Log on to www.EMRonline.com
for emergency medicine information

Rapid Reference Card
Enclosed

Emergency Medicine Reports
The Practical Journal for Emergency Physicians

Volume 23, Number 3 **January 28, 2002**

This is the final installment of a two-part series outlining diagnosis and management strategies for adults and children with urological emergencies. This issue will focus on penile, prostate, and urethral disorders, including both medical and traumatic conditions.
— *The Editor*

Penile Disorders

The penis is formed by three cylindrical structures: two larger corpora cavernosa dorsally, and a smaller corpus spongiosum ventrally, which contains the urethra. *(See Figure 1.)* The corpora cavernosa are the principal erectile bodies and extend from the glans penis to beneath the pubic rami. The tunica albuginea is a tube of connective tissue surrounding the corpora cavernosa and corpus spongiosum. The corpora cavernosa and corpus spongiosum are surrounded by Buck's fascia, which extends proximally to fuse with Colles fascia.

Priapism. The word priapism is derived from "Priapos," the name for the Greek god of fertility. Priapism is defined as a persistent (> 4-6 hours), often painful, erection of the penis, and is a true urological emergency.[1] It is an involuntary response and not

Diagnosis and Emergency Department Management of Urologic Emergencies in the Male Patient
Part II: Penile Disorders

Authors: **Gary D. Hals, MD, PhD,** Attending Physician, Department of Emergency Medicine, Palmetto Richland Memorial Hospital, Columbia, SC; **Tom Dietrich, MD**, Resident Physician, Palmetto Richland Memorial Hospital, Columbia, SC; and **David Ford, MD,** Attending Physician, Department of Emergency Medicine, Palmetto Richland Memorial Hospital, Columbia, SC.

Peer Reviewers: **William B. Ignatoff, MD**, Emergency Physician, Emergency Room Associates, Carondelet Health Network, St. Joseph's and St. Mary's Hospitals, Tucson, AZ; and **Brooks F. Bock, MD, FACEP**, Dayanandan Professsor and Chair, Department of Emergency Medicine, Wayne State University, Detroit Receiving Hospital, Detroit, MI.

associated with sexual stimulation. A recent review on priapism found that the incidence is increasing, mostly due to a rise in drug-associated priapism and cases related to trauma.[2] Some authors divide priapism into high-flow (non-ischemic) and low-flow (ischemic) states. Low-flow (ischemic) priapism results from a defect in blood flow to the penis, specifically when the corpora cavernosa do not drain blood to restore the penis to a flaccid state. In contrast to a normal erection, only the corpora cavernosa become erect, while the corpus spongiosum remains flaccid. The glans also remains soft, providing a useful diagnostic clue. As tissue ischemia is a feature of low-flow priapism, aspirated blood from the cavernous spaces is dark and has a low pH and pO_2. Measurement of pH and pO_2 on aspirated blood can be used to differentiate high-flow from low-flow if the diagnosis is unclear. Even though the corpus spongiosum remains flaccid, urethral obstruction causing urinary retention still can occur. Suprapubic catheterization may be required if a Foley catheter is unable to be passed. High-flow or non-ischemic priapism is uncommon, and results when arterial

inflow exceeds the venous outflow capability. It usually results from isolated, aberrant neural regulation in absence of physical outflow obstruction, or from traumatic fistulae formed between the cavernosal artery and the corpus cavernosum. The erection is less firm and less painful, as ischemia usually is not a feature. High-flow priapism is rare in the United States, and most often is associated with trauma when it does occur.

Low-flow priapism results from venous outflow obstruction, and can be reversible or non-reversible depending on the cause. In low-flow priapism, the erection often becomes painful, as intracavernosal pressures can exceed arterial pressure, producing ischemia. Persistent ischemia will lead to cell death, producing fibrosis and scarring that can prevent future erections. Impotence has been reported as a complication in up to 35-50% of priapism cases.[3] Older patients have an even higher incidence of impo-

Accreditation

THOMSON

AMERICAN HEALTH CONSULTANTS
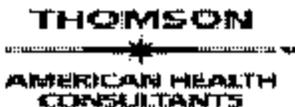
Statement of Financial Disclosure

tence. Obviously, medicolegal risk is high with this complication. Hematologic disorders are the most common cause of low-flow priapism, with sickle cell disease leading the list. In one study, up to 42% of patients with sickle cell disease reported at least one episode of priapism.[4] Other causes include thalassemia, leukemia, polycythemia, and thrombocytopenia; it also may be a drug-related complication. Drugs implicated in priapism include antihypertensives (hydralazine, calcium channel blockers), antipsychotics (trazodone, thioridizine), androgens (testosterone, tamoxifen), anticoagulants (rebound hypercoagulability with cessation of heparin), and illicit drugs (cocaine, marijuana), as well as ethanol.[5] It also is a well-known complication of drugs (prostaglandin E1, papaverine) used in the treatment of erectile dysfunction.[6]

During the evaluation of patients with priapism, several historical questions are important. The most important is the duration of the problem, as impotence is produced by prolonged ischemia, and priapism for more than 24 hours carries a high risk for complications. Some patients cause priapism by self-administration of injection treatments for impotence; it is important to elicit this history by direct questioning, as some patients may be reluctant to volunteer this fact. History of hematologic disorders and recent drug use also is helpful in determining the cause. The typical laboratory screen includes complete blood count (CBC), coagulation studies, and urinalysis.

Treatment depends in part on the cause (i.e., exchange transfusion for sickle cell patients with priapism), although several options are described as useful regardless of the cause. Anecdotal treatments with sedation (ketamine) or ice water enemas are reported by some as ineffective.[3] Terbutaline 0.25-0.5 mg subcutaneously may be helpful and may be repeated every 20 minutes as needed.[3] Pseudoephedrine, 60-120 mg orally, also has been reported as successful in some patients presenting in fewer than four hours post onset.[3] If these measures are unsuccessful, needle aspiration of the cavernosa, followed by injection of phenylephrine or pseudoephedrine, is recommended. Recently, injection of methylene blue also has been described as effective.[7] Although most ED physicians would choose to defer this procdure to a urologist, if one is not available in a timely fashion, the ED physician may need to perform the procedure. Briefly, a penile nerve block first should be performed by injecting lidocaine without epinephrine around the base of the penis. A 16- to 19-gauge needle attached to a large (20 cc) syringe is inserted laterally into the corpus cavernosa to avoid the urethra. Insert the needle at the 2 o'clock or 10 o'clock position, but vascular connections between the cavernosa usually make only one aspiration site necessary. The physician should attempt to remove up to 30 cc of blood, and if aspiration alone is successful, a compressing bandage should be placed to prevent return of priapism. If unsuccessful, repeat aspiration and then follow with injection of an equal volume of phenylephrine (10 mg in 500 cc of normal saline). As phenylephrine is an alpha agonist and produces vasoconstriction, one should use caution in patients with severe hypertension. Patients who do not respond to injection require surgery to create a venous shunt. High-flow priapism has been

Figure 1. Cross-section Anatomy of the Penis

Bladder
Rectovesical pouch
Prostate
Rectum
Urogenital diaphragm
Pubic symphysis
Suspensory ligament of penis
Corpus cavernosum
Urethra
Corpus spongiosum
Glans penis
Fossa navicularis
Scrotal septum
Corpus spongiosum

Fascia of Denonvilliers
Scarpa's fascia
Buck's fascia
Colles fascia
Dartos fascia

Tunica albuginea
Corpora cavernosa
Buck's fascia
Colles fascia
Corpus spongiosum
Urethra
Skin

Used with permission from: Tanagho EA, McAnich JW, eds. *Smith's General Urology*, 15th ed. New York: McGraw-Hill Education;2000:10.

managed recently by selective embolization.[8] All patients should be referred to a urologist for follow-up within 24 hours.

