

Urologic Emergencies

Five Do-Not-Miss Diagnoses

Janelle Bludorn, MS, PA-C^{a,*}, Emily C. Thatcher, MPAS, PA-C^b

KEYWORDS

- Urologic emergencies • Acute urinary retention • Fournier's gangrene
- Testicular torsion • Priapism • Paraphimosis

KEY POINTS

- Acute urinary retention, often caused by bladder outflow obstruction requires prompt catheterization and can lead to complications if left untreated.
- Fournier's gangrene is a rapidly progressing necrotizing soft tissue infection of the perineum that requires immediate recognition, broad-spectrum antibiotics, and surgical debridement to prevent morbidity and mortality.
- Testicular torsion is a time-sensitive condition where the testicle twists on its blood supply, causing severe pain and requiring surgical intervention within 6 to 8 hours.
- Priapism is a prolonged, painful erection lasting over 4 hours, unrelated to sexual stimulation, which can lead to permanent erectile dysfunction if not treated promptly.
- Paraphimosis is an urgent condition where the foreskin becomes trapped behind the glans penis, causing progressive swelling and potential tissue necrosis if not reduced promptly.

INTRODUCTION

Patients present to outpatient and emergency settings with a broad range of acute urologic conditions with varying degrees of severity. Although many urologic conditions are not life-threatening, some are emergent and do require prompt diagnosis and urgent intervention to avoid significant morbidity and mortality. Often, the diagnosis and initial management of these emergent conditions may be readily apparent. However, in some instances, there may be a more subtle presentation, or the optimal initial management may be less apparent. As an additional consideration, some patients may delay care due to the sensitive nature of urologic conditions requiring prompt intervention when they ultimately present to the health care setting. This article

^a Duke Physician Assistant Program, Department of Family Medicine and Community Health, Duke University School of Medicine, 800 South Duke Street, Durham, NC 27701, USA; ^b UC Davis PA Program, Betty Irene Moore School of Nursing, University of California Davis, 2570 48th Street, Suite 2500, Sacramento, CA 95817, USA

* Corresponding author.

E-mail address: janelle.bludorn@duke.edu

Abbreviations

AUR	acute urinary retention
BPH	benign prostatic hyperplasia
CBC	complete blood count
CT	computed tomography
TWIST	testicular workup for ischemia and suspected torsion
UTI	urinary tract infection

provides an overview of 5 do-not-miss urologic emergencies, which, if not recognized and managed quickly, could lead to severe systemic illness, loss of sexual function, or even death. These include acute urinary retention (AUR), Fournier's gangrene, testicular torsion, phimosis, and paraphimosis.

ACUTE URINARY RETENTION

AUR is a urologic emergency characterized by a sudden inability to urinate. It is the most common urologic emergency, and its incidence increases with age. About 10% of men over 70 and nearly one-third of all men over 80 experience AUR within a 5-year period.¹ AUR is 13 times more common in males than females.²

The high incidence of AUR in men is mainly due to bladder outflow obstruction, commonly caused by benign prostatic hyperplasia (BPH).^{3,4} Other causes of bladder outflow obstruction in men include urethral strictures, prostate or bladder cancer, constipation, phimosis, paraphimosis, and urolithiasis.³ In women, AUR is less common and is usually due to pelvic organ prolapse or urethral diverticulum.² Regardless of sex, AUR can result from neurologic impairments and detrusor muscle insufficiency such as general anesthesia or in the setting of spinal cord injury.⁴ Certain medications like anticholinergics and sympathomimetics can also induce neurologic dysfunction and cause AUR.^{4,5} Additionally, urinary tract infections (UTIs) can trigger AUR, especially in individuals with preexisting urinary tract conditions, such as BPH.⁴

Individuals with AUR present with an inability to pass urine. While this may be acute or acute on chronic, history such as prior difficulties voiding including weak stream and urinary hesitancy can help identify the timeline. Patients frequently report significant discomfort, including suprapubic and lower abdominal pain, which may radiate to the bilateral flanks.

Upon general survey, patients may be visibly uncomfortable. Physical examination may reveal a distended bladder, as evidenced by tender suprapubic fullness and dullness to percussion. Clinicians should evaluate for costovertebral angle tenderness and abnormalities of the external genitalia, such as trauma or phimosis.⁴ Prostate palpation via digital rectal examination may also be revealing in the setting of suspected contributing prostate pathology.

