Acute urinary retention

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INTRODUCTION

Acute urinary retention (AUR) is the inability to voluntarily pass urine. It is the most common urologic emergency [1]. In males, AUR is most often secondary to benign prostatic hyperplasia (BPH); AUR is rare in females [2,3].

AUR is a urologic emergency that requires immediate treatment by insertion of a urinary catheter that allows the bladder to empty. Potential complications of an AUR event are pain, loss of bladder contractibility, urinary tract infections, kidney damage, incontinence, urosepsis, increased risk of another episode of AUR, and psychologic distress. Clinically, even one episode may result in permanent damage to the bladder with longstanding pathologic effects and symptoms [4].

This topic will review issues related to evaluation and management of AUR. The diagnosis and treatment of BPH and chronic urinary retention in females are discussed separately.

- (See "Clinical manifestations and diagnostic evaluation of benign prostatic hyperplasia".)
- (See "Medical treatment of benign prostatic hyperplasia".)
- (See "Surgical treatment of benign prostatic hyperplasia (BPH)".)
- (See "Chronic urinary retention in females".)

EPIDEMIOLOGY

AUR is common in males. The incidence increases with age, occurring most frequently in males over age 60 [2,3,5,6]. It is estimated that, over a five-year period, approximately 10 percent of males over the age of 70 and almost one-third of males in their 80s will develop AUR [2,3,7]. Demographic studies show that Black and Latinx patients present more frequently with AUR, suggesting undertreatment of benign prostatic hyperplasia in these populations as an underlying cause [8].

By contrast, AUR is rare in females [9]. It is estimated that there are three cases of AUR per 100,000 females per year [10]. The female to male incidence rate ratio is 1:13.

ETIOLOGIES

The etiology of AUR is poorly understood, although several contributory factors may lead to AUR; several mechanisms may occur concurrently. The most common mechanisms are outflow obstruction, neurologic impairment, or an inefficient detrusor muscle [11,12]. Other causes include medications, infection, and trauma.

- **Outflow obstruction** – Obstruction is the most common cause of AUR [13]. The flow of urine can be impeded by mechanical factors (physical narrowing of the urethral channel) and/or dynamic factors (increased muscle tone within and around the urethra) [11,14,15].

  - In males, benign prostatic hyperplasia (BPH) is the most common single cause of AUR and is a contributing factor in up to 60 percent of AUR cases [2,3,5,6,13,16]. Three to five percent of the AUR cases secondary to BPH are in treatment-naïve patients who discover their condition at the time of the episode [17,18].

  Other contributory factors of outflow obstruction in males include constipation, prostate or bladder cancer, urethral stricture, urolithiasis, phimosis, or paraphimosis [5,15]. (See "Lower urinary tract symptoms in males" and "Clinical manifestations and diagnostic evaluation of benign prostatic hyperplasia" and "Strictures of the adult male urethra".)

  - In females, obstruction is generally secondary to anatomic distortion, including pelvic organ prolapse (eg, cystocele or rectocele); pelvic masses; constipation; or, less commonly, urethral diverticulum [9,19-28]. (See "Pelvic organ prolapse in females: Epidemiology, risk factors, clinical manifestations, and management", section on 'Urinary symptoms' and "Urethral diverticulum in females".)

- **Neurologic impairment** – AUR may develop secondary to the interruption of the sensory or motor nerve supply to the detrusor muscle [5]. Incomplete relaxation of the urinary sphincter mechanism (dyssynergia) can also result in elevations in both voiding pressures and postvoid residual volumes.

  AUR can occur with spinal cord injuries from trauma, infarct or demyelination, epidural abscess and epidural metastasis, Guillain-Barré syndrome, diabetic neuropathy, and stroke [15]. AUR is typically accompanied by back pain and/or other neurologic deficits. Patients with neurologic impairment may develop acute-on-chronic urinary retention. (See "Chronic complications of spinal cord injury and disease", section on 'Bladder dysfunction' and "Manifestations of multiple sclerosis in adults", section on 'Bowel and bladder dysfunction' and "Complications of stroke: An overview", section on 'Urinary incontinence'.)

- **Inefficient detrusor muscle** – AUR may occur in patients with an inefficient detrusor muscle when a precipitating event results in an acute distended bladder (eg, with a fluid challenge, during general or epidural analgesia without an indwelling catheter) [11,15,29-31]. This most often occurs in patients with obstructive urinary symptoms at baseline.

- **Medications** – Multiple medications (table 1) are implicated as a cause of urinary retention; most common among these are the anticholinergic and sympathomimetic drugs [32].

  Medications lead to AUR through a variety of mechanisms. Patients taking opioids and anticholinergic medications are at higher risk for AUR due to decreased bladder sensation [1,33]. Anticholinergic medications also reduce detrusor contractility [33]. Nasal decongestants that contain sympathomimetic agents increase smooth muscle tone in the region of the bladder neck.

- **Infection** – Infections may lead to AUR in the setting of inflammation that causes obstruction. For example, an acutely inflamed prostate gland from acute prostatitis can cause AUR, particularly in males who already have BPH [13,34]. Similarly, a urinary tract infection can cause urethritis and urethral edema resulting in AUR [1,34]. (See "Acute bacterial prostatitis", section on 'Clinical manifestations'.)