Balanitis. Balanitis is defined as inflammation of the glans penis, and posthitis is inflammation of the foreskin. Balanoposthitis is inflammation of both the glans penis and surrounding foreskin. Balanitis is a common problem and is the chief complaint in 11% of visits by adults and 3% of children to urology clinics. The most frequent complication from balanitis is phimosis or the inability to retract the foreskin. Balanitis is caused primarily by poor hygiene, but like recurrent vaginal yeast infections, repeated episodes can be a presenting symptom of diabetes. Patients present complaining of penile discharge, itching, and at times, difficulty urinating or impotence. Diagnosis is made by visual inspection of the penis, which will reveal erythema, edema and tenderness of the glans, small ulcerations, malodorous discharge, and difficulty visualizing the meatus. Patients with longstanding balanitis may present complaining of phimosis. Treatment consists of local cleaning by retracting the foreskin daily and washing with mild soap and warm water. Topical antifungal agents (i.e., clotrimazole or nystatin) also are indicated. If bacterial superinfection is suspected, a culture of the discharge may be obtained in severe or resistant cases, and oral broad-spectrum antibiotics (cephalosporin) prescribed. Serum glucose should be checked to screen for undiagnosed diabetes. When balanitis leads to phimosis, it is important to refer the patient to a urologist, as some patients with balanitis/phimosis also will have an undiagnosed penile cancer "hiding" underneath the foreskin.

Phimosis. Phimosis is defined as the inability to retract the foreskin to visualize the glans; if any of the glans can be seen, the patient does not have phimosis. Phimosis can be divided into congenital and acquired types. Congenital phimosis is a normal, physiologic finding in children. Males are born with the foreskin tightly adhered to the glans at birth. This condition can persist into later childhood (11-13 years). No treatment is indicated other than parental education, as misguided attempts to retract the foreskin can lead to a preventable case of paraphimosis.

Acquired phimosis is seen in adults and is a pathologic condition. It usually develops from chronic or repeated episodes of balanitis or balanoposthitis resulting in adhesions of the foreskin to the glans. Symptoms patients may present with include decreased or absent urinary stream, hematuria, dysuria, urinary retention, or penile pain. As long as the patient is not experiencing symptoms from the phimosis, no treatment other than urologic referral and education is indicated. For symptomatic patients, caution is urged, because forcing the glans through a tight preputial opening may cause paraphimosis, which is a more serious condition than phimosis. *(See following section.)* Treatment includes placing a urinary catheter (if possible) for patients with urinary retention. If unable to place the catheter, a suprapubic catheter will be needed. After appropriate anesthesia (careful, direct injection of lidocaine without epinephrine into the fore-
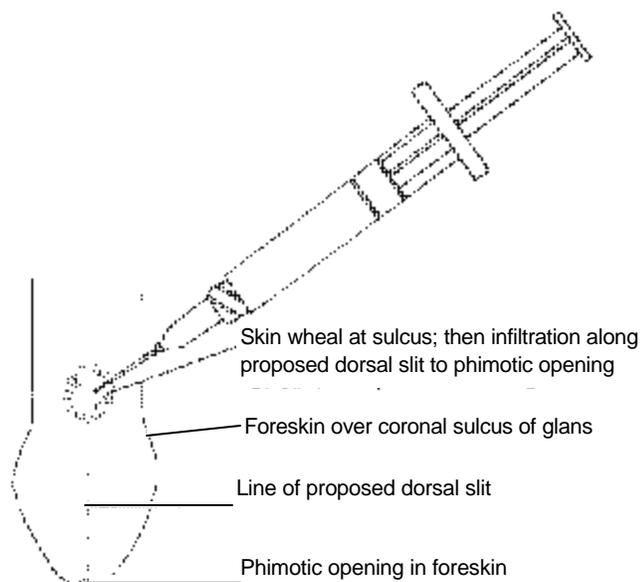
Figure 2A. Technique for anesthetizing the foreskin before performing dorsal slit procedure as treatment for phimosis.

Figure 2B. Placement of hemostats for dorsal slit procedure as treatment for phimosis.

Figures used with permission from: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co.; 1998: 948.

skin), hemostats may be used to dilate the foreskin opening. If unsuccessful, a dorsal slit may be required. In brief, after local anesthesia, a straight hemostat is used to crush the foreskin along the dorsal aspect. *(See Figure 2A.)* Pressure is maintained for several minutes. Great care must be taken not to inadvertently injure the meatus or glans with the hemostat during this maneuver. After removal of the hemostat, the foreskin is incised along the hemostat line using straight scissors up to the level of the coronal sulcus. *(See Figure 2B.)* The edges of the incision should be closed with 4-O simple interrupted chromic suture. Circumcision will be required at follow-up and should be arranged with the consultant. Each ED physician may have different levels of comfort and experience with this procedure and may choose to defer it to the consultant. This is appropriate only if the procedure can be performed in a timely fashion, i.e., the same day. ED physicians need to be aware of how to perform this procedure in case no urologic consultant is available.

Paraphimosis. Paraphimosis is the inability to reduce the retracted foreskin over the glans to its natural position. This is a true urological emergency as it produces edema, venous congestion, and ultimately, arterial compromise with gangrene of the glans. Several common causes of paraphimosis include: 1) not replacing the foreskin in its natural position after urinary catheter placement; 2) forcing retraction of the foreskin in children with a naturally narrow preputial opening; 3) scarring of the foreskin from repeated episodes of balanitis or balanoposthitis leading to a contracted band of foreskin; and 4) more recently, skin piercing complications.[9] Treatment involves several methods to return the

foreskin to its natural position. Before attempting these techniques, one must remember to examine for an occult constriction, such as a hair tourniquet.

