Latex Allergy

Robert H. Brown

Risk

- Myelomeningocele (25–50%)
- Congenital urologic anomalies (25–50%)
- Healthcare workers (3–17%)
- Atopic individuals (6–11%)
- General population (0–6%)

Perioperative Risks

- Anaphylactic reaction leading to hypotension, bronchospasm, and CV collapse

Worry About

- A latex allergy is a type I immediate hypersensitivity reaction. Life-threatening anaphylaxis can be the first manifestation of the reaction. Latex-containing medical products are common throughout most medical environments.

Overview

- Type I (immediate) hypersensitivity reaction: Immune-mediated and involve IgE-specific latex proteins. Exposure can occur by either direct contact or through inhaled airborne particles. Symptoms can be localized or generalized, mild to life-threatening and including pruritus, hives, angioedema, wheezing, hypotension, tachycardia, and CV collapse.
- Type IV (delayed or contact dermatitis) hypersensitivity reaction: Cell mediated, occurs 24–48 h after exposure, and is localized. Symptoms include localized pruritus, swelling, and blisters.
- Increase in latex allergies coincided with the advent of universal precautions and the increased use of latex examination gloves, many with high allergen content.
- Exposure can occur both by contact and by inhalation of latex-containing powder.
- Considered to represent approximately 10% of all anaphylactic reactions reported for pts while under anesthesia.
- Increased risk with repeated exposures.
- Reaction caused by cross-linking latex specific IgE on mast cells, leading to degranulation and release of both immediate and delayed inflammatory mediators.
- Dx includes a Hx consistent with a latex reaction (e.g., time, exposure), nonspecific blood markers (e.g., serum mast cell tryptase), serology testing (RAST testing), and skin testing where available.

Etiology

- Exposure with subsequent sensitization in at-risk individuals is the usual etiology of a latex allergy. At-risk individuals commonly have identified risk factors, such as atopy, food allergies, and/or a Hx of multiple surgeries.

Usual Treatment

- Avoidance of exposure should be the primary consideration.
- There is no evidence any premedications can prevent or attenuate a type I hypersensitivity reaction.
- In cases of an anaphylaxis reaction, treatment includes stopping the exposure, intravascular volume expansion, epinephrine as needed to support BP, bronchodilators to treat bronchospasm. Antihistamines and corticosteroids are distant secondary therapies.
- A latex-safe environment, one with minimal latex allergen, insufficient to elicit a latex allergic reaction, should be considered for all healthcare locations.

Assessment Points

System	Assessment by Hx	PE	Test
CV	Hypotension, tachycardia, CV collapse	Tachycardia, vasoconstriction	ECG, BP
PULM	SOB, stuffy nose, cough, elevated airway pressures	Wheezing, accessory muscle use	Auscultation, spirometry, airway pressure
DERM	Pruritus, edema	Hives, urticaria, erythema, swelling	Visual exam
HEENT	Red, itching eyes	Angioedema	Visual exam
GI	Cramps, N/V, diarrhea		

Key References: Mertes PM, Demoly P, Malinovsky JM: Hypersensitivity reactions in the anesthesia setting/allergic reactions to anesthetics, *Curr Opin Clin Immunol* 12(4):729–735, 2012; Dewachter P, Mouton-Faivre C, Hepner DL: Perioperative anaphylaxis: what should be known? *Curr Allergy Asthma Rep* 15(5):21, 2015.

Perioperative Implications

- Ask all pts about any Hx of an allergy or reactions to latex products.
- Do not attempt to prevent with premedications.
- Provide a latex-safe environment, including the preop, intraop, and postop environment.
- If latex allergic reaction suspected, make sure the postop environment is latex safe.

Anticipated Problems/Concerns

- Many latex-sensitized individuals are unaware of their allergic status.
- 10% of anaphylactic reactions under anesthesia are presumed due to a latex reaction.
- Maintain vigilance with regard to potential inadvertent latex exposures.
- Consider allergic reaction if hypotension is unresponsive to usual pressor agents.

Lesch-Nyhan Syndrome

Roberta Hines

Risk

- X-linked recessive disorder due to deficiency on the enzyme HGPRT, resulting in the buildup of uric acid
- Incidence ~5.2 per million male births (where symptoms appear)

Perioperative Risks

- Hyperuricemia and hyperuricosuria (gout)
- Airway problems secondary to scarification from self-mutilation (lip and finger biting)
- Involuntary writhing
- Repetitive movement of arms and legs
- Impairment of renal function due to obstructive uropathy

Worry About

- Aspiration pneumonia (poor muscle control).
- May have associated megaloblastic anemia (poorly utilized vitamin B_{12}).
- Drug metabolism and prolonged drug effects secondary to metabolic defect and impaired renal function.

Overview

- Pts are usually mentally subnormal.
- Pts exhibit characteristic pattern of compulsive self-mutilation, spasticity, and choreoathetosis.
- Primary biochemical defect is almost complete absence of HGPRT.
- Enzyme defect leads to excessive purine production and elevated uric acid concentrations.