  Genital herpes may cause AUR both from local inflammation as well as sacral nerve involvement. (See "Epidemiology, clinical manifestations, and diagnosis of genital herpes simplex virus infection", section on 'Primary'.)

  Other infections that have been associated with AUR include varicella zoster and vulvovaginitis [1,13,34].

- **Trauma** – Patients with trauma to the pelvis, urethra, or penis may develop AUR from mechanical disruption [13]. (See "Blunt genitourinary trauma: Initial evaluation and management".)

- **Other** – AUR may also occur postoperatively or in the postpartum period. In older males, the development of postoperative urinary retention is associated with future bladder outlet obstruction [35]. (See "Overview of post-anesthetic care for adult patients", section on 'Inability to void'.)

INITIAL EVALUATION

When to suspect acute urinary retention — AUR presents as an inability to pass urine, usually associated with lower abdominal and/or suprapubic (SP) discomfort [15]. Affected patients are often restless and may appear in considerable distress. In older adult patients, particularly those with dementia or other forms of cognitive impairment, AUR may present as an acute change of mental status [36].

Patients with acute-on-chronic urinary retention may present with recurrent urinary tract infections, declining renal function, or overflow incontinence, rather than an inability to pass urine. Discomfort may be less pronounced as well, as chronic urinary retention is often painless [37]. In these cases, patients and caregivers should monitor for acute changes in urination or abdominal fullness to detect AUR.

Patients with AUR are likely to present initially to an emergency department or the office of a primary care clinician. AUR also presents frequently in hospitalized patients, often related to medications or after surgical procedures. (See "Postoperative urinary retention in females" and "Overview of post-anesthetic care for adult patients", section on 'Inability to void'.)

Initial history and examination — The initial evaluation of patients with symptoms suggestive of AUR should begin with an abbreviated history and physical examination to determine the likelihood of the disorder. Most patients with AUR are in extreme distress, and prompt relief of the obstruction, if present, should be the primary focus of the initial encounter, rather than extended evaluation. (See 'Bladder decompression' below and 'Subsequent evaluation and management' below.)

- **History** – The patient history should focus on previous history of retention or lower urinary tract symptoms (table 2), prostate disease (hyperplasia or cancer), pelvic or prostate surgery, radiation, or pelvic trauma. The patient should also be asked about the presence of hematuria, dysuria, fever, low back pain, neurologic symptoms, long-term

systemic disease such as diabetes mellitus, or rash. Finally, a complete list of medications should be obtained to identify any agents associated with urinary retention (table 1).

In patients with back pain or neurologic symptoms, the presence of spinal cord compression should be considered. Younger age, history of malignancy, or intravenous drug use can be associated risk factors. These patients will most often have other signs and symptoms of spinal cord pathology, with AUR being one part of the clinical picture. (See "Clinical features and diagnosis of neoplastic epidural spinal cord compression", section on 'Clinical features' and "Spinal epidural abscess", section on 'Clinical manifestations'.)

- **Physical examination** – The initial physical examination should include lower abdominal palpation. The urinary bladder may be palpable, either on abdominal or rectal examination. Deep SP palpation will provoke discomfort.

  - Rectal examination – A rectal examination may be performed to evaluate for masses, fecal impaction, perineal sensation, and rectal sphincter tone. In males, a normal prostate examination does not preclude benign prostatic hyperplasia as a cause of obstruction.

  - Pelvic examination – Females with urinary retention should have a pelvic examination.

  - Neurologic evaluation – The neurologic examination should include assessment of strength, sensation, reflexes, and muscle tone, with a focus on the lower extremities and saddle areas.

Prompt diagnosis of retention — Patients are evaluated for AUR via either catheterization, bladder ultrasound, or both. The likelihood of urethral access, duration of symptoms, and level of acuity determines which initial method of evaluation is chosen. For patients that can undergo catheterization, the intervention is both diagnostic and therapeutic. (See 'Bladder decompression' below.)

- **Patients with contraindications to catheterization** – If any of the below factors are present, an urgent urologic referral is warranted to assist with alternative catheters or SP catheter placement. (See 'Difficulties with urethral catheterization' below and 'Suprapubic catheterization for selected patients' below.)

  - Patients with recent pelvic trauma or surgery
  - Patients with a history of urethral stricture

Although there is a theoretical risk to placement of a urethral catheter in the setting of acute bacterial prostatitis, this is not an absolute contraindication. These patients may have an attempt at gentle urethral catheterization by an experienced clinician. (See "Acute bacterial prostatitis", section on 'Nonantimicrobial therapy'.)

- **Patients that can undergo catheterization** – For patients in whom urethral access is likely to be clear, if they are in acute distress, prompt catheterization is indicated for relief of symptoms. If the patient is not in acute distress or the suspicion of AUR is low, bladder ultrasound may be pursued before attempting catheterization. This approach is more comfortable for the patient and avoids catheterization and the risk of catheter-related urethral injury if results are normal.

- **Diagnostic findings** – The diagnosis of AUR is made by demonstrating retained urine, either by bladder ultrasound or catheterization.

  - **On ultrasound** – A bladder volume on ultrasound ≥300 mL suggests urinary retention warranting decompression. However, the bladder ultrasound may be inaccurate due to body habitus, tissue edema, or prior surgery and scarring. Thus, if suspicion for AUR remains high (eg, if the patient is in discomfort and unable to void), a urethral catheter should be placed regardless of estimated volume on bladder ultrasound.

