

Assessment Points

Etiology	Examples	Diagnosis	Treatment
ENDO	Hyperthyroid Hypothyroid	Thyrotoxicosis Myxedema	PTU Thyroid hormone replacement
ANOXIC-ISCHEMIC	Cardiac arrest Prolonged shock Hypoxemia	Obvious from clinical course	Reverse acute event Decrease cerebral edema, maintain BP, decrease temperature?, prevent seizures
HYPERCAPNIC	Narcotic-induced Severe COPD, sleep apnea	Increased heart rate and BP Increased end-tidal or arterial Pco ₂	Reverse narcotic Mechanical vent to decrease Pco ₂
HYPOGLYCEMIC	Insulin overdose Ethanol ingestion Neonatal (idiopathic)	No IVF and PO ingestion From Hx and alcohol level Decreased blood glucose	IV glucose (D50)
HYPERGLYCEMIC	Hyperosmolar nonketotic coma Ketoacidosis	Suspect in known diabetic Ketones in blood, urine Acidosis	Insulin, correct acidosis and fluid volume deficit
ION DISTURBANCES	Decreased Na ⁺ Decreased K ⁺	Serum Na ⁺ <125 mmol/L (e.g., SIADH) Serum K ⁺ <2.5 mEq/L Severe muscle weakness	Hypertonic saline (caution) NaCl and diuretics K ⁺ replacement
RENAL	Renal failure		
HEPAT	Hepatic encephalopathy		

Key References: Bozborra A, Coskun H, Erbil Y, et al.: A rare complication of adjustable gastric banding: Wernicke's encephalopathy, *Obes Surg* 10(3):274–275, 2000; Brown EG, Douglas VC: Moving beyond metabolic encephalopathy: an update on delirium prevention, workup, and management, *Semin Neurol* 35(6):646–655, 2015.

Perioperative Implications

- Correct ion and fluid disturbances.
- Normalize blood glucose.
- Optimize organ function (e.g., renal, hepatic).
- Adequate hormone replacement.
- Search for drug/toxin exposure (sedative/hypnotics; ethanol and its street substitutes, such as ethylene).

Posttransplant Lymphoproliferative Disorder

Tamas Seres

Risk

- Cumulative incidence over 5 y: 1–2% in liver, 1–3% in kidneys, 2–6% in heart, 2–9% in lung, and 11–33% in intestinal or multiorgan transplants
- Major risk factors:
 - EBV positive serology in the recipient (multisystem PTLTD)
 - EBV negative recipient and EBV-positive donor (PTLD limited to allograft tissue)
 - The degree of T-cell immunosuppression (induction with OKT3, ATGAM, thymoglobulin, and maintenance with tacrolimus)
- Additional risk factors:
 - Time after transplant (highest incidence during the first y)
 - Recipient age (<25 y)
 - Ethnicity (Caucasians)
- Overall survival rates ranging between 25–35%

Perioperative Risks

- Increased risk of airway or bowel obstruction and hemodynamic compromise

- Increased risk of dysfunction of the transplanted organs
- Increased risk for infection and CNS involvement

Worry About

- Enlarged tonsils and cervical adenopathy increasing difficulty of airway
- Thoracic adenopathy complicating intubation, ventilation, and cardiac output
- Pulm involvement causing decreased oxygenation and/or ventilation
- Dysfunction of the transplanted kidneys, liver, or heart
- GI involvement manifesting as N/V or bowel obstruction
- CNS involvement manifesting as mental status change or increased ICP
- Immunosuppression causing an increased rate of infection

Overview

- Lymphoproliferative disorders are among the most serious and potentially fatal complications of chronic immunosuppression in organ transplant recipients.

- These tumors are mostly B-cell-type large-cell lymphomas. Extranodal involvement occurs in 30–70% of these cases as a localized tumor in either the transplanted organ or another site, such as the GI system, lungs, skin, liver, and CNS.

Etiology

- B lymphocytes, infected by EBV, proliferate in the setting of immunosuppression, where T-cell immune surveillance is significantly decreased.

Usual Treatment

- Reduction of immunosuppression, rituximab, cytotoxic T-cell infusions, and radiation (CNS).
- Surgery may be necessary to debulk large masses and relieve bowel obstructions.
- Chemotherapy for disseminated unresponsive disease.