Etiology

- Genetic disease inherited as X-linked recessive trait (female carriers generally asymptomatic)

Usual Treatment

- No specific treatment of enzyme deficiency.
- Benzodiazepines frequently used to control self-mutilation and spasticity (baclofen may be helpful).
- Gene therapy possibility.
- Gabapentin.
- Gout can be treated with allopurinol.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
HEENT	Distortion of airway structures due to self-mutilation		Examine airway	
CV	Htn, CAD Adrenergic pressor response to stress is absent	Angina, angina-equivalent symptoms, PND	Displaced PMI S_3	ECG Pharmacologic stress testing Coronary angiography and ECHO
RESP	Aspiration pneumonia	SOB following vomiting episode	Rales Wheezing	CXR
GI	Vomiting Athetoid dysphagia	Dysphagia		
RENAL	Decreased renal function due to obstructive uropathy			BUN Cr IVP
CNS	Mental retardation Seizure disorders Decreased MAO activity		Mental status questioning	EEG Mental function tests
MS	Spasticity, contractures		ROM	

Key References: Williams KS, Hankerson JG, Ernst M, et al.: Use of propofol anesthesia during outpatient radiographic imaging studies in patients with Lesch-Nyhan syndrome, *J Clin Anesth* 9(1):61–65, 1997; Salhotra R, Sharma C, Tyagi A, et al.: An unanticipated difficult airway in Lesch-Nyhan syndrome, *J Anaesthesiol Clin Pharmacol* 28(2):239–241, 2012.

Perioperative Implications

Preoperative Preparation
- Antacids.
- H_2 blockers.
- Metoclopramide.
- IV access may be difficult.

Monitoring
- Routine
- ST-segment analysis if CAD present

Airway
- Rapid-sequence induction.
- Avoid succinylcholine.
- Awake fiberoptic intubation.

Preinduction/Induction
- Premedication where appropriate to help with behavioral issues.
- Avoid agents with renal metabolism (adjust dosing).

Maintenance
- Avoid agents with renal toxicity.
- No one agent or technique shown superior.
- Administer exogenous catecholamines with caution (due to associated Htn).

Extubation
- Awake to avoid aspiration

Adjuvants/Postoperative Period
- Make some space accessible to avoid injury to child.
- Benzodiazepines for spasticity.

Anticipated Problems/Concerns
- Hx unavailable or inaccurate because of retardation

Leukemia

Dilipkumar K. Patel | Nathan Poiro

Risk
- Estimated 318,389 individuals living with leukemia or in remission in USA
- Estimated 54,270 new cases and 24,450 deaths of leukemia in 2015
- Males >females
- ALL greater in children (median age of diagnosis 14 y)
- CML, CLL, and AML common in adults and diagnosed in sixth and seventh decades

Perioperative Risks
- Immunocompromised pt, tumor lysis syndrome (metabolic derangement), tumor compression of organs (anterior mediastinal mass), neutropenia (anemia, coagulopathy), hyperviscosity, oral mucositis, sequelae of cytotoxic agents (immunocompromised state, respiratory failure, cardiovascular failure), opportunistic infection, and sepsis
- Hematoma and/or bleeding, thromboembolism, diffuse alveolar hemorrhage from thrombocytopenia and splenic sequestration of platelets

Worry About
- Myelosuppression: Thrombocytopenia, anemia, and neutropenia
- Bone marrow suppression with NO; rare potential for malignant hyperthermia in ALL
- Upper airway edema, anterior mediastinal mass (paralysis, supine position)
- Pleural effusion, pneumonitis, and pulm fibrosis
- Tumor lysis syndrome (especially with dexamethasone), hyperkalemia, hyperuricemia, hyperphosphatemia, hypocalcemia, and renal failure
- Remote anesthesia location, airway difficulty, equipment, and monitoring

Overview
- Four main types of leukemia: ALL, AML, CLL, and CML. No staging system for leukemia.
- From 2004 to 2010, the 5-year relative survival rates overall: CML—59.9%, CLL—83.5%, AML—25.4%, ALL—70%, ALL—93% for children <5 y.
- Usually outpatient treatment, but may require GA or MAC for bone marrow biopsy, bone marrow harvest, central venous access/port placement, lumbar puncture (diagnostic and intrathecal chemotherapy), HSCT, bronchoscopy, pericardiocentesis, and radiation therapy.
- Mortality remains high post HSCT secondary to sepsis, pulmonary complications, and GVHD.

Etiology
- Largely unknown. Greaves hypothesis (in utero mutation and secondary delayed viral exposure).
- Strong suspicion that leukemia and lymphoma are virus-induced (e.g., EBV). Associated with genetic disorders (e.g., Down syndrome).
- Chronic exposure to benzene (primarily from tobacco smoke), extraordinary doses of radiation, and secondary malignancy from certain cancer therapies can be causes of the leukemia.
- Breastfeeding for 6 mo or more could lower childhood leukemia risk.

Usual Treatment
- Treatment varies with type of leukemia, age, and phase (beyond the scope of this chapter)
- Supportive treatment: Antimicrobial, blood transfusion, nutrition, and pain control
- Newer approaches: Monoclonal antibody, experimental cancer vaccines, donor lymphocyte infusion, gene therapy, autologous and allogeneic transplantation, and stem cell transplantation
- AML:
  - Ara-C
  - Anthracyclines: Daunorubicin, idarubicin + cytarabine
  - Gemtuzumab ozogamicin: ATRA
  - Arsenic trioxide: Vinca alkaloids: vincristine/vinblastine
  - Bone marrow transplant
- CML:
  - HSCT
  - Tyrosine kinase inhibitors: Imatinib mesylate (initial treatment of choice)
- Nilotinib
  - Dasatinib
  - Busulfan
  - Hydroxyurea
  - Interferon alfa, allopurinol
  - Splenectomy, radiation, bone marrow transplant
- CLL:
  - Cyclophosphamide
  - Corticosteroid
  - Fludarabine
  - Cytarabine
  - Bendamustine, rituximab
  - Alemtuzumab
  - Radiotherapy
- ALL:
  - Imatinib, clofarabine, L-asparaginase, daunorubicin, vincristine, dexamethasone, doxorubicin, cytarabine (ara-C)
  - Radiation therapy, intrathecal chemotherapy