  - **On catheterization** – Upon placement of a urethral catheter, a drained volume of >200 mL confirms AUR.

BLADDER DECOMPRESSION

The initial management of AUR is prompt bladder decompression by catheterization, followed by additional laboratory testing to determine the etiology and associated complications.

Bladder decompression can be accomplished with urethral or suprapubic (SP) catheterization. There are no uniform guidelines for bladder decompression. Most patients will have an initial attempt at urethral catheterization. If bladder ultrasound is pursued initially, catheterization is indicated once urinary retention is demonstrated. (See 'Prompt diagnosis of retention' above.)

Urethral catheterization in most patients

Catheter choice and placement — With few exceptions, urethral catheterization is the appropriate initial method for decompression in AUR, particularly in patients for whom AUR is expected to resolve (eg, patients with urinary tract infections or AUR secondary to medication effect). A 14 to 18 French catheter should be inserted as first line in most patients with AUR [13].

Indications for choosing a smaller or larger catheter are discussed below. (See 'Difficulties with urethral catheterization' below.)

If the patient has had recent urologic surgery, acute prostatitis, or anatomic abnormalities, a coude tip catheter or SP catheter may be indicated. (See 'Difficulties with urethral catheterization' below and 'Suprapubic catheterization for selected patients' below.)

Regardless of the modality (urethral or SP), we recommend complete drainage of the bladder in patients with AUR. Historically, rapid complete bladder decompression was thought to increase the rate of potential complications (transient hematuria, hypotension, and postobstructive diuresis). However, partial drainage and clamping does not reduce these complications and may increase risk for urinary tract infection [37-40]. Therefore, this practice is no longer recommended.

Deciding whether to leave catheter in place — The decision to leave the catheter in place or remove it after initial drainage depends on patient factors and initial urine volume after catheterization. When the catheter is left in place, duration of catheterization is determined by the etiology of AUR and expected recovery. (See 'Voiding trial (trial without a catheter)' below.)

- **Acute kidney injury (AKI) or concern for hydronephrosis** – These patients should have the catheter left in place.
- **Urinary tract infection** – If a urinary tract infection is diagnosed, the catheter should be left in place until antimicrobial therapy has been initiated. (See 'Evaluating the etiology of AUR' below and 'Infection or medication effect' below.)
- **No concern for urinary tract infection, AKI, or hydronephrosis** – The initial drained urine volume guides decision making on if the catheter can be removed or if it should be left in place.
    - **Urine volume less than 200 mL** – For patients with an initial urine volume of less than 200 mL, immediate catheter removal and subsequent observation for recurrence is appropriate, as these findings are not consistent with a diagnosis of AUR. These patients should be evaluated for other causes of abdominal and/or SP discomfort. (See "Evaluation of the adult with abdominal pain" and "Acute pelvic pain in nonpregnant adult females: Evaluation".)
    - **Urine volume greater than 200 mL** – When the initial urine volume exceeds 200 mL, the total volume drained in the first 10 to 15 minutes should be recorded to determine

if the catheter can be removed or if it should be left in place pending further workup and treatment.

- If the total volume is >400 mL, the catheter is left in place.
- If the total volume is between 200 and 400 mL, the decision to remove the catheter depends on the etiology of AUR (see 'Subsequent evaluation and management' below), potential complications in the event of AUR recurrence, and the patient's ability to manage recurrent symptoms. We are more likely to leave a catheter in place in patients in whom workup for AUR etiology is ongoing, patients with altered mental status, and patients who may have difficulty returning to the hospital if AUR recurs.

Difficulties with urethral catheterization — Some patients may have an obstruction that does not readily allow passage of the catheter. A partially obstructing urethral or prostatic scar may be present if the patient has had a prior transurethral procedure (eg, transurethral resection of the prostate), pelvic trauma, or radiation [12]. In this case, the obstruction may be bypassed by downsizing the catheter to a 10 or 12 French indwelling catheter.

In the absence of prior instrumentation or injury, the more common cause of obstruction would be an enlarged prostate. For these patients, a larger catheter (20 or 22 gauge) with a firm coude tip may be needed and may require urologic consultation. (See "Placement and management of urinary bladder catheters in adults", section on 'Transurethral catheter placement'.)

If attempts to pass a catheter are not successful, urgent urology consultation may be an option for bedside flexible cystoscopy with either dilatation of a stricture or passage of a wire over which a urinary catheter may be placed [12].

Complications of urethral catheters are discussed separately. (See "Complications of urinary bladder catheters and preventive strategies", section on 'Urethral catheters'.)

Suprapubic catheterization for selected patients — Placement of a SP catheter is sometimes necessary for bladder decompression in patients who have contraindications to or fail urethral catheterization (eg, those with recent urologic surgery, acute prostatitis, urethral stricture disease, severe benign prostatic hyperplasia, or other anatomic abnormalities). SP catheterization may also be pursued for patients expected to require long-term bladder drainage.

SP catheters are usually placed by a urologist. SP tubes can be placed in the operating room, the emergency department, or occasionally an outpatient clinic. However, patient factors (age,

health, medications, body mass index, prior surgical history, etc) may preclude placement outside of the operating room.