The treatment options discussed in the literature can be divided into non-invasive and invasive techniques. The non-invasive technique involves attempting to reduce edema (and size) of the glans to allow the foreskin passage back over the glans. After penile block with lidocaine, the glans can be firmly squeezed, wrapped with kerlex or small elastic wrap for five minutes, or ice can be applied to reduce swelling. One can either place thumbs on the glans and use index and middle fingers to apply traction to the foreskin, or grasp the dorsal band with forceps (at 3 o'clock and 9 o'clock positions), applying constant traction on the foreskin while a second operator applies constant counter pressure to the glans penis. *(See Figure 3.)* In a series of nine patients (six children, three adults), one group was able to reduce 100% with durations of 6-36 hours.[10]

More invasive techniques include the puncture technique,[11] which consists of making multiple punctures of the glans with an 18-gauge needle to allow edema fluid to escape the foreskin. This is followed by application of pressure to the glans while simultaneously pulling the foreskin back to its normal position as described above. The final and most invasive technique involves incision of the phimotic ring, the tight band of tissue preventing the foreskin from returning to its natural position. *(See Figure 3.)* This procedure normally is performed by the urologic consultant, but may be done by the ED physician when consultants are not available. Lidocaine without epinephrine is infiltrated on both

Figure 3. Manual Reduction and Surgical Treatment of Paraphimosis
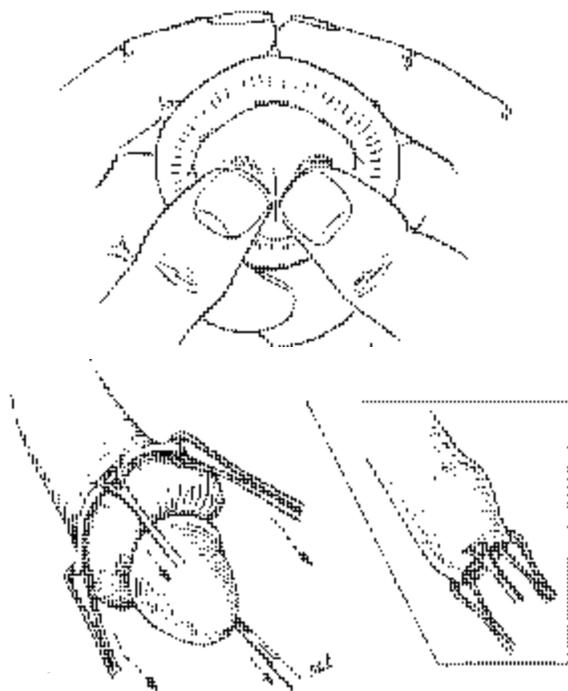
Manual Reduction. *Top:* Placement of fingers for manual reduction of paraphimosis.
Bottom: Use of Babcock clamps to manually reduce paraphimosis.

- Line of infiltration and incision
- Constricting ring
- Paraphimosis
- Glans
- Extending incision too far will foreshorten and tether the penis
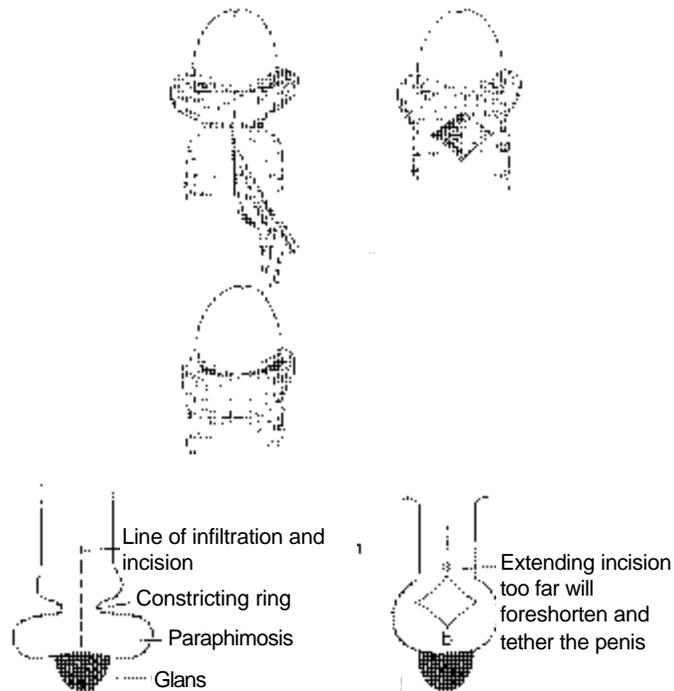
Surgical Treatment. Constricting ring is where incision should be performed to release foreskin.

Figures used with permission from: Roberts JR, Hedges JR (eds). *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co.; 1998: 951-952.
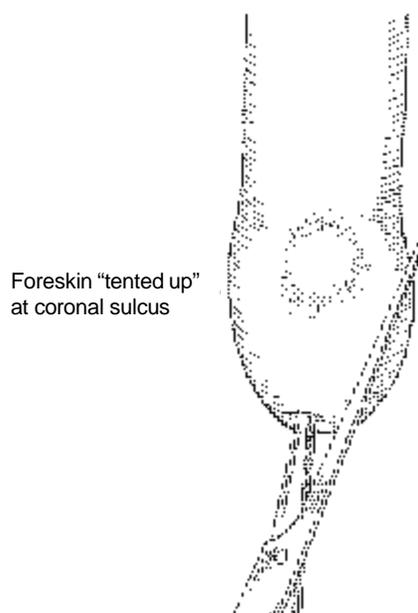
---

sides of the phimotic ring on the dorsal aspect of the penis. A scalpel is used to incise down to and through the phimotic ring, after which the foreskin will relax and easily be reduced. Care should be taken not to injure the penile shaft during this procedure; the wound should extend only through the foreskin, and not injure deeper structures. The wound needs to be continued to a full dorsal slit if concern exists about patient follow-up, compliance, or recurrence of paraphimosis. Full circumcision is required after 7-10 days for resolution of the initial edema.

Penile Tourniquet. Various objects can become entrapped around the penis both in children and adults. Adults may place objects around the penis for sexual activity, while in young children human hairs are the most common etiology. Care must be taken to consider child abuse in children with penile tourniquets, as well. Delay in removal of these objects can cause unnecessary ischemia (with serious consequences) and, therefore, they must be removed swiftly. When removal of these items is beyond the emergency physician's level of comfort and experience, urologic consultation is required. Some cases will require removal and further treatment in surgery. Important features of the history and exam include assessment of the ability to void, presence of normal sensation, skin color, and presence of pulses. Pulses are best detected by Doppler ultrasound. Both children and adults are affected by zipper injuries, which can entrap the penis. Zipper injuries can be treated by breaking the median bar of the zipper (to release the tissue), using mineral oil to lubricate and release the tissue, or by excision of the trapped tissue with a small elliptical incision.[12] Metal or non-expanding rings encircling the penis may be removed by compressing the distal penis by wrapping with gauze or string to facilitate removal.[13] When removing these rings with any cutting blade, it is best to place some type of guard between the ring and skin to prevent unintentional damage. Care also must be taken to cool metal items during the cutting procedure. Removal of entrapped hairs can be challenging, as the hair can become imbedded to the point of being nearly invisible in the edematous tissue. If attempts at removal with magnification and fine dissection are unsuccessful, consultation with a urologist is required. With any penile tourniquet, if concern exists for integrity of the urethra or distal penile artery, their patency must be established before discharge of the patient from the ED.

