Tuberculosis

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Risk

- Incidence in USA in 2014 was 2.96 cases per 100,000 persons; worldwide, incidence is over 9 million cases per year. There were 1.5 million TB-related deaths worldwide in 2014.
- Incidence in USA has been decreasing every year since 1992.
- Risk is higher among homeless, elderly, Asian, and Latin American immigrants, minorities, and prisoners. Also, immunosuppression (e.g., HIV infection, transplant recipients, chronic renal insufficiency) increases TB risk.
- TB is still a leading cause of death among HIV-infected pts.

Perioperative Risks

- Risk to the pt and to medical personnel.
- Pt risk depends on extent of pulm disease, organ system involvement, and overall health status.
- Elective surgery is best delayed until pt is either noninfectious or free of TB.

Worry About

- Overall health status of the pt, infectiousness of the pt, cross-contamination through anesthesia machine and other nondisposable equipment
- Effects of anti-TB drugs on organ systems (e.g., liver damage, hearing loss, neuritis, nephrotoxicity)

Overview

- TB is caused by *Mycobacterium tuberculosis*.
- Pulmonary TB is the most common form of infection in humans; intestine, spine and bones, kidneys, and meninges can also be affected.
- TB left untreated can be fatal.

Etiology

- TB is transmitted by droplet nuclei produced by coughing, sneezing, or talking (causative bacilli can remain airborne for hours).
- TB does not spread by casual contact (e.g., shaking hands, sharing food or drink, or disposing of bed linens).
- Primary infection can be the reason for up to one-third of newly diagnosed TB cases.

Usual Treatment

- Initial phase (2 mo) of treatment comprises a four-drug regimen taken orally (i.e., isoniazid, rifampin, pyrazinamide, and ethambutol), followed by continuation phase (4 mo) with a two-drug regimen taken orally (i.e., isoniazid and rifampin).
- Four-drug regimen is recommended for 6 mo in drug-resistant cases.
- HIV/AIDS pts may need a longer duration of therapy (9–12 mo).

Assessment Points

System	Effect	Assessment by Hx	PE	Test
GENERAL		Night sweats, weight loss	Fever	Tuberculin skin test and in vitro T-cell release of IFN-gamma assay
RESP	Hilar or mediastinal lymphadenopathy, apical infiltrate or necrosis.	Cough and hemoptysis	None or inspiratory rales in affected area	CXR, sputum culture
CV	Pericardial effusion, constrictive pericarditis	SOB	Signs of tamponade, muffled heart sounds	ECG, ECHO
CNS	TB meningitis	Listlessness, headache, seizures, coma	Altered mental status, cranial nerve abnormality	LP, CSF analysis
GI	Peritonitis, enteritis	Abdominal pain, obstruction	Palpable mass, ascites	Endoscopy and biopsy, ascitic fluid analysis/culture
GU	Chronic cystitis, epididymitis, hydronephrosis, female genital tract disease	Late appearance of pyuria, hematuria	May have thickened epididymis	Cystoscopy
MS	Weight-bearing joints (e.g., spine, hip, knee)	Pain, kyphosis	Spinal tenderness	X-ray, CT, bone biopsy

Key References: Centers for Disease Control and Prevention (CDC): Tuberculosis. <www.cdc.gov/tb>. (Accessed 13.06.16); Shaikh SI, Sudhindra GB: Tuberculosis and anaesthesia, *Indian J Appl Res* (4)2:15–17, 2014.

Perioperative Implications

Preoperative Preparation

- Evaluate for toxicity due to anti-TB therapy: CBC, ALT, AST, serum bilirubin levels, visual symptoms, and peripheral neuropathy. For extensive pulmonary TB, consider PFTs.
- Care team must wear properly fitted N95 masks.
- Schedule TB/suspected TB cases at the end of d to maximize time for clearing and minimize spread. A comprehensive discussion and planning among the team members (surgery team, anesthesia team, and support staff) is necessary.
- Use an OR that has an anteroom; otherwise keep the doors closed, minimize traffic, and use additional air cleaning.
- Use disposable equipment and add a bacterial filter (0.3 µm) to the expiratory limb or at the Y-connection of the anesthesia circuit.
- After use, stop all gas flow through the anesthesia machine for at least 1 h to avoid cross- contamination. If machine contamination is suspected, formaldehyde gas can be used to sterilize it.

Monitoring

- Standard ASA monitors
- Depending on comorbidities and type of surgery, invasive monitoring should be considered case by case.

Postoperative Period

- Postop recovery in an AII room (AII room—an isolation room with single occupancy, negative pressure in the room, airflow at 6–12 ACH or equivalent; remember that mycobacterial bacilli can remain airborne for hours).
- If AII room is not available, air-cleaning technologies (e.g., HEPA filtration, UVGI) can be used.

Ulcerative Colitis, Chronic

Patrick J. Forte | Kathleen E. Barrett

Risk

- Incidence in USA and Northern countries of 35-100:100,000; incidence of 11:100,000/y with 2- to 4-fold increased frequency in Jewish populations.
- Mortality highest in early years of disease, or with prolonged disease due to risk of colon cancer; two peaks for age of onset: 15–30 y and 60–80 y.
- Male:female ratio is 1:1; smokers:nonsmokers, 0.4:1; former smokers:nonsmokers, 1.7:1. Up to 20% of pts have a positive family Hx.

Perioperative Risks

- Inflammatory mediators activate the coagulation cascade in local blood vessels.
- Increased interleukin-17 level is being investigated as having a cause or effect connection between IBD and inhalational anesthetics.
- Chronic steroid use can cause adrenal insufficiency and delayed wound healing.

Worry About

- Diarrhea causing metabolic acidosis, hypokalemia, lyte abnormalities, intravascular volume depletion
- Defects in bleeding or clotting due to activation of coagulation cascade
- Bowel distention precluding use of nitrous oxide and increasing risk of perforation.
- Extracolonic manifestations: Primary sclerosing cholangitis and/or cirrhosis of the liver: choose appropriate anesthetics, analgesics, and NMBs. Ankylosing spondylitis: Limited cervical ROM, restrictive pulm mechanics.

Overview

- Indications for surgery include toxic megacolon, colonic perforation, massive hemorrhage, obstruction, and cancer prevention or resection. If pt is presenting for surgery, disease is in progressive stage and operation can be urgent/emergent in nature.
- Pts may have steroid dependence, hypovolemia, electrolyte imbalance, malnutrition, hypoalbuminemia, anemia, bleeding.
- Sulfasalazine is the mainstay of treatment for all stages of disease. Side effects include blood

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.

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.

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_2	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.
- 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

Selina Read | Lee A. Fleisher

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
- Cancelation 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_2.
- Atelectasis can be decreased with incentive spirometry or sigh breaths intraop.
- Increased secretions can be managed by frequent suctioning.