In cases when no urologist or appropriately trained clinician is available and the patient is in distress, bladder distention can be temporarily relieved with SP aspiration via a needle. However, this treatment can make subsequent SP placement more difficult or even dangerous due to bladder decompression. If an appropriately trained medical professional will be available in the near future, needle decompression should be deferred. (See "Placement and management of urinary bladder catheters in adults", section on 'Suprapubic catheter placement'.)

SP catheters have some benefits over indwelling urethral catheters and are preferred in patients who are expected to require long-term bladder drainage. SP catheters prevent bladder neck and urethral dilatation and, therefore, prevent urinary incontinence due to sphincter dysfunction. They also have the advantage of allowing assessment of the patient's ability to void before removing the catheter, they may be associated with fewer infections than an indwelling urethral catheter [41], and they are less uncomfortable than urethral catheters. Lastly, SP catheters in males avoid the risk of subsequent urethral stricture, a common complication in males requiring long-term urethral catheterization [42].

However, SP catheters carry an increased risk for complications associated with placement, including bowel perforation and wound infection. (See "Complications of urinary bladder catheters and preventive strategies", section on 'Suprapubic catheters'.)

Complications of decompression — Complications associated with bladder decompression include [1]:

- **Hematuria** – Hematuria occurs in 2 to 16 percent of patients but is rarely clinically significant [37]. For example, one trial found that hematuria occurred in approximately 11 percent of patients with AUR; hematuria resolved with irrigation for almost all patients [43].

- **Transient hypotension** – After initial bladder decompression, patients may experience transient hypotension [37]. However, blood pressure usually normalizes without intervention and does not progress to clinically significant hypotension.

- **Postobstructive diuresis** – Relief of urinary tract obstruction can lead to a postobstructive diuresis, defined as a diuresis that persists after decompression of the bladder. Postobstructive diuresis is uncommon with AUR; it usually represents an appropriate attempt to excrete excess fluid retained during obstruction associated with chronic urinary

retention [44]. Typically, these patients present with acute renal failure and other electrolyte derangements.

Postobstructive diuresis may require additional fluid management. Many patients can manage the increase in urine output by increasing oral fluid intake. In patients who are unable to do so or have severe postobstructive diuresis, we measure the urine output and replace one-half the urine volume with one-half isotonic saline. However, the rate of replacement and choice of replacement fluid may differ based on initial volume status and whether hypo- or hypernatremia is also present. (See "Maintenance and replacement fluid therapy in adults", section on 'Replacement fluid therapy'.)

SUBSEQUENT EVALUATION AND MANAGEMENT

Evaluating the etiology of AUR — Once the bladder is decompressed and AUR is confirmed, information from the history and physical examination, including review of medications that cause AUR (table 1), are revisited to determine the etiology of AUR (see 'Initial history and examination' above). Laboratory testing is indicated to evaluate for infection and associated complications, including the following:

- Urinalysis, urine culture, and complete blood count to evaluate for suspected infection
- Serum chemistry and creatinine, especially in any patient whose history suggests acute-on-chronic urinary retention, to evaluate for associated acute kidney injury

Although benign prostatic hyperplasia (BPH) is a common cause of AUR in males, routine measurement of prostate-specific antigen is not indicated at this stage as it is expected to be elevated during an acute episode of AUR.

If the etiology for AUR is not found on initial evaluation, males should be referred to a urologist to evaluate for less common anatomic etiologies (eg, urethral stricture) and/or for possible bladder function testing. Urodynamic studies should be performed by a urologist with experience in functional bladder disorders. (See "Strictures of the adult male urethra" and "Urethral diverticulum in females".)

Females with posterior vaginal defects (eg, rectocele) leading to incontinence should be evaluated by a gynecologist. (See "Posterior vaginal defects (eg, rectocele): Clinical manifestations, diagnosis, and nonsurgical management".)

Additional treatment by etiology — Subsequent treatment is guided by the underlying etiology of AUR.

Infection or medication effect — Infection and medication effect are treatable etiologies of AUR. In these patients, antibiotic therapy for infection or discontinuation of medications causing urinary retention (table 1) should prompt resolution of AUR. Antibiotic regimens for infection are discussed elsewhere. (See "Acute bacterial prostatitis", section on 'Management' and "Acute simple cystitis in adult and adolescent females", section on 'Management'.)

For these patients, no further evaluation is needed unless the AUR does not resolve with treatment.

Benign prostatic hyperplasia — BPH is the most common cause of AUR in males [2,3,5,6,13]. Males without a history of BPH should be presumed to have AUR due to BPH if there are no other likely etiologies. For males with suspected or documented BPH, we initiate an alpha-1-adrenergic antagonist at the time of initial catheterization, if the patient is not already on therapy. Options and doses are provided in the table (table 3).

For those with documented BPH, we also add a 5-alpha reductase inhibitor to reduce AUR recurrence and symptomatic progression of BPH [45-47]. Once AUR develops in males with known BPH, AUR recurrence risk is high. Studies performed before effective medical management was available found that one-half of males experienced a recurrence of AUR within one week and two-thirds experienced a recurrence within one year [30,48].

Management of BPH is discussed in detail separately. (See "Medical treatment of benign prostatic hyperplasia", section on 'Combination of alpha-adrenergic blockers and steroid 5-alpha reductase inhibitors'.)

