

CHAPTER 96

PHIMOSIS, MEATAL STENOSIS, AND PARAPHIMOSIS

Merrill McHoney
Kokila Lakhoo

Phimosis

Introduction

Phimosis is defined as a narrowing of the preputial ring that prevents retraction of the foreskin over the glans penis. It can be physiological (congenital) or pathological (acquired). Physiological phimosis is almost invariably present at birth. Most cases of phimosis presenting for surgical opinion are physiological and self-limiting.

Demographics

At birth, the foreskin is usually nonretractile (physiological phimosis), with no apparent racial differences in incidence. Physiological phimosis regresses with age, as the foreskin widens and gradually advances over the glans penis. Prepuccial adhesions are sometimes present during regression of physiological phimosis, but these also resolve spontaneously in most cases as epithelial keratinisation occurs.

Aetiology/Pathophysiology

Physiological phimosis is a variant of normal prepuccial development. Table 96.1 gives an indication of the natural history of physiological phimosis. Physiological phimosis can persist up to, and resolve at puberty in some cases.

Table 96.1: Percentage of boys with retractile foreskin, by age.

Newborn Infants	4%
1-year old boys	50%
4-year old boys	90%

Pathological phimosis can be defined as a scarred and fibrotic foreskin that prevents its retraction and is unyielding. Pathological phimosis may very rarely be a primary or congenital anomaly, but is much more commonly secondary. One cause is repeated attacks of infection of the foreskin and/or glans (balanoposthitis) that cause scarring. The usual infecting organism is staphylococcus; flucloxacillin or co-amoxiclav is usually therapeutic. Poor foreskin hygiene may contribute to repeated infection. Recurrent or chronic inflammation may lead to a rigid, fibrous foreskin. Scarring from trauma, for example from zipper injuries, may also be causative.

Pathological phimosis is most often the result of balanitis xerotica obliterans (BXO).¹ In this condition, equivalent to lichen sclerosis atrophicus, the foreskin is thickened, inflamed, scarred, and unyielding. The exact aetiology of BXO is uncertain. Histologically, there is hyperkeratosis and basal layer degeneration with an infiltrate of lymphocytes, plasma cells, and histiocytes. The pathological process giving rise to BXO can also affect the urethra, giving rise to meatal and urethral stenosis. According to one study,² BXO is twice as common in blacks and Hispanics compared to whites. BXO is unusual before 2 years of age; usually peaking in presentation after 5 years.³ The prevalence of pathological phimosis in boys up to 15 years of age is 0.6% in a Westernised population.¹

Clinical Presentation

History

Phimosis usually presents with a history of inability to retract the foreskin, often with ballooning on urination. Other symptoms are uncommon. A misdirected urinary stream may be caused by the urine spraying off the foreskin, with complaints of wetting the toilet seat. A white or creamy discharge is consistent with a discharge of smegma associated with a physiological phimosis. There may be a history of recurrent discharge with or without an intermittent lump at the corona (smegmatous “cyst”).

Mild inflammation of the tip of the foreskin is common and is due to ammoniacal irritation. This sometimes causes a history of redness confined to the tip. Overt infection of the foreskin causes swelling and redness of the entire foreskin and a yellow or greenish discharge. The child may complain of burning on urination. Urinary tract infection (UTI) should be ruled out.

BXO often presents with severe burning with urination. The patient or parent may also express the fact that the foreskin, which was once retractile, is no longer so. With severe disease, the pain can cause the child to inhibit urination and thus contribute to retention. There may be mild bleeding from the foreskin. With meatal or urethral involvement, the symptoms can progress to straining at urination and poor stream. Complete obstruction can ensue due to severe meatal stenosis.

Physical examination

In physiological phimosis, the foreskin is soft and supple. There is usually a sufficient prepuccial meatus to be seen. Often, this can be accentuated by gentle stretching of the foreskin. In some cases the foreskin can be partially retracted to reveal part, if not most, of the glans, with supple glanular adhesion remaining. In physiological phimosis, the foreskin “pouts” or “mushrooms” on gentle retraction. Retraction should never be forceful.

In a rare variation of phimosis, the urine stream gets directed into the prepuccial space, giving rise to the so-called “volcano penis” (Figure 96.1). In this condition, the prepuce stretches and covers most of the penis. The prepuccial and suprapubic space expands with urine,



Figure 96.1: Volcano penis with a phimosis.



Figure 96.2: Pathological phimosis due to BXO.

stretching the tissue planes. Pressure on the large prepuceal space can sometimes cause urine to be expressed from the foreskin meatus. This form of phimosis is best treated with a tri-radiate preputoplasty, as circumcision is difficult and can be disfiguring cosmetically.

