

Urethral Stricture Disease

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Overview

Urinary obstruction can occur for many reasons. In particular, obstruction of urine, as it flows from the bladder through the urethra, may be caused by a narrowing caused by scar. It occurs rarely in women, and is seen more commonly in men. A number of things can lead to stricture formation, and the most important of these are: trauma/injury (straddle injury, pelvic fracture), infection (sexually transmitted disease), post-instrumentation (eg. traumatic catheter placement, transurethral surgery) and malignancy/cancer (rare). Strictures which are found at the tip of the penis/urethra (urethral meatus) may be caused by trauma, but are often associated with an inflammatory skin condition known as lichen sclerosis et atrophicus (previously balanitis xerotica obliterans).

In general, urethral strictures are divided into two main categories:

1. Anterior urethra (from the sphincter [control muscle] to the tip of the penis)
2. Posterior urethra (from the bladder to the urethral sphincter)

Symptoms

Men who develop urethral strictures describe symptoms associated with the inability to adequately empty their bladder: weak urinary stream, straining to urinate, spraying of the stream, incomplete emptying, dribbling, urinary tract infection and inability to void. Rarely is pain associated with this condition, unless it relates to the acute injury. Blood in the urine is rare, but may be associated with a stricture.

Causes

Strictures that occur in the anterior urethra are usually a result of an injury to the urethra, and its development may not become evident for many months to years. The most common location for a stricture in the anterior urethra is in what's known as the bulbar urethra, which is that part of the urethra that sits just below the pubic bone. "Straddle" injuries, such as falling onto the crossbar of a bicycle, may cause a urethral contusion ("bruising") to occur, and a stricture develops as these injuries heal. Other causes include injury from placement of a catheter, trauma from endoscopes or foreign bodies, and sexually transmitted diseases (STDs). STDs cause intense inflammation of the urethra and the surrounding tissues, causing urethritis. Left untreated, this inflammation may result in scarring or stricture formation. Prompt diagnosis and treatment of urethritis reduces the risk of subsequent stricture formation.

Risk Factors

- History of trauma/injury: pelvic fracture, groin injury

- History of urinary tract instrumentation/urethral surgery: transurethral surgery, catheterization, urethral dilation
- History of urethritis: Sexually transmitted disease (Gonococcus, Chlamydia)
- History of previous urethral stricture
- Others: stab or gunshot wounds to penis, radiation exposure

Diagnosis

The diagnosis of urethral stricture begins with a history and physical exam. Patients will often describe certain risks factors (see above), and for those patients with the symptoms, described above, a thorough investigation is required to rule out urethral stricture or complications related to one.

Urinanalysis: performed to rule out hematuria (blood in the urine), infection or other urinary abnormalities.

Urine culture: studies the urine for evidence of infection, which may occur in some people with a urethral stricture.

Uroflowmetry/Peak flow urine study: individuals are asked to void into a special toilet, which measures the speed at which urine flows from the bladder to the end of the urethra. Many individuals with a stricture will have a diminished rate of flow.

Post-void Residual Urine Study: an ultrasound of the bladder is performed, measuring the amount of urine that remains after a "normal" void.

Retrograde Urethrogram (RUG) with Voiding Cystourethrogram (VCUG): X-ray contrast (dye) is used to fill the urethra and bladder as images are obtained, identifying the level of blockage. Men are then asked to void (VCUG) and again x-rays are taken to better outline the level of stricture.

(See images below)



Cystoscopy: using a fiberoptic telescope the urinary tract from the tip of the penis to the bladder can be inspected. This can help rule-out other causes of obstruction or allow the urologist to better characterize the stricture.

Sonourethrogram: This test is usually done in the operating room as part of the pre-operative surgical planning.; It uses an ultrasound probe to image the stricture, measure its length and assess for the degree of scarring.

Most patients will have a urinalysis, urine culture, uroflowmetry, post-void residual study and a RUG/VCUG. Cystoscopy may not be required and its need will be determined by the doctor.

Complications

- Urinary retention - not being able to urinate
- Urinary tract infection (UTI)
- Bleeding
- Difficulty with ejaculation
- Bladder stone
- Urethrocutaneous fistula (abnormal connection between urethra and skin)
- Renal failure (very rare)

Treatment

There are no medical treatments for urethral stricture, though early treatment of urethritis or UTI's with antibiotics is an important part of the treatment of strictures. The treatment of urethral strictures can be divided into three main categories:

1. **Nonoperative:** for many men the stricture is not severe enough or bothersome, and the risk of complications remains low. In these men, doing nothing may be the best option, avoiding the need for surgery. This strategy may also be adopted for men with significant medical illnesses that place them at a greater risk for having surgery. A strategy, in which the patient self-catheterizes, may be used to slow the rate of narrowing from the stricture. Sometimes a urinary catheter will be placed through the skin of the lower abdomen (suprapubic tube) to drain the urine, for individuals who are very sick or have impassable strictures prior to surgery.
2. **Minimally invasive/endourological:** When the stricture becomes severe enough to block the urine flow or cause complications, a procedure to dilate/open-up the stricture is required. This may be performed in the office using urethral sounds (metal dilating rods), a cystoscope and urethral dilators or in the operating room, where the stricture is cut using a knife or laser (internal urethrotomy). In general, a catheter will be placed for 1-10 days after each of these procedures. Deciding which procedure to use first depends on the nature of the stricture. Depending on the length of the stricture, the success of these procedures is in the range of 50% for "first-time" attempts. Individuals who redevelop a stricture after one of these procedures may require more formal reconstruction, because success of subsequent minimally invasive treatments is significantly lower. Current research using temporary urethral stents (metal coils which hold the urethra open while it heals after dilation) is being conducted, but their use remains investigational at this point.
3. **Open Surgical Reconstruction:** In carefully selected patients, who fail other forms of management, reconstruction is the preferred form of management.
 - a. For short strictures (<2.0 cm) in the bulbar urethra, removing the stricture and then reconnecting the ends of urethra (excision with primary re-anastomosis) has success rates of 90-95%.
 - b. Strictures may require more complex forms of reconstruction due to significant scarring, length (>2.0 cm), location (posterior urethra, meatus/penile tip, or pendulous urethra/shaft). Tissue transfer techniques may be combined with re-anastomosis to achieve a good repair. The most commonly used tissue that is used to aid in reconstruction is buccal mucosa, taken from the inside lining of the cheek and "grafted" into the urethra. This allows the surgeon to develop a more wide open urethra. Skin from the penis may also be used, and when used it usually remains attached to its own blood supply, a "flap", and thus can be very useful for very difficult to treat strictures. Success rates for graft and flap procedures in the bulbar urethra range from 80-90%.

- c. For the most complex strictures of the anterior urethra, including the urethral meatus, a staged surgical approach is adopted, removing the stricture then placing a graft in the open space. This is allowed to heal open to the air for a period of 9-12 months, before it is "retubularized" into a urethra. This is usually reserved for individuals with strictures in the pendulous urethra, very scarred strictures, repeated failures, and very long strictures.

Self-care

People who have sustained an injury to the urethra are encouraged to follow-up with a urologist or primary care provider, especially if they develop urinary symptoms related to obstruction. Self-dilating may help slow the rate at which strictures reform after dilation. For those individuals at risk for contracting STDs, use of barrier contraception (condoms) is strongly encourage, as is prompt treatment of urethritis with antibiotics.

Related Conditions

urethral stenosis, urethral injury, urethral disruption