Patients without a previous diagnosis of BPH who are started empirically on an alpha-1-adrenergic antagonist will need further evaluation with a urologist for confirmation or alternative diagnosis. (See "Clinical manifestations and diagnostic evaluation of benign prostatic hyperplasia".)

Other conditions — The management of other conditions that are associated with AUR are discussed in the individual topic reviews. As examples:

- Spinal cord injury (see "Chronic complications of spinal cord injury and disease", section on 'Urinary complications')
- Urethral stricture (see "Strictures of the adult male urethra")
- Urethral diverticulum (see "Urethral diverticulum in females")

Indications for hospitalization — Most patients can be managed in the outpatient setting once the bladder is decompressed [49]. Hospitalization is indicated for patients who have

urosepsis, obstruction related to malignancy, acute myelopathy, or acute renal failure associated with bladder obstruction [1,13]. Patients who develop severe postobstructive diuresis that cannot be managed by increasing oral fluid intake may require hospitalization for intravenous fluid management. (See 'Complications of decompression' above.)

Prior to discharge, patients should be instructed in managing the catheter, emptying their catheter bag, and monitoring their urine output. Prophylactic antibiotics are not indicated for patients with an indwelling urinary catheter. (See "Placement and management of urinary bladder catheters in adults", section on 'Catheter care' and "Placement and management of urinary bladder catheters in adults", section on 'Prophylactic antibiotics'.)

The approach and timeline of catheter removal is discussed below. If the patient is discharged with a catheter in place, follow-up for outpatient management should be arranged prior to discharge. (See 'Voiding trial (trial without a catheter)' below.)

VOIDING TRIAL (TRIAL WITHOUT A CATHETER)

The duration of catheterization depends on the underlying etiology of AUR and the patient's success with a voiding trial.

Timing of voiding trial — In patients with AUR, initial bladder decompression and initiation of medical therapy should be followed by a voiding trial or trial without a catheter. The timing of the voiding trial is determined by the underlying etiology of AUR and its likelihood of resolution.

- **Single-episode, reversible etiology of AUR** – Patients with an underlying etiology that is expected to resolve with treatment (eg, urinary tract infection, postoperative urinary retention, medication effect) should attempt a voiding trial as soon as possible once the underlying condition has been treated to avoid catheter complications. (See 'Performing a voiding trial (trial without a catheter)' below and "Complications of urinary bladder catheters and preventive strategies".)

- **AUR due to BPH** – In patients with suspected or documented benign prostatic hyperplasia (BPH) presenting with AUR, medical therapy should be started at the time of initial catheterization. Patients newly started on medical therapy should complete at least three days of medical therapy prior to voiding trial. (See 'Benign prostatic hyperplasia' above.)

  The optimal timing of voiding trial in patients with AUR due to BPH is uncertain, and clinical practice varies. In general, we suggest a voiding trial 7 to 10 days after the catheter is placed; however, in patients with AUR and BPH who have been started on medical

therapy and do not have high volume retention >800 mL, it is reasonable to offer a voiding trial as early as three days after the catheter is placed. We provide self-catheterization teaching at the time of voiding trial, if manageable by the patient or care team. This practice avoids future episodes of retention and facilitates monitoring of postvoid residual (PVR). (See 'Management after initial voiding trial' below and "Placement and management of urinary bladder catheters in adults", section on 'Clean intermittent catheterization'.)

An older randomized trial suggested that voiding trial success was more likely after seven days of catheterization versus two days (62 versus 51 percent) [50]. In particular, patients with retention volumes >1300 mL may benefit from more prolonged catheterization. In contrast, a subsequent observational study of 2600 males with AUR and BPH suggested that males who were catheterized for three days or less had greater success with spontaneous voiding compared with males catheterized for more than three days [51]. The success rate was higher in males receiving an alpha-1-adrenergic antagonist before the voiding trial. However, in our clinical experience, there is a higher failure rate of early voiding trials.

- **AUR with chronic etiology** – Patients who have underlying etiologies not likely to resolve within one week (eg, stricture, spinal cord injury) and/or who have acute-on-chronic urinary retention should have a voiding trial one to two weeks after the catheter is placed. This timing allows for therapeutic bladder decompression and initiation of medical therapy to maximize the likelihood of success of a voiding trial; though, many of such patients may require chronic catheterization. (See 'Performing a voiding trial (trial without a catheter)' below.)

Performing a voiding trial (trial without a catheter)

Voiding trial procedure — In our practice, a voiding trial starts with catheter removal early in the morning either at home, in the office, or in the inpatient setting if hospitalized. Patients are encouraged to hydrate aggressively and have a PVR measured four to six hours later in the office or while inpatient. The outcome of the voiding trial is determined by PVR measurement, as below.

Interpretation of voiding trial

- PVR <200 mL is considered a successful voiding trial and the catheter is discontinued.
- PVR >200 mL is considered equivocal. In such patients, we provide instruction on clean intermittent catheterization (CIC), if manageable by the patient or care team, as it can be used as an adjunct to voiding or for AUR recurrences that may require rescue bladder

drainage. In patients with AUR, CIC is preferred, as it is associated with an increased rate of spontaneous voiding and reduction in urinary tract infections compared with indwelling catheters [52]. (See "Placement and management of urinary bladder catheters in adults", section on 'Clean intermittent catheterization'.)

If patients are unable or unwilling to perform CIC, an indwelling urethral catheter is replaced.

