



Problems of the Foreskin and Glans Penis

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Conditions that affect the foreskin and glans penis that should be recognized by the emergency medicine practitioner include phimosis, paraphimosis, and inflammatory penile skin conditions, such as balanitis, posthitis, and balanoposthitis. Despite some difficulty in clearly defining phimosis and balanitis/balanoposthitis, paraphimosis remains a true urologic emergency that requires immediate identification and management.

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Structural and inflammatory disorders involving the foreskin and glans penis are fairly common chief complaints for children presenting to the emergency department. The emergency medicine practitioner must therefore be able to accurately identify and manage these conditions and, likewise, recognize when urgent urologic consultation is necessary. This article will provide a review of phimosis, paraphimosis, and inflammatory penile skin conditions (balanitis, posthitis, and balanoposthitis).

Phimosis

Phimosis is a term, from the Greek expression for “muzzling,” used to describe difficulty or inability to retract the foreskin, which can be observed because of the following reasons: too small of a foreskin opening restricting retraction or persistent adhesion between the foreskin and penis.

Frequency

Studies have observed that foreskins are normally non-retractile in the neonatal period, with lower percentages remaining nonretractile as age increases: up to 10% to 38% of 3-year olds, 8% to 16% of 6-year olds, and only about 1% of 16-year olds have nonretractile foreskins [1-4]. Pathologic phimosis is observed more frequently in countries that do not routinely perform neonatal circumcisions [5].

Pathophysiology/Anatomy

The foreskin or prepuce is a fold of skin covering the head of the penis that develops at approximately 8 to

9 weeks' gestation and provides some protection to the underlying immature glans penis. The skin on the shaft of the penis is keratinized, whereas squamous epithelium lines the foreskin adjacent to the glans [6]. Separation of the adjacent epithelial layers between the foreskin and glans is a continually evolving process. Incomplete separation from birth up to approximately the third year of life results in physiologic or congenital phimosis. During this period, the foreskin is essentially adherent to the glans. Forcible retraction can result in significant pain, bleeding, and small tears at the opening that could result in increased scarring and, ultimately, a phimotic ring. Eventual full retraction occurs as the foreskin detaches from the glans, because of gentle traction by caregivers, intermittent erections, and keratinization of the inner epithelium [5,7].

Pathologic, secondary, or acquired phimosis can result from conditions involving chronic and/or recurrent inflammation of the prepuce, such as poor hygiene, balanoposthitis, repetitive forceful retraction, or other trauma (Figure 1).

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Figure 1 Pathologic phimosis resulting from inflammation of the foreskin (posthitis).

Symptoms

Patients with congenital phimosis should be asymptomatic. Desquamated epithelial cells, trapped under the foreskin near the corona of the glans penis, or smegma can be observed in children with an incomplete foreskin retraction. These benign whitish lumps or discharge will extrude once complete retraction of the foreskin takes place. Pathologic phimosis may be accompanied by difficulty with urination or alteration of the urinary stream. “Ballooning” or bulging of the prepuce from urine temporarily trapped in the subpreputial space results from a very tight phimosis with a narrow opening. Dysuria or hematuria can occur, though less commonly [7,8]. If untreated, phimosis can ultimately lead to chronic inflammation, carcinoma, painful intercourse, or paraphimosis. Paraphimosis occurs when the phimotic foreskin is retracted over the glans penis and cannot be reduced back into its original position.

Treatment

Because most children will have retractile foreskins as teenagers, “watchful waiting” and continued proper preputial hygiene is the optimal treatment strategy for those patients with physiologic phimosis [4,8]. Timely and proper retraction of the foreskin should not be forceful or produce pain based on the age-dependent pathophysiology and potential complications described above. Topical corticosteroids may be used to hasten this process. They have been demonstrated to be perhaps a safer, more effective, and economical alternative therapy for phimosis vs circumcision [5,9,10] or a prepuce-sparing surgical procedure, preputioplasty [11]. There is, however, great variability in the recurrence rate of phimosis with topical steroid use [5,12,13]. The most effective duration for topical steroid application and the criteria used to define failure of medical therapy are as yet undefined [3]. For

patients who fail steroid therapy or those with pathologic phimosis, painful erections, recurrent urinary tract infections, or balanoposthitis, a urologic consultation for circumcision is recommended [8,14].