AUR can be a clinical diagnosis, but it is typically confirmed using point-of-care bladder ultrasound or bladder scan to assess the degree of retention. If ultrasound or bladder scanner is not readily available, clinicians may proceed directly to bladder decompression via urinary catheterization, which serves as both a diagnostic and therapeutic measure. Urinalysis should be performed to rule out associated UTI; other laboratories, including basic metabolic panel or complete blood count (CBC), may be indicated based on clinical presentation.^{4,5}

Depending on the patient's condition, catheterization can be performed via urethral or suprapubic approach. The preferred intervention is urethral placement of an indwelling Foley catheter.⁵ For patients with known or suspected BPH, a Coudé-tipped catheter can be advantageous.⁴ After bladder decompression via catheterization,

most patients with AUR can be managed as outpatients with an indwelling catheter left in place, a secured leg bag, and appropriate patient education regarding indwelling catheter care. They should be referred to urology for a voiding trial in 3 to 10 days.¹ For patients with BPH, initiate an alpha-1 adrenergic antagonist.¹ Hospitalization is indicated for urosepsis, malignancy-related obstruction, acute myelopathy, or acute renal failure.⁴ Following emergent decompression, patients should be evaluated and monitored for hematuria, transient hypotension, and precipitation of postobstructive diuresis.⁶

FOURNIER'S GANGRENE

Fournier's gangrene is a rare, life-threatening necrotizing soft tissue infection of the perineum. It has an incidence of 1.6 per 100,000 males and is less common in women.^{7,8} Despite its rareness, clinicians should maintain a level of suspicion as it is a true urologic emergency that demands prompt recognition and treatment to mitigate the risk of rapid progression and mortality. The condition typically arises from a breakdown in the mucosal barriers of the urethra or colon, leading to a mixed polymicrobial infection involving organisms such as group A *Streptococci*, *Staphylococcus*, *Escherichia coli*, *Klebsiella*, *Enterococci*, *Clostridia*, and *Bacteroides*, among others.^{7,9} Although Fournier's gangrene can affect anyone, older men and individuals with diabetes mellitus are at elevated risk.⁹ Additional risk factors include obesity, immunodeficiency, malignancy, heavy alcohol use, smoking, and renal failure.^{9,10}

The onset of Fournier's gangrene is rapid, often initially with vague pain, itching, or edema of the perineum, labia, or scrotum before dramatic progression to more significant local and systemic manifestations.⁹ As the condition progresses, local features emerge, including erythema, tenderness, blisters, bullae, edema, subcutaneous gas, and crepitus. Severe pain out of proportion to physical examination is a classic finding.⁹ Systemic features such as hypotension, fever, and tachycardia can also be present. The infection can spread rapidly through superficial and deep fascial planes and extend into the anterior abdominal wall, gluteal folds, and genitalia. Diagnosis is primarily clinical and prompt identification and initiation of treatment is critical before septic shock, multiorgan failure, or death occurs.⁷

Although wound cultures are essential for identifying the pathogens and determining their susceptibility, initiation of empiric broad-spectrum antibiotic therapy and surgical consultation should not be delayed.⁹ Laboratory studies can support the diagnosis, including CBC revealing leukocytosis with a left shift and a metabolic panel suggestive of metabolic acidosis and acute kidney injury. If the patient is stable or the diagnosis is unclear, imaging may be useful but should not delay the initiation of treatment. Ultrasound, including point-of-care-ultrasound, can quickly identify subcutaneous emphysema suggestive of necrotizing soft tissue infection.⁹ Computed tomography (CT) is the most sensitive and specific diagnostic imaging for Fournier's gangrene.^{7,9,11}

The cornerstone of treatment of Fournier's gangrene is emergent and extensive surgical debridement alongside antibiotic therapy and volume resuscitation.⁷ Depending on the extent of the infection, surgical debridement may be managed by an interdisciplinary team, including urology, general surgery, obstetrics/gynecology, and plastic surgery, with many patients requiring a wide area of debridement and multiple reconstructive surgeries. Appropriate antibiotic regimens include coverage for gram-positive, gram-negative, and anaerobes; a parenteral carbapenem or piperacillin-tazobactam plus clindamycin plus vancomycin is a reasonable approach.^{5,9} Intravenous fluid resuscitation can be achieved with crystalloid with consideration for vasopressors if the patient is

persistently hypotensive.^{7,9} Adjunctive therapies, such as hyperbaric oxygen and vacuum-assisted closure devices may also help improve outcomes by reducing the extent of debridement required.⁹

Despite aggressive treatment, the morbidity and mortality associated with Fournier's gangrene remains high. Mortality rates from sepsis range between 20% and 40% even with aggressive treatment.^{7,10} Morbidity is influenced by the extent of surgical intervention required as this can potentially result in permanent complications such as colostomies, catheter dependence, decreased fertility, and loss of sensation.

TESTICULAR TORSION

Testicular torsion is an urgent urologic condition that can occur at any age. It affects approximately 1 in 4000 males under 25 annually, with a higher incidence in children and adolescents.¹² In adults, testicular torsion is less common but still accounts for a significant percentage of cases of acute scrotal pain.