Reported success rates for initial voiding trials in males with prostate disease with AUR have ranged from 20 to 40 percent [53]. Factors that favor a successful voiding trial include age less than 65 years, detrusor pressure greater than 35 cm H_2O, a drained volume of less than one liter at catheterization, and the identification of a precipitating event [48,53].

Management after initial voiding trial

- **Patients who discontinue the catheter (successful voiding trial)** – Patients who pass a voiding trial for AUR should be counseled that urinary retention may recur, especially in patients with AUR from BPH. These patients should be mindful of the presenting symptoms of AUR; including their own voiding diaries may be useful in monitoring for subtle changes in symptoms that may indicate AUR recurrence. (See 'When to suspect acute urinary retention' above.)

- **Patients who perform clean intermittent catheterization** – Patients who successfully manage CIC may continue using this method as an adjunct to voiding and for AUR recurrences indefinitely.

- **Patients who had an indwelling catheter replaced** – If a first voiding trial is unsuccessful and the indwelling catheter is replaced, we suggest a second voiding trial two weeks later (see 'Performing a voiding trial (trial without a catheter)' above). If a second voiding trial is not successful, chronic catheterization may be necessary. Long-term CIC is preferred, as per above (see 'Interpretation of voiding trial' above). If CIC is not possible, an indwelling or suprapubic (SP) catheter is placed. Additional details regarding CIC and SP catheterization are discussed elsewhere. (See "Placement and management of urinary bladder catheters in adults", section on 'Clean intermittent catheterization' and 'Suprapubic catheterization for selected patients' above.)

  Some patients may be candidates for surgery, depending on the etiology of urinary retention. (See 'Indications for surgery' below.)

Persistent urinary retention in females, including additional evaluation and treatment options, is discussed in detail elsewhere. (See "Chronic urinary retention in females".)

INDICATIONS FOR SURGERY

Patients who have two or more unsuccessful voiding trials should be evaluated for surgery, which remains the definitive treatment for AUR. These patients should undergo urodynamic studies to determine if a surgical procedure to reduce bladder outlet resistance would be beneficial. If urodynamic studies show elevated bladder pressures suggestive of outlet obstruction, surgery may have a role in alleviating symptoms.

Among symptomatic patients with benign prostatic hyperplasia, transurethral resection of the prostate reduces the risk of developing AUR by 85 to 90 percent [54]. (See "Surgical treatment of benign prostatic hyperplasia (BPH)".)

If surgery is pursued, it should be scheduled at least 30 days after an episode of AUR [49]. Patients who undergo surgery immediately following an episode of AUR are at an increased risk of complications, including intraoperative bleeding and sepsis related to bacteriuria [49,55]. In one cohort study, 1242 males who underwent prostatectomy for AUR had an increased risk of perioperative complications in addition to an excess risk of death at 30 and 90 days after the procedure compared with males undergoing elective prostatectomy (relative risk 26.6 and 4.4, respectively) [49]. Some of this excess risk could be due to older age, larger prostate size, and higher comorbidity in the males with AUR.

Surgical indications for females with chronic urinary retention are discussed separately. (See "Chronic urinary retention in females", section on 'Women with obstruction'.)

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Benign prostatic hyperplasia".)

INFORMATION FOR PATIENTS

UpToDate offers two types of patient education materials, "The Basics" and "Beyond the Basics." The Basics patient education pieces are written in plain language, at the 5^{th} to 6^{th} grade reading

level, and they answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials. Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are written at the 10th to 12th grade reading level and are best for patients who want in-depth information and are comfortable with some medical jargon.

Here are the patient education articles that are relevant to this topic. We encourage you to print or e-mail these topics to your patients. (You can also locate patient education articles on a variety of subjects by searching on "patient info" and the keyword(s) of interest.)

- Basics topic (see "Patient education: Neurogenic bladder in adults (The Basics)")

SUMMARY AND RECOMMENDATIONS

- **Etiologies** – Acute urinary retention (AUR) is the most common urologic emergency and is seen more often in males than females. Benign prostatic hyperplasia (BPH) is the most common underlying condition in males, but there are many possible etiologies, including neurologic disorders, trauma, and infection. Medications are frequently implicated (table 1). (See 'Epidemiology' above and 'Etiologies' above.)

- **When to suspect AUR** – Patients generally present with the abrupt inability to pass urine. It is typically associated with lower abdominal and/or suprapubic (SP) discomfort. Patients who have chronic urinary retention may not have abdominal pain but may complain of symptoms of overflow incontinence. Persons with dementia or other forms of cognitive impairment may present with an acute change in mental status. (See 'When to suspect acute urinary retention' above.)

- **Making the diagnosis** – The diagnosis is made by demonstrating >300 mL retained urine by bladder ultrasound or >200 mL by catheterization.

  If the procedure can be performed relatively quickly, a bladder ultrasound is a good first choice for patients who are not in extreme distress because it is noninvasive, it is more comfortable for the patient, and bladder decompression can be avoided if results are normal.

  In patients whose history and physical examination strongly suggest a diagnosis of AUR, including SP discomfort and/or palpable bladder fullness, it is reasonable to proceed

directly to catheterization, which is both diagnostic and therapeutic. (See 'Prompt diagnosis of retention' above.)

