomax) to relax smooth muscle of ureter/urethra
- If surgical intervention necessary (20%), choice based on stone size and location:
  - ESWL
  - Flexible ureteroscopy and holmium laser lithotripsy
  - Percutaneous nephrolithotomy
  - Retroperitoneal laparoscopy

**Assessment Points**

System	Effect	Assessment by Hx	PE	Test
CV	Increased heart rate or BP secondary to pain or urosepsis		Tachycardia Htn	
RESP	Grunting respiration during renal colic		Normal chest exam	
GI	Abdominal pain	N/V Moving irritation in abdomen	Tenderness to deep palpation of abdomen. radiation of pain to ipsilateral groin	
RENAL	Renal colic with very severe pain localizing to the affected flank; pain may radiate to groin or abdomen	Sudden onset of flank pain	Flank tenderness to palpation over affected kidney	UA (hematuria), BUN/Cr, Noncontrast CT scan (gold standard), KUB plain film, IVP

**Key References:** Pearle M: Urinary lithiasis: etiology, epidemiology, and pathogenesis. In Wein AJ, Kavoussi LR, Partin AW, et al., editors: *Campbell-Walsh urology*, ed 11, Philadelphia, PA, 2016, Elsevier, pp 1170–1199; Cheney FW, Domino KB, Caplan RA, et al.: Nerve injury associated with anesthesia: a closed claims analysis, *Anesthesiology* 90(4):1062–1069, 1999.