Fournier's Gangrene. Fournier's gangrene is a surgical emergency produced by polymicrobial infection of the subcutaneous tissues in the groin. It is synonymous with necrotizing fasciitis of the perineal, perianal, and genital areas. It is characterized by a rapidly progressive and highly lethal course. Mortality rates vary, but usually exceed 40% in most series.[14] Patients with more advanced disease (abdominal and thigh involvement), comorbid conditions, and shock on presentation are more likely to succumb. Fournier's gangrene is not limited to males or

adults, although the male to female ratio is 10:1 and most patients range from 30 to 60 years of age. Risk factors include diabetes and other forms of immune suppression, advanced age, alcoholism, malnutrition, HIV infection, obesity, and local trauma.[15] Most cases average four isolates, with *Escherichia coli* as the predominant aerobe and *Bacteroides fragilis* the main anaerobe.

First described by Jean Alfred Fournier in 1883, the infection originates in the skin surrounding the genitals, in the urethra, or in the rectum. Undertreated or undiagnosed ischiorectal, perianal, and intersphincteric abscesses are the most common causes of Fournier's gangrene.[14] Although it begins as a simple cellulitis or abscess, unlike most localized infections, it produces end-artery thrombosis (obliterative endarteritis) and ischemia in surrounding healthy tissue, leading to extremely rapid spread from the site of origin. Classical Fournier's gangrene destroys skin, subcutaneous tissue, and fascia, but spares underlying muscle. Fascial destruction rates as high as 2-3 cm per hour have been quoted by some authors,[14] underscoring the importance of not delaying diagnosis and treatment. It can spread to the penis and scrotum along Buck's or dartos fascia, or to the abdominal wall via Scarpa's fascia. Actual testicular involvement is rare, as testicles receive their blood supply from arteries originating directly off the aorta.

The first signs of infection are pain and itching of the genitals or perineal areas, and most patients wait an average of five days before presenting for care. Complaints of pain often will be out of proportion to physical findings, and pain actually may decrease with more advanced tissue destruction. On physical exam, the patient with more advanced disease typically appears septic, with fever and hemodynamic instability, but early in the course he may present with few systemic signs. Reddened skin with surrounding edema may be the only physical finding. However, as time passes, surrounding skin becomes hypoesthetic, crepitance often can be felt, and overlying skin becomes dark and necrotic. The scrotum can become swollen, tense, and discolored.

Given the rapid course, consultation should be done as soon as Fournier's gangrene is suspected and should not wait for any laboratory test results. The patient's only chance for recovery is rapid surgical intervention to debride necrotic tissue and halt progression of damage. If care of the patient is beyond resources at one's institution, transfer also should be made as soon as the diagnosis is suspected. Tests indicated include those for any septic patient (CBC, electrolytes, and cultures of blood, urine, and wounds), as well as imaging. Plain films sometimes may show gas in the scrotum, as may ultrasound, and it has been reported in up to 90% of cases,[16] but absence of subcutaneous gas does not exclude the diagnosis. A computed tomography (CT) scan will define the extent of the disease more accurately and can identify the underlying cause (e.g., location of an abscess), but should not be ordered without prior urologic consultation. Although the definitive treatment is surgical intervention, ED treatment includes fluid resuscitation, administration of broad spectrum antibiotics (i.e., 2 gm ceftriaxone IV), and very early consultation when the diagnosis is considered.

Tetanus prophylaxis also easily can be forgotten. Hyperbaric oxygen treatment has been shown to be beneficial in several series,[17] but should be arranged only after discussion with the consultant.

Penile Fracture. Penile fracture is a rare urologic emergency involving blunt trauma to an erect penis. Most cases in the United States involve forceful intercourse, with the penis striking the pubis or perineum, while in Middle Eastern cultures, attempted detumescence by forceful downward deflection of the erect penis is the primary cause.[18] The patient will present reporting hearing an audible crack followed by pain, detumescence, deviation away from the fracture, ecchymosis or frank hematoma, and edema of the penis. Pathologically, a tear or rupture is found in the tunica albuginea and one or both of the corpora cavernosa. Up to 20% of cases may involve traumatic injury of the corpus spongiosum and urethral disruption as well.[19] Any sign of blood at the urethral meatus necessitates the need for a retrograde urethrogram to delineate urethral integrity. Initial stabilization should involve cold compresses, analgesia, and Foley catheterization barring urethral injury demonstrated by retrograde urethrogram. The only accepted treatment is surgical repair.[20,21] Unnecessary delays between injury and repair will allow for scarring and thereby increase risk for complications not limited to erectile dysfunction, urethral fistulas, penile aneurysm, and penile curvature.

Penile Cancer. Penile cancer is relatively rare, with a frequency of 1 out of every 100,000 malignancies.[3] Squamous cell carcinoma is the most common cancer reported, and risk factors include lack of circumcision, phimosis, chronic inflammation such as balanitis, tobacco use, and history of human papilloma virus (genital warts).[22] It most often presents in the fifth or sixth decade. Early lesions often can be hidden just behind the glans and may not be visible without retraction of the penis during physical exam. Treatment consists of surgical resection and radiation therapy. As with most cancers, early detection is associated with higher survival rates, and any patient with a suspicious lesion needs referral to a urologist for further evaluation and treatment.

Prostate

Anatomy. The prostate gland is a part fibro-muscular, part glandular organ that sits just inferior to the urinary bladder and behind the symphysis pubis in the pelvis. It normally weighs 18g and contains the posterior 2.5 cm of the urethra. The ejaculatory ducts leave on its posterior side and empty into the posterior urethra. The prostate gland consists of an outer fibrous capsule. Beneath this is found a sphere of collagen and smooth muscle fibers that surround the urethra; this makes up the involuntary sphincter. Deep to this layer lies the prostatic stroma. This layer is composed of elastic tissue, smooth muscle fibers, and connective tissue. The epithelial glands are embedded in this mix of tissue. These glands drain into the 25 excretory ducts, which then drain into the prostatic urethra.

Prostatitis. Prostatitis is common, and results in nearly 1 million visits to the ED and physicians offices yearly. Acute

prostatitis will be the final diagnosis in nearly 25% of males presenting with acute genitourinary complaints. Patients with increased risk are the immunocompromised (i.e., those with diabetes or end-stage renal disease), those with chronic renal insufficiency, or those with history of urethral instrumentation. Prostatitis has been divided into four categories: acute bacterial, chronic bacterial, non-bacterial, and prostadynia. The other three are self-explanatory, but prostadynia is characterized by complaints consistent with prostatitis without signs of prostatitis. This section will cover only acute bacterial prostatitis (ABP).

ABP is an infection of the prostate caused primarily by the same aerobic gram-negative rods that are responsible for most urinary tract infections. The coliforms, especially *Escherichia coli*, cause 80% of cases. *Pseudomonas* species, *Enterobacter, Klebsiella, Serratia,* and *Proteus* account for about 20% of cases. Enterococci, such as *Streptococcus faecalis*, rarely can cause ABP. Patients with renal tuberculosis may seed the prostate and have tuberculosis prostatitis. It is very uncommon to have a mixed bacterial infection. It is still not clearly known how the prostate gland becomes infected. Various routes have been postulated, including urine reflux into the prostatic ducts (which empty into the posterior urethra), direct ascent of bacteria up the urethra, spread to the prostate of blood-borne bacteria, and lymph-borne spread of bacteria from the rectum. ABP often is associated with acute cystitis, and frequently causes urinary retention. Although an acute prostatic infection usually resolves completely with appropriate antibiotic therapy, abscess of the prostate can occur. Therefore, it is important to have the patient follow up with a urologist one week after beginning therapy.