- **Acute bladder decompression** – Initial management of AUR consists of prompt bladder decompression, usually with an indwelling urethral catheter. Urethral catheterization is contraindicated in patients who have had recent urologic surgery (eg, radical prostatectomy or urethral reconstruction). A SP catheter may be necessary when obstruction precludes a urethral catheter and is also preferred in patients who are expected to require longer-term catheterization. (See 'Bladder decompression' above.)

- **Additional treatment by etiology** – Additional treatment relies on the underlying etiology of AUR. (See 'Evaluating the etiology of AUR' above.)

  In males with BPH or presumed BPH, treatment also includes an alpha-1-adrenergic antagonist initiated at the time of initial catheterization. Combination treatment for BPH, including addition of a 5-alpha reductase inhibitor is indicated to prevent recurrence of AUR and symptomatic progression of BPH. (See 'Benign prostatic hyperplasia' above.)

  If an etiology for AUR is not identified, patients should be referred to urology or gynecology for specialized evaluation. (See 'Additional treatment by etiology' above.)

- **Limited need for hospitalization** – The majority of patients can be managed as outpatients once bladder decompression is accomplished. Hospitalization is indicated for patients with urosepsis, acute kidney injury, or obstruction related to malignancy or spinal cord compression. (See 'Indications for hospitalization' above.)

- **Voiding trial (trial without a catheter)** – The duration of catheterization depends on the underlying etiology of AUR and the patient's success with a voiding trial.

  - **Timing of voiding trial** – Patients with AUR that is expected to resolve with treatment (eg, urinary tract infection, postoperative urinary retention, medication effect) can undergo voiding trial as soon as the underlying condition has been treated. We wait at least one to two weeks to perform voiding trial in patients with underlying etiologies not likely to resolve within one week (eg, spinal cord injury, stricture) and/or acute-on-chronic urinary retention. This timing allows for therapeutic bladder decompression and initiation of medical therapy.

    The optimal timing of voiding trial in patients with AUR due to BPH is uncertain, and practice varies. For these patients, we suggest initiating medical therapy and deferring the voiding trial for at least 7 to 10 days after the catheter is placed to increase the

likelihood of a successful trial (**Grade 2C**). However, in patients who do not have high retention volume (eg, ≤800 mL), it is reasonable to offer a voiding trial as early as three days after initiation of medical therapy.

We provide self-catheterization teaching at the time of voiding trial, if manageable by the patient or care team. This practice avoids future episodes of retention and facilitates monitoring of postvoid residual (PVR). (See 'Timing of voiding trial' above.)

- **Performing a voiding trial** – We remove the catheter early in the morning and encourage patients to hydrate aggressively. The PVR is measured four to six hours later. (See 'Performing a voiding trial (trial without a catheter)' above.)
  - A PVR <200 mL is considered successful, and the catheter is discontinued.
  - A PVR >200 mL is considered equivocal. In such patients, we provide instruction on clean intermittent catheterization (CIC), if manageable by the patient or care team. CIC can be used as an adjunct to voiding or for AUR recurrences that may require rescue bladder drainage. If CIC cannot be managed by the patient, the indwelling catheter is replaced.
- **Repeat voiding trial** – For patients in whom initial voiding trial is unsuccessful, we advise a second voiding trial after an additional two weeks with the catheter in place. (See 'Management after initial voiding trial' above.)

- **Management of unsuccessful voiding trial** – Chronic catheterization either through long-term CIC, indwelling urethral catheter, or SP catheter may be necessary in patients with unsuccessful voiding trials. Surgical therapy may be warranted for definitive treatment in some patients. (See 'Management after initial voiding trial' above and 'Indications for surgery' above.)

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GRAPHICS

Pharmacologic agents associated with urinary retention

Sympathomimetics (alpha-adrenergic agents)	Ephedrine sulfate (Marax, Tedral)
	Phenylephrine HCl (Neo-Synephrine)
	Phenylpropanolamine HCL (Conlac)
	Pseudoephedrine HCl (Sudafed, Actifed)
Sympathomimetics (beta-adrenergic agents)	Isoproterenol
	Metaproterenol
	Terbutaline
Antidepressants	Imipramine (Tofranil)
	Nortriptyline (Aventyl)
	Amitriptyline (Elavil)
	Doxepin (Adapin)
	Amoxepine (Asendin)
	Maprotiline (Ludiomil)
Antiarrhythmics	Quinidine
	Procainamide
	Disopyramide
Anticholinergics (selected)	Atropine
	Scopolamine hydrobromide
	Clidinium bromide (Quarzan)
	Glycopyrrolate (Robinul)
	Mepenzolate bromide (Cantil)
	Oxybutynin (Ditropan)
	Flavoxate HCl (Urispas)
	Hyoscyamine sulfate (Anaspaz)
	Belladonna
	Homatropine methylbromide
	Propantheline bromide (Probanthine)
	Dicyclomine HCl (Bentyl)