Paraphimosis

Paraphimosis is a urologic emergency in which the foreskin is irreducibly retracted over the glans penis, with resultant distal swelling and, ultimately, ischemic symptoms if the entrapped prepuce cannot be returned to its proper position (Figure 2).

Frequency

Paraphimosis occurs in uncircumcised or incompletely circumcised individuals and can occur at any age but is most common in adolescence. A retrospective survey of caregivers of children attending 2 inner-city primary care clinics described 2 cases of paraphimosis of 272 (0.7%) uncircumcised boys [15]. There is also a significant iatrogenic incidence of paraphimosis, as when a child is catheterized to obtain a sterile urine sample and the care provider subsequently neglects to reduce the foreskin.

Pathophysiology

Once the foreskin is retracted behind the glans penis and not returned to its original position, distal vascular engorgement and edema occurs at the glans and prepuce.

Some reports have described an increased risk of paraphimosis in adults and teenagers with a history of repetitive urinary catheterization, poor hygiene, penile body piercing [16,17], and “erotic” dancing [18].

Symptoms

Patients can present with penile pain, but not always [19]. Painful erections have also been described. Children may also present with obstructive voiding symptoms, dysuria and hematuria, and acute urinary obstruction if

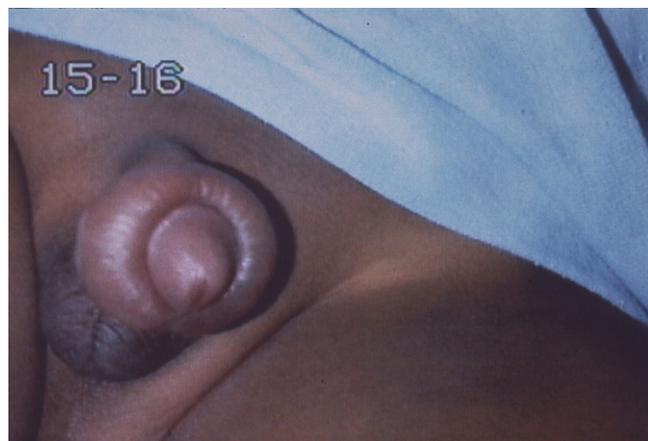


Figure 2 Paraphimosis without evidence of ischemia to the foreskin or glans.



Figure 3 Demonstration of the aspiration puncture method for paraphimosis reduction.

the paraphimosis has been long standing and the swelling is severe.

Treatment

The goal of treatment of paraphimosis is to reduce penile edema enough to allow the foreskin to return to its original position over the glans. A variety of reduction techniques have been described, but controlled trials comparing their efficacies have not been conducted [20,21]. All the techniques may require a regional anesthetic block, procedural sedation, and/or analgesia.

Manual reduction entails steady circumferential pressure on the distal edema with countertraction on the foreskin, which can be facilitated with ice and sequential wrapping. In addition, the use of gauze to provide greater traction on the foreskin may be helpful [22].

Osmotic methods with a variety of substances, including sugar and hyaluronidase, have been described, especially for those that have failed manual traction [22,23]. The disadvantage to the osmotic method is the longer time to achieve reduction compared with other techniques.

Aspiration puncture methods, one of which was originally described as the Dundee-Perth technique, involve expressing fluid from multiple puncture holes sterilely placed in the edematous foreskin after a regional penile anesthesia [24,25] (Figure 3). Another related method involves aspirating the glans [26].

When less invasive techniques have failed to reduce the paraphimosis, a dorsal slit incision may be performed to alleviate the constricting ring [16]. Although this is a reliable method for reduction, the result may be cosmetically unsatisfactory, especially if circumcision is not desired. A circumcision is ultimately the method used to alleviate otherwise irreducible paraphimosis and to prevent future recurrence.