ABP typically presents with fever, chills, back and perineal area pain, urinary frequency, urgency, dysuria, nocturia, and bladder outlet obstruction symptoms. Arthralgias, myalgias, and malaise are common accompanying symptoms. Some patients will complain of painful ejaculation, a historical feature fairly specific for acute prostatitis. On rectal examination, the prostate is exquisitely tender, swollen, firm, indurated, and warm to the touch. All or part of the gland may demonstrate these signs. As cystitis often accompanies ABP, urinalysis and urine culture, as well as culture of any spontaneous urethral discharge, usually will yield the infecting pathogen.

ABP responds extremely well to antibiotics that would not normally diffuse from plasma into prostatic fluid. This is because the intense inflammation and hyperemia in ABP cause enhanced passage of antibiotics into the prostate. Since the causative organisms are usually gram-negative rods, the preferred initial therapy is aimed at this group of bacteria. Preferred oral therapy is with trimethoprim, 160 mg, and sulfamethoxazole, 80 mg, twice daily for 10-14 days. Alternatives for sulfa allergic patients include ampicillin, 500 mg PO every 6 hours for 30 days, or ofloxacin, 400 mg PO twice a day for 30 days.[23] Patients with systemic symptoms (fever, vomiting, etc.) require parenteral therapy with tobramycin or gentamicin (both 3-5 mg/kg/day) plus ampicillin, 2 g IV every 6 hours for one week, after which the patient is started on 23 days of oral

therapy. General supportive measures such as hydration, bed rest, medication for fever and pain, and stool softeners also are indicated. Any transurethral instrumentation (i.e., Foley catheter placement) is contraindicated during acute infection. Should the patient develop acute urinary retention, suprapubic catheter placement and hospitalization by a urologist is indicated. After a successful course of treatment, the patient should be followed for at least four months and undergo periodic examinations and cultures of prostatic fluid.

Prostate Cancer. Prostate cancer is the second most common cancer of males in the United States, with lung cancer being the first. There are about 200,000 new cases per year and around 30,000 deaths from complications of prostate cancer. Although there are several kinds of prostate cancer, most cases are adenocarcinoma. Multiple factors have been associated with increased risk of prostate cancer. The risk at age 40 is 1 in 100,000 and rises to 1146 in 100,000 at age 85. Fully 70% of men older than age 90 have signs of prostate cancer on autopsy. Men older than age 65 account for 80% of the cases diagnosed. Race also is a factor, as the risk for African-American men is 1.5-2 times higher than for Caucasians. Prostate cancer is diagnosed at younger ages in African-American males as well. A positive family history for prostate cancer brings a two- to three-fold increased risk. High levels of dietary fat and cadmium also are identified risk factors.

As prostate cancer typically exhibits slower growth than many cancers, the survival rates are better than for most cancers. Five-year survival rates are 92%, and 10-year survival rates are 67%, with the higher rates achieved in patients with early detection. Unfortunately, prostate cancer often is a silent disease, with many cases found on routine physical exam. Symptoms suggestive of prostate cancer include urinary obstruction/retention, urinary tract infections (UTIs), impotence, bone pain from metastases, and signs of spinal cord compression. When evaluating older men with these symptoms, the presence of occult prostate cancer should be considered and urologic consultation or follow-up arranged.

Urethral Disorders

Urinary Retention. Older male patients often present with complaints of inability to void. In fact, urinary obstruction (from any cause) is a frequent cause of acute and chronic renal failure, and it is theoretically preventable. In many patients, the symptoms appear gradually, as with benign prostatic hypertrophy, and the patient is unaware of the change over time. It becomes "normal" for him. Unfortunately, as the output of urine is blocked from the bladder, pressures rise in the urethra and kidney. The pressure rise in the nephron reduces the glomerular filtration rate, and if not corrected leads, to a concomitant reduction in renal blood flow (via thromboxane A2 and angiotensin II). The decline in blood flow is so dramatic that the kidney slowly becomes ischemic to the point of gradual necrosis. If the obstruction is not relieved in time, renal failure is the eventual result. In children, the causes of urinary retention are primarily anatomic: phimosis, meatal stenosis, etc. In

younger men, renal stones, strictures from recurrent sexually transmitted diseases (STDs), phimosis, and blood clots (trauma) are common causes. In older men (> age 60), benign prostatic hypertrophy is the most common cause, followed by prostatic cancer, renal stones, and diabetes. Retention also can appear as a side-effect of decongestants (phenylephrine, pseudoephedrine), antihistamines (diphenhydramine hydrochloride, phenergan), amphetamines, narcotics (morphine), beta-agonists (atropine, isoproterenol, progesterone), and other medications (e.g., dicyclomine, hyoscyamine, imipramine, amitriptyline, diazepam, nifedipine, indomethacin, and benztropine). Pelvic nerve damage from trauma, multiple sclerosis, spinal cord compression, etc., also can produce urinary retention. Viral etiologies (Herpes simplex and Herpes zoster) also have been described.

Presenting symptoms include complete inability to void, painful bladder distention, and problems with urine stream: frequency, urgency, hesitation, nocturia, dribbling (overflow incontinence), and decreased urinary stream. Recurrent UTIs also can be a clue to the presence of urinary retention. Physical exam typically reveals a tender, percussable, suprapubic mass. Laboratory testing includes a chemistry panel to evaluate renal function, urinalysis, and culture (if infection is suspected). A key point to remember is to consider and screen for acute renal failure in patients presenting with urinary retention, and not just place a Foley catheter and discharge them. As stated above, many of these patients' symptoms appear gradually, so they may be unaware of them and not able to communicate them to the physician. Once the cascade of events toward renal failure has begun, only recognition and treatment to relieve the obstruction can preserve renal function. Post-void residual (PVR) measurements can be helpful in determining if a patient is sufficiently emptying his bladder. A normal PVR volume is less than 125 cc.