Antiparkinsonian agents	Trihexyphenidyl HCl (Arlane)
	Benztropine Mesylate (Cogentin)
	Amantadine HCl (Symmetrel)
	Levodopa (Sinemet)
	Bromocriptine Mesylate (Parlodel)
Hormonal agents	Progesterone
	Estrogen
	Testosterone
Antipsychotics	Haloperidol (Haldol)
	Thiothixene (Navane)
	Thioridizine (Mellaril)
	Chlorpromazine (Thorazine)
	Fluphenazine (Prolixin)
	Prochlorperazine (Compazine)
Antihistamines (selected)	Diphenhydramine HCl (Benadryl)
	Chlorpheniramine (Chlor-Trimeton)
	Brompheniramine (Dimetane)
	Cyproheptadine (Periactin)
	Hydroxyzine (Atarax, Vistaril)
Antihypertensives	Hydralazine (Apresoline)
	Nifedipine (Procardia)
Muscle relaxants	Diazepam (Valium)
	Baclofen (Lioresal)
	Cyclobenzaprine (Flexeril)
Miscellaneous	Indomethacin (Indocin)
	Carbamazepine (Tegretol)
	Amphetamines
	Dopamine
	Vincristine
	Morphine sulfate and other opioids
	Anesthetic agents

Graphic 75763 Version 2.0

American Urological Association (AUA) urinary symptom score/International Prostate Symptom Score (IPSS)

Questions to be answered	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always	
1. Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5	
2. Over the past month, how often have you had to urinate again less than 2 hours after you finished urinating?	0	1	2	3	4	5	
3. Over the past month, how often have you found you stopped and started again several times when you urinated?	0	1	2	3	4	5	

4. Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
6. Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	
7. Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	0 (none)	1 (1 time)	2 (2 times)	3 (3 times)	4 (4 times)	5 (5 or more times)	
						Sum of numbers (AUA symptom score):	
Total score:							
0 to 7: Mild symptoms							
8 to 19: Moderate symptoms							
20 to 35: Severe symptoms							

Quality of life due to urinary symptoms	Delighted	Pleased	Mostly satisfied	Mixed - about equally satisfied and unsatisfied	Mostly dissatisfied	Unhappy	T
If you were to spend the rest of your life with your urinary condition the way it is now, how would you feel about that?	0	1	2	3	4	5	6

The AUA symptom score and the IPSS use the same questions and scale. The IPSS additionally includes the last disease-specific quality of life question.

Graphic 57680 Version 11.0

Alpha-1-receptor antagonists used to treat lower urinary tract symptoms due to benign prostatic hyperplasia (BPH)

Medication	Dose*		Administration
Alfuzosin (Uroxatral, Xatral)	Initial and maintenance	10 mg	Once daily immediately following a meal at the same time each day
Silodosin (Rapaflo)	Initial and maintenance	8 mg	Once daily with a meal at the same time each day
Tamsulosin (Flomax)	Initial and maintenance	0.4 mg	Once daily approximately 30 minutes after a meal at the same time each day; 0.8 mg dose may be administered as 0.4 mg twice daily
	If inadequate response after 2 to 4 weeks	0.8 mg	
Tamsulosin extended-release (Flomax CR) (NOTE: formulation available in some countries other than the United States)	Initial and maintenance	0.4 mg	Once daily with a meal at the same time each day; maximum dose 0.4 mg once daily
Conventional agents: Titration recommended to reduce orthostatic effects Dose is advanced as shown if patient remains symptomatic and is tolerating current dose			
Doxazosin immediate-release (Cardura)	Days 1 to 3	1 mg	Once daily at bedtime
	Days 4 to 14	2 mg	
	Weeks 2 to 6	4 mg	
	Week 7 and thereafter	8 mg	
Doxazosin extended-release (Cardura XL)	Days 1 to 21	4 mg	Once daily with morning meal
	Week 4 and thereafter	8 mg	
Terazosin (Hytrin)	**Standard titration (appropriate for most patients)**		
	Days 1 to 3	1 mg	Once daily at bedtime
	Days 4 to 14	2 mg	
	Weeks 2 to 6	5 mg	
	Week 7 and thereafter	10 mg	

	If inadequate response after 4 to 6 weeks of 10 mg/day	20 mg	
	Rapid titration (for selected patients)		
	Days 1 to 3	1 mg	Once daily at bedtime
	Days 4 to 14	2 mg	
	Weeks 2 to 3	5 mg	
	Week 4 and thereafter	10 mg	
	If inadequate response after 4 to 6 weeks of 10 mg/day	20 mg	

- Dosing recommendations are for oral administration in adult patients with normal organ function. Titration schedules are examples; other regimens may be appropriate. For recommendations on clinical use and individualizing drug selection, refer to the clinical topic review of BPH and individual drug information topics.
- Alpha-1-receptor antagonists may have additive hypotensive effects with phosphodiesterase-5 inhibitors (eg, sildenafil) and other agents that lower blood pressure. For specific drug interactions, refer to the Lexicomp drug interactions database included within UpToDate.
- Dosing recommendations for other agents used to treat lower urinary tract symptoms due to BPH is available in a separate table within UpToDate.

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* If therapy is interrupted for 3 or more days, reinitiate at lowest dose and retitrate according to schedule.

Data from:

1. *Lee M. Management of benign prostatic hyperplasia. In: Pharmacotherapy, 7th ed, Dipiro JT, Talbert RL, Yee GC, et al (Eds), McGraw-Hill Medical 2008.*
2. *Lexicomp Online. Copyright © 1978-2024 Lexicomp, Inc. All Rights Reserved.*
3. *AUA Practice Guidelines Committee. AUA guideline on management of benign prostatic hyperplasia (2003). Chapter 1: Diagnosis and treatment recommendations. J Urol 2003; 170:530.*

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