

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.

Maintenance

- Warm IV and irrigation fluids; keep room and the pt warm.
- Monitor for signs of anaphylaxis: tachycardia, hypotension, and/or bronchospasm.

Extubation

- If concern for angioedema with airway involvement exists, evaluate the airway before extubation with a FOB or video laryngoscope; can perform cuff-leak test.

Postoperative Period

- Monitor for possible delayed urticarial reactions (atypical cold urticaria).

Anticipated Problems/Concerns

- Laryngeal/oropharyngeal angioedema may compromise the airway, which can make intubation and securing the airway challenging.

- Localized areas of urticaria and/or angioedema are usually benign, but serious widespread edema can compromise the airway or lead to systemic shock.
- Maintaining core body temperature can also be challenging due to redistribution while under general anesthesia and radiant heat loss to the environment.

Uterine Rupture

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Risk

- Incidence varies; 1:1500 women for all pregnancies; 1:8400 for unscarred uteri.
- Incidence of rupture with prior uterine scar (i.e., cesarean, myomectomy) ranges from 0.5–2% in developed countries.
- Maternal mortality is between 0.1–1% of cases.
- Risk factors: Uterine scar (e.g., prior classical cesarean, prior low transverse cesarean, previous uterine myomectomy), congenital uterine anomalies, multiparity (especially previous cesarean deliveries), fetal macrosomia, uterine instrumentation, uterine trauma, rapid progression of labor, polyhydramnios, abnormal placentation (e.g., accreta, percreta), placenta previa, pharmacologic induction, or augmentation of labor

Perioperative Risks

- Potentially catastrophic for pt and fetus. Maternal morbidity is ~0.1% and includes hemorrhage, shock, and hysterectomy. If the fetus is delivered within 10–37 min of diagnosis, fetal morbidity is improved but still includes hypoxemia and/or acidosis, depressed Apgar scores, and a neonatal ICU admission.
- Dx is difficult and usually delayed owing to nonspecific symptoms. Physicians should have a low threshold for diagnosing pts with risk factors given the increased maternal morbidity and mortality over time.
- Hemodynamically stable pts can become unstable quickly.

Worry About

- Massive hemorrhage in the pregnant pt

- Fetal morbidity due to hypoperfusion and hypoxemia or anoxia
- Amniotic fluid embolism and DIC

Overview

- Because of a breach in the myometrium, which is often secondary to separation of a previous cesarean scar, uterine rupture can occur antepartum, intrapartum, or postpartum. At term, the lower uterine segment contains mostly connective tissue and little placental tissue. Therefore ruptures of the lower uterine segment can be asymptomatic and not result in maternal and/or fetal compromise. However, ruptures of the upper uterine segment where placental tissue is involved can lead to massive bleeding, with resultant need for emergent cesarean delivery and/or laparotomy.
- Vaginal delivery is preferred over cesarean delivery as there is less maternal blood loss and maternal morbidity.
- The American Congress of Obstetricians and Gynecologists (ACOG) advocates for a trial of labor after cesarean (TOLAC) in pts with a previous low transverse uterine scar. TOLAC is discouraged by ACOG in pts being induced with prostaglandins or with a history of a classical cesarean because the risk of rupturing is greatly increased. Additionally, TOLAC is discouraged in hospitals where emergency cesarean delivery cannot be performed within 20–30 min.
- Uterine rupture is usually a clinical Dx since there is often not enough time for ultrasound, CT, or MRI.
- Diagnosis: Prolonged late decelerations, recurrent variable decelerations, and fetal bradycardia are the most common presenting symptoms (87%). Other

symptoms include diminished uterine contractility; reduced baseline uterine pressure; abdominal, lower back, or shoulder pain; halting or retracting of the presenting fetal part; vaginal hemorrhage; and hypotension or shock. Abdominal pain remains a reliable sign even in the presence of a labor epidural, as a low-dose local anesthetic is typically used.

Etiology

- Separation of the scar from a previous uterine surgery, often during TOLAC, is technically “uterine dehiscence,” but as they have similar presentations, they are considered together here.
- Rupture of myomectomy scar (highest incidence of rupture).
- Weak or stretched uterine muscles due to grand multiparity, polyhydramnios, multiple gestations, abnormal placentation, fibroids.
- Rapid labor or prolonged labor with pharmacologic augmentation.
- Traumatic rupture.

Usual Treatment

- When a uterine rupture occurs antepartum or during labor, urgent or emergent laparotomy with cesarean delivery and uterine repair (or possibly even hysterectomy) is the only treatment. Urgency is determined by the speed of diagnosis and maternal and fetal stability. Once rupture is diagnosed, the cesarean should begin within 20–30 min.
- If rupture is diagnosed incidentally postpartum, the pt may undergo close observation without surgery.

Assessment Points

System	Effect	Assessment by Hx	PE	Test
CV	Tachycardia, hypotension, shock		BP, HR, orthostasis	
RESP	Discomfort with breathing due to diaphragmatic irritation	Shortness of breath	Tachypnea, labored breathing	
GU	Vaginal bleeding	Abdominal pain, shoulder pain, absence of contractions	Abdominal tenderness, presenting fetal parts	Hgb/Hct
HEME	DIC		Widespread bleeding especially at the IV site	Platelets, TEG, coagulation factors
FETUS	Category 2 or 3 fetal distress			FHR monitor

Key References: Nahum GG: Uterine rupture in pregnancy, *Medscape* <<http://reference.medscape.com/article/275854-overview#showall>>, 2016 (Accessed 15.03.16); Rossi AC, Prefumo F: Pregnancy outcomes of induced labor in women with previous cesarean section: a systematic review and meta-analysis, *Arch Gynecol Obstet* 291(2):273–280, 2015.

Perioperative Implications

Preoperative Preparation

- In TOLAC, monitor fetal heart rate tracing continuously.
- Strongly consider placing at least two 18-gauge IV lines for high-risk pts in labor.
- Identify high-risk pts for early epidural placement to confirm adequate anesthesia.
- Continuous epidural during labor can be advantageous in that it can be dosed for surgical anesthesia

- if a repeat cesarean is indicated. Use a combination of low-dose local anesthetic and opioid to reduce the likelihood of an instrumented delivery or mask the pain symptoms of uterine rupture.
- If an epidural is not present when uterine rupture is diagnosed or time for dosing is inadequate, GA may be necessary for an emergent repeat cesarean.
- Consider the following for the anesthetic management of suspected or confirmed uterine rupture:
 - Two large-bore IV lines.

- Typed and cross-matched blood products.
- Arterial line.
- Large-bore central line if peripheral access is poor.
- Fluid warmer.
- Quick access to laboratory values (point-of-care blood gas analyzer).

Monitoring

- ASA monitors; consider invasive monitoring of BP and CVP.