Assessment Points				
System	Effect	Assessment by Hx	PE	Test
HEENT	Cervical adenopathy Pharyngitis Enlarged tonsils with pseudomembranous appearance Otitis media Sinusitis Laryngeal edema	Difficulty swallowing Sore throat Headache Facial pain, ear pain Difficulty talking or breathing	Lymphadenopathy Tonsillar enlargement Spotty, erythematous tonsils Otitis media Tenderness over sinuses Drooling; tripod position Difficulty of breathing	CT Hx and physical exam Serologic test for EBV
RESP	Lung nodules Pleural effusions Hilar and mediastinal adenopathy	SOB Orthopnea	Decreased breath sounds Crackles, egophony	CXR CT
CV	HF	SOB, tires easily Edema	New murmur, crackles Pitting edema	ECHO ECG
GI	Liver dysfunction, Bowel obstruction, Bowel perforation, Tumors anywhere in GI tract	N/V Abdominal pain and discomfort Distention Swelling, tenderness over graft site	Jaundice Abdominal distention Tenderness over graft Rebound tenderness	LFTs Abdominal x-ray, CT US
RENAL	Renal insufficiency or failure	Decreased UO Swelling	Pitting edema, Crackles	BUN, Cr, lytes
ID	Mononucleosis syndrome Generalized lymphadenopathy Sepsis	Fatigue, fever	Elevated temperature	CBC, serology for EBV
CNS	Brain tumors	Headache LOC Seizure	Stupor, coma Seizure	CT, MRI

Key References: Friedberg JW, Aster JC: Epidemiology, clinical manifestations, and diagnosis of post-transplant lymphoproliferative disorders. In Freedman AS, Brennan DC, editors: Waltham, MA, 2015, UpToDate. www.uptodate.com/contents/epidemiology-clinical-manifestations-and-diagnosis-of-post-transplant-lymphoproliferative-disorders. (Accessed 01.06.16); Pinyavat T: Posttransplant lymphoproliferative disorder. In Houck PJ, editor: *Handbook of pediatric anesthesia*, New York, 2015, McGraw Hill, pp 166–168.

Perioperative Implications

Preoperative Preparation

- Difficult airway techniques; consider GE reflux precautions.
- Evaluate the need for blood products and specific antibiotics.
- Evaluate the function of the transplanted organs.
- Consider stress-dose steroids if receiving steroids.
- Consider side effects of the immunosuppressant medications.

Monitoring

- Consider invasive monitoring in the event of organ failure or mediastinal mass.
- Consider ICP monitor as indicated for CNS involvement.

Airway

- Consider awake fiberoptic techniques if upper airway edema or masses or mediastinal masses are present.

Preinduction/Induction

- Induction agents should be chosen based on organ function. Cyclosporine can potentiate the effect of succinylcholine.
- A mediastinal mass can compress the aorta and SVC, leading to significant hypotension if pt is supine. Consider sitting or semisitting induction.
- Consider lower extremity for volume resuscitation if a large mediastinal mass is present.

Maintenance

- Keep the pt breathing spontaneously in case of significant airway obstruction.

- If a mediastinal mass is present, keep the pt in semisitting position and turn to lateral or prone position if hemodynamics become compromised.

Extubation

- Risk of airway obstruction if airway is manipulated during surgery

Postoperative Period

- Airway edema can become a problem.
- Continue stress-dose steroids.

Anticipated Problems/Concerns

- Airway obstruction and hemodynamic compromise
- Dysfunction of transplanted organs
- Mental status change or increased ICP in CNS involvement

Prader-Willi Syndrome

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Risk

- Prevalence: 1:25,000
- Incidence: 1:10,000-15,000
- Racial prevalence: None
- Gender predominance: Similar frequency in both sexes and all races
- Most common syndromic form of obesity, affects 350,000–400,000 individuals worldwide
- Annual death rate is 3% versus 1% in the general population, primarily due to respiratory arrest

Perioperative Risks

- Infantile hypotonia, hypoventilation, and breathing difficulty
- Potential for difficult intubation and aspiration risk
- Worsening of obstructive/central sleep apnea and abn ventilatory responses to hypoxia, hypercarbia, and bronchospasm

- Bradycardia, ventricular arrhythmias (PVCs)
- Postop resp insufficiency
- Potential risk of rhabdomyolysis with succinylcholine
- Aberrant thermoregulation: Hyperthermia and MHS-like syndrome
- Glucose intolerance or DM

Worry About

- Abn short and restricted neck mobility, limited mouth opening and difficult intubation
- Poor vascular access and intraop positioning
- Systemic and pulm Htn, conduction defects, RBBB cor pulmonale, and dilated cardiomyopathy
- Restrictive lung disease (obesity, kyphoscoliosis) and reactive airways

Overview

- Presents in two stages: Infantile central hypotonia, FTT, and delayed developmental milestones. Childhood stage presents with obesity (BMI >97th

percentile in a child and $\geq 30\%$ in an adult), skeletal abn (dysmorphic, short stature, short hands and feet, scoliosis), hypogonadism, and hypothalamic dysfunction.

- Restrictive pulmonary disease results from muscle weakness, obesity, and kyphoscoliosis. It starts in early childhood and is present in 80–90% of pts >30 y of age.
- CV system: Htn in 17–32%; myocardial hypertrophic hypokinetic syndrome.
- Central thermoregulation: May develop hyperpyrexia.
- Cognitive problems: Mild to moderate mental retardation. Mean IQ in 60s–70s; some individuals have normal intelligence.
- Behavior problems of oppositional behavior, emotional lability, aggressive and violent behavior; obsession with food and compulsion to eat. Psychosis found in 5–10% of adults.
- High threshold for pain.