

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.

Perioperative Implications**Preoperative Preparation**

- If obese, acid aspiration prophylaxis and airway evaluation.
- If signs of urosepsis, assess hydration status and peripheral perfusion.

Monitoring

- Routine.
- Temperature monitoring during immersion lithotripsy is essential because water temperature may produce hyperthermia or hypothermia.
- Shock waves synchronized to ECG in ESWL to avoid dysrhythmias prior to initiation of shock.

Preinduction

- Adequate padding to avoid nerve damage

Induction

- Sedation may be adequate for lithotripsy and minor ureteroscopy procedures. GA as well as spinal or continuous lumbar epidural with T8-level epidural

are all acceptable depending on type of procedure, comorbid conditions, and pt preference.

- An LMA is appropriate for urolithiasis of the lower tract; an ETT may be necessary for the removal of an upper-tract stone so as to fully control ventilation and thus excursion of the kidney during lithotripsy procedures.

Maintenance

- Central blood volume may increase.
- Pt may become hypotensive secondary to urosepsis or warm irrigant causing decreased SVR.
- Vital capacity may decrease and work of breathing increase.
- Pleural effusion or hydropneumothorax may occur during percutaneous renal procedures.

Adjuvants

- Visualization of stone may require iodine-containing contrast material.
- Anticholinergic agents (glycopyrrolate) are occasionally given to shorten lithotripsy treatments; however,

tachycardia can occur, resulting in myocardial ischemia in high-risk pts.

- Most pts receive prophylactic antibiotics prior to urinary tract procedures.

Anticipated Problems/Concerns

- Peroneal nerve compression from lithotomy position
- Allergic reactions in 5% receiving IV contrast media
- Steinstrasse, or ureteral obstruction by fragmented calculi, may cause ureteral colic following lithotripsy.
- Htn may occur following lithotripsy.
- Septic complications occur in 1% of pts after lithotripsy, specifically in those with signs of infection and obstructing ureteral stones.
- Ureteral injury occurs in 9% of ureteroscopy procedures, with 1.6% requiring further surgical intervention.
- Bladder perforation may present as shoulder pain, unexplained Htn, or tachycardia in the PACU.

Urticaria, Cold

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Risk

- Higher incidence found in regions with colder climate
- Prevalent in all races and genders; most commonly seen between ages 10–40 y

Perioperative Risks

- Can develop urticaria and/or angioedema with skin cooling and rewarming
- Systemic shock-like reactions can occur with whole-body cold exposure (e.g., swimming)

Worry About

- Exposing patients to cold stimulus (e.g., cold room, cold IV or irrigation fluids, cold instruments or devices against the skin)

Overview

- A subdivision of chronic inducible urticaria (when symptoms last >6 wk)
- Accounts for 3–5% of all physical urticarias (urticaria caused by physical stimuli)
- Characterized by appearance of urticaria and/or angioedema after cold exposure

- Urticaria, which presents as pruritic, superficial erythematous papules or plaques that are blanchable, and angioedema, involving swelling of the deeper dermis, which usually affects face/lips/extremities and tends to be painful
- Disease course usually lasting from 5–9 y but may resolve after several months
- Symptoms occurring within min after exposure to cold stimulus (cold air/fluids)
- Disease: acquired (most common) or familial (rare hereditary disorder)
- Acquired: Primary or secondary to an underlying disease process, such as malignancy, cryoglobulinemia, or infection (e.g., HIV, infectious mononucleosis).
- After treatment of underlying disease (e.g., treatment with antibiotics): secondary cold urticaria may resolve
- Dx: Made with cold stimulation test (ice cube to volar surface of forearm)
- If + stimulation test, threshold testing to determine severity of disease
- Threshold testing: performed with a computer-aided thermoelectric Peltier device

Etiology

- Primary cold urticaria appears related to skin mast cells sensitization to cold by a serum factor, and is very likely autoantibodies mediated (functional anti-IgE antibodies have been described in pts with ACU).
- Sensitized skin mast cells release histamine and other proinflammatory mediators upon interaction with cold stimulus.
- Cryoglobulins cause activation in secondary cold urticaria.

Usual Treatment

- Nonsedating second-generation H₁ antihistamines are standard treatment, successful at delaying and preventing occurrences (up to 4× the standard dose). Cyproheptadine is not used as commonly as in the past because of its sedating and anticholinergic effects.
- Omalizumab, an anti-IgE monoclonal antibody, has been shown effective in resistant chronic urticaria, including cold urticaria.
- Emergent treatment consists of steroids, H₁ blockers, and epinephrine, especially if airway compromise is evident.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
DERM	Urticaria or angioedema Flushing, erythema, pruritus	Cold reactions	Wheals (hives) Nonpitting edema	Cold stimulation test Threshold testing
RESP	Bronchospasm Dyspnea	Swelling on cold exposure	Breath sounds Wheezing and hypoxemia	Auscultation, SpO ₂ , ABG
CV (systemic Rx)	Tachycardia, hypotension Dizziness	Syncope after aquatic activities	Headache and weakness Loss of consciousness	ECG, NIBP
HEENT	Laryngeal edema, oropharyngeal edema	Dysphagia after cold drinks/food	Tongue/lip or facial edema	Fiberoptic exam of airway if compromise suspected

Key References: Abajian M, Schoepke N, Altrichter S, et al.: Physical urticarias and cholinergic urticaria. *Immunol Allergy Clin North Am* 34(1):73–88, 2014; Trevisonno J, Balram B, Netchiporouk E, et al.: Physical urticaria: review on classification, triggers and management with special focus on prevalence including a meta-analysis. *Postgrad Med* 127(6):565–570, 2015.

Perioperative Implications**Preoperative Preparation**

- Use antihistamines (H₁ and H₂) and steroid prophylaxis in pts with known disease, especially if cold challenge is expected during surgery (e.g., CPB).
- Avoid medications that provoke histamine release (e.g., morphine, atracurium).

- Warm the OR, table, IV fluids, and all medications before injection.

Monitoring

- Monitor skin temp, examine skin for urticaria, and use standard monitors (ECG, SpO₂, NIBP).

Airway

- Have emergency airway equipment if suspected angioedema (fiber optic, video laryngoscope)

Induction

- All IV meds must be warmed before injection; avoid histamine-releasing medications.