This condition arises from inadequate fixation of the testis to the tunica vaginalis which can lead to the testis twisting on the spermatic cord, obstructing venous return and eventually compromising arterial flow.¹³ The compromised blood flow results in ischemia, which varies in severity depending on how long the torsion lasts and the degree of rotation.¹⁴

Patients with testicular torsion typically present with sudden, severe scrotal pain.⁵ Other symptoms may include nausea, vomiting, and abdominal pain.¹⁵ On physical examination, the scrotum is often swollen and tender, and the affected testis may be elevated or oriented horizontally, known as the *bell clapper* deformity.¹⁴ The cremasteric reflex is usually absent, although this is not a definitive diagnostic sign.⁵ Clinical decision tools such as the testicular workup for ischemia and suspected torsion (TWIST) score can be helpful for risk stratification based on clinical features (**Table 1**).¹⁵

Doppler ultrasound of the scrotum can support the diagnosis by revealing absent or reduced blood flow to the affected testicle or twisting of the spermatic cord, called the whirlpool sign.⁵ However, equivocal or negative ultrasound findings and a high clinical suspicion should also prompt urologic consultation and consideration of surgical exploration.

Patients suspected of having torsion based on history, examination, or ultrasound findings should be urgently evaluated by urology for consideration of surgical

Table 1
Testicular workup for ischemia and suspected torsion score

TWIST Parameter ²⁶	Score
Testicular swelling	2
Hard testicle	2
Absent cremasteric reflex	1
Nausea or vomiting	1
High-riding testis	1
<i>Total possible score</i>	<i>7</i>

Interpretation of the TWIST score²⁶:

Score 0–2: Low risk (100% negative predictive value for torsion)

Score 3–4: Intermediate risk (ultrasound warranted)

Score 5–7: High risk (100% positive predictive value for torsion)

evaluation and intervention. The standard treatment is surgical exploration and detorsion, ideally within 6 to 8 hours of symptom onset.¹⁵ If surgery is delayed, manual detorsion at the bedside may be attempted as a temporary measure to restore blood flow. This is performed by rotating the affected testicle away from midline.⁵ Surgical exploration not only confirms the diagnosis but also allows for the fixation of both the affected and contralateral testes to prevent future torsion.^{5,16} Delays in treatment can lead to irreversible testicular damage due to ischemia, with the risk of nonviability increasing significantly after 8 hours. Studies indicate that detorsion within 6 hours results in a 90% salvage rate, which drops to 50% after 12 hours and below 10% after 24 hours.^{12,16} Although torsion had previously been cited as causing an adverse impact on fertility, recent evidence suggests that unilateral testicular torsion in childhood or adolescence has negligible effect on fertility.¹⁷

PRIAPISM

Penile priapism is a prolonged, unwanted erection lasting at least 4 hours, unrelated to sexual stimulation.¹⁸ Clitoral priapism is also possible but will not be covered within this article.¹⁹ Priapism can be seen in any age group, with a bimodal distribution of incidence with peaks at ages 5 to 10 years old and 20 to 50 years old.²⁰ Sickle cell disease is a common contributing factor for younger patients, while medications tend to be implicated for older patients.²¹

Priapism is classified into 2 types: ischemic and nonischemic. The more common type, ischemic priapism occurs when blood becomes trapped in the penis, leading to pain and a fully rigid erection.²² Without treatment, it can cause irreversible damage, with tissue necrosis beginning after 24 hours and fibrosis developing after 48 hours. Common causes include sickle cell disease, malignancy, and certain medications or substances including sildenafil, intracavernous injections, alpha-blockers, anticoagulants, trazodone, bupropion, and cocaine.^{5,22} Ischemic priapism is a medical emergency; if it persists for over 12 to 24 hours, the risk of permanent erectile dysfunction is significant.

Less common and typically less painful, nonischemic priapism, usually results from a fistula between the cavernosal artery and the corpus cavernosum, often due to trauma or congenital arterial malformations.²² The erection is partial and nontender. This type is not typically associated with permanent damage, is not emergent, and has a high likelihood of resolving spontaneously or with conservative treatment.²²

Diagnosing ischemic priapism involves a detailed history and physical examination, focusing on the erection's duration, pain level, medications, and any history of hematologic disease or trauma. This can be a clinical diagnosis, importantly noting that acute embarrassment often delays presentation for evaluation. Penile doppler ultrasound can further aid in identifying blood flow patterns. Laboratory studies such as CBC and coagulation panels are indicated. Penile blood gas can be obtained to support the diagnosis of ischemic priapism, revealing hypoxemic acidosis.²² Upon high clinical suspicion and/or diagnosis, emergent urology consultation should be obtained to direct management.