As any practicing ED physician knows, placing a Foley catheter in elderly male patients can vary from extremely easy to very challenging. Placement of lidocaine jelly into the urethra before attempting catheter placement is advised. The penis should be angled in a slightly cephalad direction with gentle traction. *(See Figure 4.)* This helps ease placement by straightening out the urethra as much as possible. Keep in mind that the normal male urethra is 20 cm long, and the catheter must be inserted at least 24 cm before the balloon can be safely inflated. At the first return of urine from the inserted catheter, the balloon has just passed through the membranous portion of the urethra; the catheter still has 3-4 cm to go before clearing the bladder neck. It is best to insert the catheter all the way to the hilt before inflating the balloon. Also remember that the balloon may end up in a false passage, and that any pain while slowly inflating the balloon is a clue to stop and re-attempt catheter placement. In the face of acute urinary retention in an older man, one could begin attempts with a Coude catheter to maximize chances of success and minimize urethral trauma. These catheters have an upward deflection of the distal portion and allow easier passage through an enlarged prostate gland. When the patient is supine, the deflection on the catheter tip

Figure 4. Foley Catheter Placement
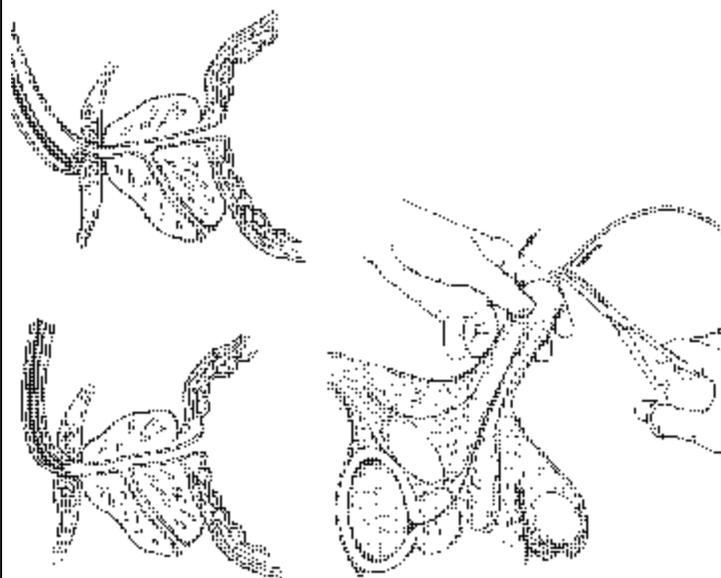
Proper technique for successful Foley catheter placement. Holding the penis with mild tension and in the upright position will help it pass through the external sphincter and prostate.

Used with permission from: Roberts JR, Hedges JR, ed,. *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co.; 1998: 962.

should be aimed up toward the ceiling to follow the natural curve of the urethra. If the Coude catheter cannot be passed, further attempts at catheterization should be stopped. Filiforms and followers are flexible, narrow, solid catheters used to negotiate and dilate strictures, and may be needed for successful catheter placement. The urologist should be consulted for filiform and follower use, guide wire use, or suprapubic cystostomy tube placement.

After successful placement of the Foley catheter, some patients will experience complications from post-obstructive diuresis. These symptoms may occur immediately or may be delayed several hours. The diuresis can be dramatic—8-20 L/day. Patients at risk for this complication include those with a history of congestive heart failure or renal insufficiency, or those with significant peripheral edema upon presentation. In some cases, persistent hypotension from volume depletion may occur. This may result from the patient's inability to concentrate his urine, as his nephrons may take time to recover after the pressure of retention is released. In other cases, the patient's renal function is normal, but a salt or urea diuresis occurs to rid the body of excess accumulated during urinary retention. Monitoring electrolytes and replacing the patient's urinary output may allow some patients to recover in only a few hours, but persistent diuresis calls for admission until symptoms have resolved over the next 1-2 days. The physician should use one-half normal saline to replace fluids lost in urine output, as the urine sodium is around 80 mEq/L (one-half the serum level).

Removal of a Non-Deflating Catheter. At times, the ED physician will be faced with attempting to remove a Foley catheter after the balloon has failed to deflate in the normal fashion using a syringe. In some instances, the catheter may have been cut prior to presentation, but this will only deflate the balloon when the valve-flap that retains fluid in the balloon is in the distal segment. Several reported techniques involve either over-inflating the balloon or breaking it from within using a corrosive substance. Over-inflation of the balloon does work, but requires up to 200 mL to break a 5 mL balloon and almost always leaves retained balloon fragments.[24] The patient is then left with the problem of retained balloon pieces inside the bladder. The urologic consultant will need to perform cystoscopy after this technique, as retained balloon pieces will promote bladder stone formation and may become a nidus for infection. Organic solvents (i.e., ether, acetone, mineral oil, etc.) also have been used to dissolve the latex balloon from the inside. This technique is not recommended, as retention of free balloon fragments is common and a chemical cystitis also often results. Another method described is to puncture the balloon with a spinal needle (25- or 27-gauge) by suprapubic, transperineal, or transrectal approach. Ultrasound guidance is recommended when using this technique. Perhaps the safest method is to pass a thin guide wire (stylet from an angiographic catheter or guide wire from a urethral catheter) into the lumen of the channel leading to the balloon to release the valve that holds back the balloon fluid.[25] The recommended sequence to follow in this situation is to first remove the syringe adapter to rule out its malfunction. Next, a guide wire is used to release the retaining valve. If this is not successful, then needle deflation of the balloon is used (with urologic consultation, if possible). Regardless of the technique used, do not forget to inspect the balloon after removal to ensure no fragments are retained. If retained fragments are suspected, urologic consultation is indicated for cystoscopy.

Urethritis. Urethritis is a common complaint in patients presenting to the ED for urologic issues. STDs account for a large portion of the diagnoses in these patients, with *Neisseria gonorrhoeae* and *Chlamydia trachomatis* being the two most common organisms. Classically, patients with gonorrhea have more pronounced symptoms and present more quickly after inoculation than patients with chlamydia. Urethritis also can be caused by instrumentation (Foley catheterization), trauma, and foreign body placement. Urethritis can progress to cystitis, prostatitis, epididymitis, orchitis, and systemic disorders such as disseminated gonococcal infection and Reiter's syndrome. Other complications of chronic or repeated infections include urethral strictures and stenosis, which can produce urinary retention/obstruction, a leading cause of acute renal failure.

Symptoms of acute urethritis include penile discharge and dysuria. Urinary frequency suggests cystitis or prostatitis, and systemic signs of infection should be absent. History should include detailed sexual history—number of partners, condom use, history of previous STDs, HIV status, etc. History of recent instrumentation also should be discussed, as some patients may not be forthcoming with information on self-placement of foreign bodies. Systemic symptoms, indicating more advanced disease, should be sought to rule out these other disorders. When present, arthritis, conjunctivitis, rash, and symptoms of prostatitis, epididymitis or orchitis all indicate the case is more involved than simple urethritis. On physical exam, the physician should check for meatal stenosis, or urethral stricture, or presence of discharge, and should evaluate the scrotum, testicles, and prostate for involvement. Urinalysis is not necessary in cases of isolated urethritis, but is indicated if other disorders (i.e., epididymitis, prostatitis, etc.) are suspected. *Chlamydia* and *gonorrhea* cultures should be obtained, as well as a Venereal Disease Research Laboratory test to screen for syphilis. HIV testing should be recommended and discussed with the patient, although this typically is done at local health departments instead of EDs due to regulations placed on HIV testing (counseling with results, etc.).

In the past, treatment was recommended based on initial Gram stain results, but due to the frequency of multiple infections in the same patient, current recommendations are to treat for both chlamydia and gonorrhea in these patients. Recommended combinations of fluroquinolones, ceftriaxone, azithromycin, and doxycylcine are all effective. Follow-up with the patient's primary doctor or a urologist should be recommended.