With pathological phimosis, the foreskin is thickened and scarred and can be unyielding. In cases of BXO, the foreskin may be scaly, inflamed, and haemorrhagic, or it can be white and fibrotic (Figure 96.2). It can also be literally pinhole size.

Investigations

In cases of physiological phimosis, no investigation is usually required. If infection is suspected, a swab for culture should be taken. If UTI is suspected, a urine sample should be tested.

In cases of BXO and for those patients presenting with symptoms of meatal stenosis, a urine flow study is useful.

Management

Physiological phimosis

As already noted, most cases of physiological phimosis resolve spontaneously, sometimes as late as puberty. Conservative management is therefore the mainstay of treatment in these cases. Firm reassurance from the surgeon to the parents is required to avoid unnecessary circumcision. Routine foreskin care is all that is needed. When partial retraction of the foreskin becomes possible, the foreskin should be gently retracted in the bath, gently cleaned and then pulled back over the glans. This should never be forceful and should be done by the boy himself when possible, as he will normally stop retracting if there is any discomfort. Forceful retraction may create small tears and can create a pathological phimosis.

Topical steroids have been shown to be a viable, cost-effective outpatient means of treating physiological phimosis.⁴ Occasionally a 4- to 6-week course of weak topical steroid administration (e.g., 0.05% betamethasone) is useful to demonstrate retractability. Parents should be warned, however, that recurrence is common after the course if routine foreskin care and retraction are not continued. The demonstration of what will soon ensue as a natural process in time is often sufficient treatment, and a second course should not be necessary.

Circumcision

Physiological phimosis alone is not an indication for circumcision. Indications for circumcision include:

- pathological phimosis;
- BXO;
- recurrent balanoposthitis;
- persistent painful erections associated with a phimosis; and
- physiological phimosis that persists into adolescence.

Circumcision is performed in the following steps (see also Chapter 95):

1. The foreskin is dilated to allow division of adhesions and full retraction.
2. The foreskin is marked at the coronal level where it will be incised, making sure that neither too much or too little is excised.
3. The foreskin and inner prepuceal layer can be incised individually or together by using a knife.
4. The inner prepuceal layer is then trimmed to leave a 5-mm cuff.
5. Haemostasis is achieved by using bipolar diathermy.
6. The shaft skin is then anastomosed to the inner layer by using fine interrupted absorbable sutures (e.g., 5/0 monocryl).
7. A haemostatic mattress suture can be placed on the frenulum to assist with haemostasis.

The most common complication of circumcision is bleeding. This is often minimal and self-limiting, requiring only a pressure dressing in most cases. Rarely, a return to the surgical theatre is needed to achieve haemostasis; either with suture or diathermy. The most common site for bleeding is the frenulum.

Infection is uncommon; usually a staphylococcus is causative. Topical (e.g., fucidin) or enteral (e.g., flucloxacillin or co-amoxiclav) antibiotics are usually needed for 5 days. Infection and sequelae of it are more common when untrained circumcisions are performed, a particular issue in African ritual circumcisions.^{5,6} Severe infection can lead to penile gangrene and loss. Occasionally, overwhelming sepsis can lead to death.

Meatal stenosis can occur postcircumcision secondary to exposure of the meatus to trauma or ammoniacal dermatitis in the infant. If too much shaft skin is excised, painful erections can result. Removal of too much skin can also cause a partially buried appearance to the penis, and cosmetic dissatisfaction can occur.

Amputation of the glans is a rare complication of circumcision. This is more common in procedures being done by nontrained personnel.

Prognosis and Outcomes

There are no long-term aspects of physiological phimosis of note. If present after puberty at the age when sexual intercourse is started, however, it can cause interference with sexual activity.

Boys with BXO should be followed up to detect the development of urethral stenosis. Older patients and those with meatal involvement tend to have a more severe and complicated clinical course. Penile carcinoma in adulthood has been described as arising from BXO. Late-presenting or long-standing disease should include this differential diagnosis in the work-up.

Ethical Issues

The main ethical issue surrounds requests for circumcision in infants with physiological phimosis. Although there is sufficient evidence demonstrating the resolution with conservative management, there continues to be pressure from parents and doctors alike to circumcise these boys. There is also a group of patients who will be referred for consideration under religious and cultural reasons. The incidence of complications after circumcision is not negligible, but should be balanced against the higher incidence of complications if untrained personnel perform the surgery. There have been deaths and serious complications in both Western and African countries from untrained circumcisions. The paediatric surgeon may need to modify his practice based on local policies and outcomes as well as personal conviction.

Meatal Stenosis

Introduction

Meatal stenosis is a narrowing of the external urinary meatus, giving rise to difficulty passing urine. It is uncommon in the paediatric population, and most cases have an obvious cause that can be treated by

simple intervention.

Demographics

The incidence of meatal stenosis varies alongside the aetiological causes. The international figure for meatal stenosis postcircumcision varies widely, from 1% to 20% of cases.