For ischemic priapism, immediate treatment is essential to prevent permanent damage and erectile dysfunction. The first-line treatment is corporal aspiration, in which blood is drained from the penis using a needle or angiocatheter following administration of a dorsal penile nerve block.^{5,22} If this is insufficient, diluted phenylephrine, a vasoconstrictor, can be injected to reduce blood flow and allow drainage.^{5,22} If these measures fail, a surgical shunt may be created to redirect blood flow, or, in severe cases, dilation of the corpora may be necessary.²²

PARAPHIMOSIS

Paraphimosis is an urgent urologic condition where the foreskin of an uncircumcised or partially circumcised penis becomes trapped behind the glans penis and cannot return to its normal position.⁵ This leads to obstructed venous and lymphatic outflow, causing the foreskin and glans to become increasingly edematous. If untreated, the swelling can cut off arterial blood supply, leading to skin necrosis, infarction, or gangrene within hours to days.²³

Common etiologies of paraphimosis can be classified in these 4 categories:

1. Iatrogenic: health care provider neglects to reduce the foreskin after a urologic procedure²⁴
2. Anatomic: due to phimosis or loss of skin elasticity. Phimosis is the condition in which the foreskin is unable to be retracted behind the glans²³
3. Traumatic: from sexual activity or penile trauma²⁴
4. Failing to reduce the foreskin after urination or cleaning

Lesser common causes include infectious or inflammatory causes, or piercings.^{24–26}

Paraphimosis is a clinical diagnosis apparent upon history and physical examination. Symptoms include penile pain, swelling of the foreskin and glans, and a constricting band of phimotic tissue. In severe cases, ischemia may cause the skin to turn blue or black and become firm. Urinary obstruction may also occur, leading to bladder distention and suprapubic tenderness.²³

The mainstay of treatment is to reduce edema and restore the foreskin to its original position. This can be done by manual reduction at the bedside. The clinician should first compress the glans and foreskin to reduce swelling; this can be done by applying firm pressure with the hand or applying a compressive dressing.⁵ Then, apply water-soluble lubricant and gently push the glans back while pulling the foreskin forward. To improve patient tolerance of this procedure and thus improve its likelihood of success, ensure adequate analgesia before beginning. This may include administration of topical or injected local anesthetics, anti-inflammatories, opioids, and/or light sedation.⁵ If manual reduction fails or tissue necrosis is imminent, surgical intervention by urology is indicated. This may involve a dorsal slit procedure or circumcision.²⁴

DISCUSSION

The 5 urologic emergencies outlined in this article underscore the role of early recognition and prompt intervention to avoid significant morbidity or mortality. Conditions such as AUR, Fournier's gangrene, testicular torsion, priapism, and paraphimosis share a common theme: delayed diagnosis or treatment can lead to irreversible damage, systemic complications, or death. This highlights the necessity for clinicians to maintain a high index of suspicion, especially in cases where the presentation may be subtle or atypical. For example, Fournier's gangrene can begin with nonspecific symptoms but rapidly progress to a life-threatening infection, necessitating both clinical vigilance and the swift initiation of broad-spectrum antibiotics and surgical debridement.

Moreover, the sensitive nature of urologic emergencies may cause patients to delay seeking care, complicating the clinical course. This delay worsens the patient's prognosis and requires health care providers to be prepared to manage the advanced stages of the disease. In testicular torsion, for instance, the window for testicular salvage significantly narrows after 6 to 8 hours, reinforcing the urgency of immediate surgical consultation and intervention.

This article also emphasizes the interdisciplinary approach required in managing these emergencies, particularly in complex cases like Fournier's gangrene, which may involve urologists, surgeons, and intensive care teams. A robust understanding of the pathophysiology, and swift, decisive action, are critical in achieving favorable outcomes.

SUMMARY

In summary, although many urologic conditions do not pose the risk of major long-term morbidity or death, clinicians should keep emergent conditions on their list of differential diagnoses when patients present with acute genitourinary symptoms. The prompt diagnosis and management of conditions, including AUR, Fournier's gangrene, testicular torsion, phimosis, and paraphimosis, can have profound impacts on patient outcomes.

CLINICS CARE POINTS

- After placing a Foley catheter, uncomplicated benign prostatic hyperplasia-related acute urinary retention can be treated as an outpatient with alpha-1 adrenergic antagonists and a referral to urology, as long as postobstructive diuresis has been monitored and blood pressure remains stable.
- Fournier's gangrene is primarily a clinical diagnosis requiring immediate intervention; relying solely on imaging for diagnosis can delay treatment.
- Use the testicular workup for ischemia and suspected torsion score for risk stratification for testicular torsion based on clinical features, and do not exclude the diagnosis based on the presence of the cremasteric reflex alone.
- Ischemic priapism requires immediate intervention with corporal aspiration to avoid irreversible damage, while nonischemic priapism is a less emergent condition.
- Avoid overlooking the possibility of urinary obstruction in severe cases of paraphimosis and treat with adequate analgesia when performing manual reduction.

DISCLOSURES

The authors have nothing to disclose.

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