Urethral Foreign Bodies. Foreign bodies are placed in the urethra for a variety of reasons—during sexual encounters, by psychiatric patients, and for sexual/physical abuse. Hematuria in combination with cystitis, urethral discharge, and difficulty passing urine should alert the physician to the possible diagnosis. Many items will show up on routine x-ray of the pelvis. If a urethral foreign body is suspected, urologic consultation is indicated. Many foreign bodies only can be removed endoscopically, and even if one is removed manually, retrograde urethrography (or endoscopy) is indicated to rule out urethral disruption.

Conclusion

A wide variety of diagnoses must be considered when male patients present to the ED with acute genital complaints. Fournier's gangrene and testicular torsion are the two most dangerous entities encountered, as both are surgical emergencies where time to intervention is critical. One must rule out these diagnoses first when treating male patients with genital complaints in the ED. The acute scrotum can be particularly challenging, as acute epididymitis and testicular and appendage torsion can be very difficult to differentiate. Further, misdiagnosis of testicular torsion can mean loss of a testicle for the patient and a pending malpractice case for the physician. Priapism and paraphimosis are two disorders that also must be recognized and treated in a timely fashion to prevent ischemia and necrosis of the distal penis. It is important for the ED physician to be aware of the scope of male urologic emergencies and their diverse treatments. Knowledge of these disorders is necessary to make the "right call" on these patients and to know when to call for help. The ED physician also must be aware of his or her own comfort level performing procedures used in treatment of

the conditions discussed in this paper, and consult a urologist for assistance when needed.

References

1. Melma A, Serels S. Priapism. *Int J Impot Res* 2000;12:S133-S139.
2. Paulter SE, Brock GB. Priapism: From Priapus to the present time. *Urol Clin N Am* 2001;28:391-403.
3. Schneider RE. Male Genital Problem. In: Tintinalli JE, et al, eds. *Emergency Medicine: A Comprehensive Study Guide.* 5th ed. New York: McGraw-Hill Professional Publishing;2000:631-640.
4. Sylla C, Ba M, Ndoye A, et al. Penile emergencies. *Ann Urol* 2000;34:203-207.
5. Altman AL, Seftel AD, Brown SL, et al. Cocaine associated priapism. *J Urol* 1999;161:1817-1818.
6. Perimenis P, Athanasopoulos A, Geramoutsos I, et al. The incidence of pharmacologically induced priapism in the diagnostic and therapeutic management of 685 men with erectile dysfunction. *Urol Int* 2001;66:27-29.
7. Martinez PF, Hoang-Boehm J, Weiss J, et al. Methylene blue as a successful treatment alternative for pharmacologically induced priapism. *Eur Urol* 2001;39:20-23.
8. Gujral S, MacDonagh RP, Cavanagh PM. Bilateral superselective arterial microcoil embolisation in delayed post-traumatic high flow priapism. *Postgrad Med J* 2001;77:193-194.
9. Hansen RB, Olsen LH, Langkilde NC. Piercing of the glans penis. *Scand J Urol Nephrol* 1998;32:219-220.
10. Turner CD, Kim HL, Cromie W. Dorsal band traction for reduction of paraphimosis. *J Urology* 1999;54:917-918.
11. Hamdy FC, Hastie KJ. Treatment of paraphimosis: The 'puncture' technique. *Br J Surg* 1990;77:1186.
12. Mydlo JH. Treatment of a delayed zipper injury. *Urol Int* 2000; 64:45-46.
13. Vahasarja VJ, Hellstrom PA, Serlo W, et al. Treatment of penile incarceration by the string method: 2 case reports. *J Urol* 1993; 149: 372-373.
14. Laucks SS 2nd. Fournier's gangrene. *Surg Clin North Am* 1994;74: 1339-1352.
15. Marks L. The acute scrotum. *Crit Decisions Emerg Med* 1997; 2:11-17.
16. Sharifi R. Perineal necrotizing infection. *Curr Surg* 1990;47:1.
17. Korhonen K, Him M, Niinikoski J. Hyperbaric oxygen in the treatment of Fournier's gangrene. *Eur J Surg* 1998;164:251-255.
18. Zargooshi J. Penile fracture in Kermanshah, Iran: Report of 172 cases. *J Urol* 2000;164;364-366.
19. Tsang T, Demby AM. Penile fracture with urethral injury. *J Urol* 1992;147:466-468.
20. Hinev A. Fracture of the penis: treatment and complications. *Acta Med Okayama* 2000;54:211-216.
21. Shittu OB, Kamara TB. Fracture of the penis—diagnosis and management. *Afr J Med Sci* 2000;29:179-180.
22. Dillner J, von Krogh G, Horenblas S, et al. Etiology of squamous cell carcinoma of the penis. *Scand J Urol Nephrol Suppl* 2000;205: 189-193.
23. Harwood-Nuss AL, Etheredge W, McKenna I. Urologic Emergencies. In: Rosen P, et al, eds. *Emergency Medicine: Concepts and Clinical Practice*, 4th ed. St. Louis, MO: Mosby;1998:2227-2261.
24. Moisey CU, Williams LA. Self-retained balloon catheters—a safe method for removal. *Br J Urol* 1980;52:67.
25. Sood SC, Sahota H. Removing obstructed balloon catheter. *Br Med J* 1972;4:735.

Physician CME Questions

19. Which of the following characterizes low-flow priapism?
    A. Normal intracavernosal blood pH
    B. Warm, semi-rigid penis
    C. Irreversible cellular damage and fibrosis if not treated within 24 hours
    D. Direct arterial-venous shunting

20. Which of the following is true concerning penile disorders?
    A. Low-flow priapism does not require emergent treatment to prevent penile ischemia.
    B. Balanitis may be the only presenting symptom of diabetes.
    C. Most authors do not recommend surgical treatment for penile fractures.
    D. High-flow priapism is a common disorder.

21. Optimal management of penile fracture includes:
    A. cool sitz baths, analgesia, and testicular elevation.
    B. cold compresses, analgesia, and catheterization.
    C. cold compresses, analgesia, catheterization pending normal retrograde urethrogram, and prompt surgical repair.
    D. outpatient urologic follow-up.

22. Which of the following is true regarding phimosis and para phimosis?
    A. Phimosis is defined as the inability to retract the foreskin to visualize the glans.
    B. Paraphimosis is defined as the inability to return the retracted foreskin to its normal anatomic position.
    C. Paraphimosis is an emergent condition, as ischemia of the glans penis may result.
    D. Phimosis does not require emergent treatment as long as the patient can void.
    E. All of the above are true.

23. Fournier's gangrene:
    A. is synonymous with necrotizing fasciitis of the perineal and perianal areas.
    B. on physical exam, Fournier's gangrene may show only edema with mild redness of the skin when the patient complains of severe pain.
    C. is a true surgical emergency.
    D. requires surgical consultation as soon as the diagnosis is suspected.
    E. All of the above are true.