Balanitis, Posthitis, and Balanoposthitis

Balanitis, posthitis, and balanoposthitis are states of inflammation or infection involving various parts of the foreskin and glans penis. *Balanoposthitis* is the term used to

describe involvement of both the foreskin and glans penis. *Posthitis* is the term used to describe specific involvement of the foreskin and balanitis, of only the glans penis. *Balanitis xerotica obliterans* is a more rare, chronic, progressive fibrosis of the foreskin of unknown etiology. Also called lichen sclerosus et atrophicus of the glans penis, it can result in phimosis, sclerosis of the glans, and urethral stenosis. It should be considered in the differential diagnosis of school-aged children presenting with pathologic phimosis [27-30].

Frequency

Balanoposthitis occurs most often in children between the ages of 2 and 5 years [31,32]. European studies observe that no more than 4% of boys are affected [32]. Difficulty in determining its true incidence may be a result of inconsistencies in diagnosis and lack of a clear definition. For example, is an irritant dermatitis in the diaper area that has spread to the glans penis considered balanitis? Moreover, significant controversy exists regarding whether the presence or absence of the foreskin provides an increased risk for penile inflammation. Van Howe [33] found that circumcised boys had an approximately 8-fold risk of penile inflammation when adjusted for age younger than 3 years and number of examinations. The retrospective survey of Herzog and Alvarez [15] reported balanitis in 5.9% of uncircumcised and 2.9% of circumcised children, although the difference was not statistically significant. Fergusson et al [34] found more penile problems in circumcised boys younger than 1 year and the reverse for patients older than a year.

Symptoms

Patients may complain of a wide variety of symptoms including penile itching and pain, redness, soreness, preputial discharge, and slight swelling [31]. Patients with balanitis xerotica obliterans develop a distal preputial orificial white ring of scar tissue that ultimately results in pathologic phimosis, painful erections, and possible urinary spraying and retention in later stages [28].

Etiology/Pathophysiology

The etiology of balanoposthitis is most commonly nonspecific. It may be the result of inadequate hygiene of the preputial-glanular sulcus, a contact dermatitis from soaps, detergents, clothing, or other external irritants, or even excessive foreskin manipulation, so-called foreskin fiddling [28,31,32,35]. Infectious agents have also been implicated as possible etiologies for balanoposthitis: streptococcal and staphylococcal species [8,28] and candida [33]. In one series, 100 consecutive boys aged 2 to 9 years were seen in follow-up at a urology clinic. Thirty-two of these patients had initially presented to the emergency department, and cultures of preputial discharge in these patients revealed 15 with no growth, 7 with mixed

growth, 5 with *Staphylococcus aureus*, 4 with *Proteus vulgaris*, and 1 with *Morganella morganii* [32]. Distinguishing possible infectious causes from those conditions caused by sexually transmitted illnesses, *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*, and syphilis, is critical, especially in the prepubescent child who may be the victim of sexual abuse. A variety of other infectious etiologies and systemic diseases causing balanoposthitis have been observed in adult patients.

Management/Therapy

General management usually involves careful cleansing of the foreskin, sitz baths, and application of low-dose topical corticosteroids. Further recommendations include irrigating using a small angiocatheter if there is difficulty or pain with foreskin retraction, avoiding soap to clean the area because its use can alter the normal flora, and allowing the area to dry completely to discourage the growth of yeast. If candidal or the rare bacterial infection is suspected, topical antifungals or antibiotics can also be prescribed, with the addition of oral antimicrobials if these therapies are not successful [28,33]. No evidence-based comparisons between local foreskin care with oral and topical antibacterial and/or antifungal treatments have been conducted so there is wide variability in practice.

Circumcision, or an alternative preputial surgical procedure, is an option for recurrent episodes of balanitis refractory to medical management and is the treatment of choice for balanitis xerotica obliterans.

Summary

Most conditions affecting the foreskin and glans penis presenting to the emergency department are not serious or life threatening and can be treated with topical antibiotics or corticosteroids, appropriate anticipatory guidance, and education regarding the normal development of the foreskin, as well as training in proper foreskin hygiene. Proper recognition and timely treatment of paraphimosis remains a paramount concern.

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