24. Acute bacterial prostatitis:
    A. is an indication for admission when associated with urinary retention.
    B. is a rare diagnosis in ED patients with urinary complaints.
    C. does not contraindicate transurethral instrumentation (i.e., Foley catheter placement) during acute infection.
    D. All of the above

25. Which of the following is *incorrect* regarding catheter placement?
    A. During Foley catheter placement, the penis should be angled in a slightly cephalad direction with gentle traction.
    B. Placement of lidocaine jelly into the urethra before attempting catheter placement is advised.
    C. The normal male urethra is 20 cm long, so the catheter should be inserted at least 24 cm before the balloon can be safely inflated.
    D. At the first return of urine, the catheter has just passed the membranous urethra, and the catheter still has 3-4 cm to go before clearing the bladder neck.
    E. Coude catheters have a downward deflection of the distal portion, which allows easier passage through the enlarged prostate gland.

26. Sinus/cold medicines containing antihistamines and/or deconges-tants may cause urinary retention.
    A. True
    B. False

In Future Issues:
Supraventricular Tachycardia

Emergency Medicine Reports
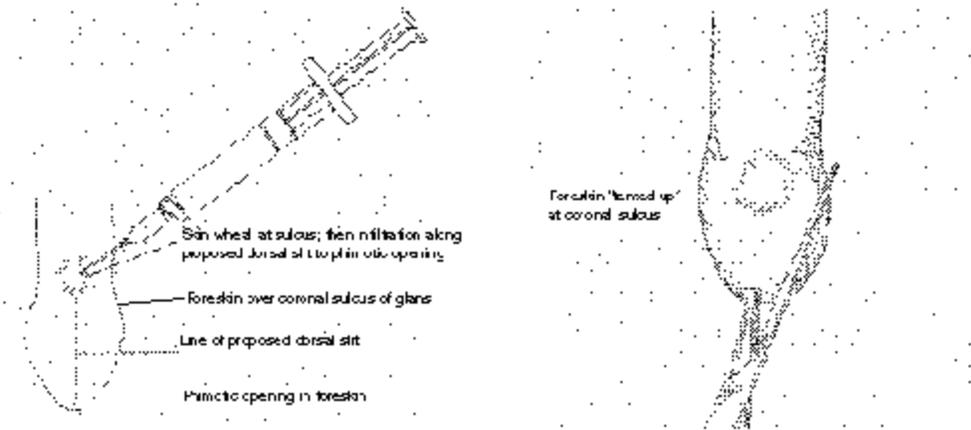The Practical Journal for Emergency Physicians

Urologic Emergencies Part II

Cross-Section Anatomy of the Penis
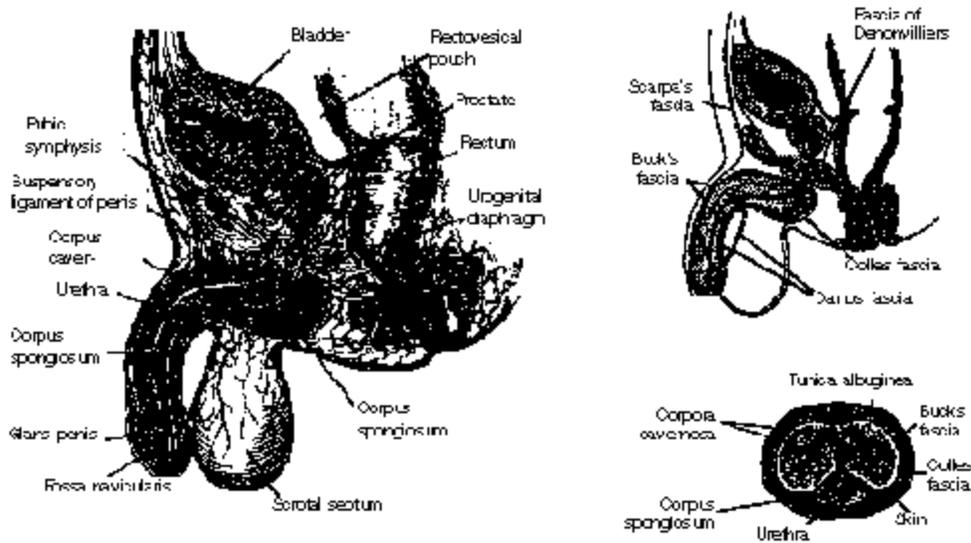
Used with permission from: Tanagho EA, McAninch JW, eds. *Smith's General Urology*, 15th ed. New York: McGraw-Hill Education;2000:10.

Dorsal Slit Procedure as Treatment for Phimosis

Technique for anesthetizing the foreskin before performing dorsal slit procedure as treatment for phimosis.

Placement of hemostats for dorsal slit procedure as treatment for phimosis.

Figures used with permission from: Roberts JR, Hedges JR, eds. *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co,1998:948.

Manual Reduction and Surgical Treatment of Paraphimosis

Line of infiltration and incision
Constricting ring
Paraphimosis
Glans

extending incision
no far will
foreshorten and
either the penis

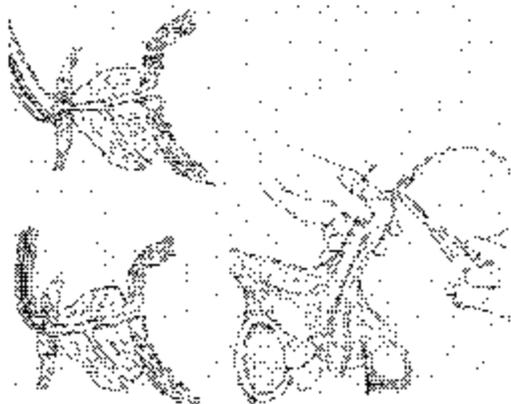**Manual Reduction.** *Top:* Placement of fingers for manual reduction of paraphimosis.
Bottom: Use of Babcock clamps to manually reduce paraphimosis.
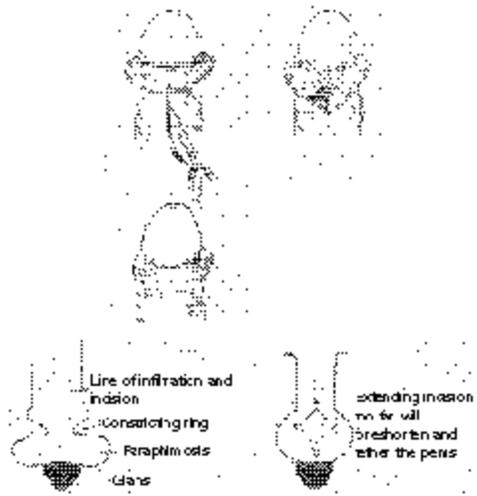
Surgical Treatment. Constricting ring is where incision should be performed to release foreskin.

Figures used with permission from: Roberts JR, Hedges JR (eds). *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co. 1998. 951-952.

Foley Catheter Placement

Proper technique for successful Foley catheter placement. Holding the penis with mild tension and in the upright position will help it pass through the external sphincter and prostate.

Used with permission from: Roberts JR, Hedges JR, ed. *Clinical Procedures in Emergency Medicine*, 3rd ed. Philadelphia: W.B. Saunders Co.; 1998: 982.