As mentioned earlier, BXO peaks in presentation after 5 years. Overall, between 15% and 30% of BXO cases have urethral involvement at presentation,³ with an increasing prevalence of meatal stenosis with time. BXO seems to have a twice higher incidence in blacks compared to whites.

Aetiology/Pathophysiology

Meatal stenosis is almost always acquired. Congenital meatal stenosis is rare and usually associated with another congenital anomaly of the urinary tract, such as hypospadias or urethral duplication. These cases are not addressed in this chapter.

The most common natural cause of meatal stenosis in children is BXO. In these cases, foreskin disease (pathological, scarred, and fibrotic) is present as evidence of the aetiology. Meatal stenosis can also be secondary to iatrogenic trauma (e.g., catheterisations) or repeated trauma or inflammation from ammoniacal dermatitis (ammonia nappy rash) postcircumcision. Ischaemic damage during the circumcision itself is also possible due to excessive diathermy around the frenulum and meatus and posthypospadias repair.

Clinical Presentation

History

The history with meatal stenosis is that of severe difficulty urinating. The child forces and strains to pass urine, and produces a thin stream or sprays. Suprapubic pain may be present during micturation.

Lethargy, weight loss, vomiting, or symptoms of anaemia may be present in late-presenting cases of meatal stenosis when renal function may be affected.⁷

Physical examination

A meatus that is stenotic may be obvious on retracting the foreskin. If BXO is present, the foreskin and glans are thickened, inflamed, and scarred. If there is significant bladder outlet obstruction, the bladder may be palpable. The patient should be observed urinating. The urinary stream is thin and weak; often only a thin spray is produced. The child may seem to force and be in discomfort, and it takes an appreciably long time to empty the bladder.

In late-presenting cases, there may be detrusor failure, with a dribbling stream, distended bladder, and general ill health. There may be signs of renal failure (dry skin, weight loss, and pallor).

Investigations

A urine flow study is useful to assess the urine stream. It should also be repeated during follow-up after intervention. In meatal stenosis, the study can show a poor flow and there may be a significant residual volume after voiding.

Tests for renal function are required only if renal failure is suspected.

Cystoscopy is indicated only if urethral involvement is suspected from the severity of the symptoms.

Management

Meatal dilatation is an alternative in minor cases, but sometimes requires repeated dilatations, with a relatively high incidence of recurrence. Under general anaesthesia, serial urethral dilators are used to calibrate and then dilate the urethral meatus to an appropriate size for the child. A routine repeat dilatation can be scheduled, or the effect of a single dilatation can be assessed before proceeding to a repeat procedure. Severe or recurrent meatal stenosis is best treated by meatotomy.

At meatotomy, the following steps are taken:

1. Before incising the meatus, a fine mosquito clip can be used to gently crush the tissue for around 5 seconds to assist haemostasis.

2. An incision (approximately 3–5 mm) is made in the urethral meatus with a fine-tipped scissors or a knife to create an adequate meatal opening.

3. Careful bipolar diathermy can be used to achieve haemostasis if there are any vigorous bleeding points.

4. The edges of the incised urethra are then sutured to the glans by using a few fine absorbable sutures (e.g., 6/0 monocryl).

Postoperative Complications

Mild postoperative pain after meatotomy is common and can be treated by local pain-relieving gels along with oral pain relief. A soak in the bath is sometimes therapeutic.

Recurrence is the main postoperative complication. This can generally be treated successfully by repeat meatotomy. In cases of BXO, more extensive urethral disease should be considered, and referral made to a paediatric urologist or suitably experienced surgeon.

Prognosis and Outcomes

There are usually no long-term sequelae in simple cases. However, boys with BXO should be followed up to identify any ongoing or progressive disease, with resulting urethral stenosis.

Rarely, meatal stenosis is discovered after a long clinical delay. There can be secondary effects on bladder function and secondary renal damage. These cases will need urological and/or nephrology follow-up as necessary.

Prevention

The main preventive measure to decrease the incidence of meatal stenosis will be the judicious practice of circumcision, especially in young boys, as well as attention to good surgical practice during circumcisions. If circumcision is necessary, it should be performed by appropriately trained persons to give the lowest complication rate.

There is yet no known prevention of meatal stenosis in cases of BXO presenting without initial involvement. Prophylactic topical steroid use has not been shown to be efficacious enough in that vein.^{8,9}

Paraphimosis

Introduction

Paraphimosis is defined as the inability to return a retracted foreskin back over the glans. This results in swelling of the glans and foreskin due to oedema from the resultant constriction.

Demographics

Paraphimosis can occur at any age after the foreskin becomes retractable over the glans. There is no specific age preference thereafter. Cases present from early childhood into adulthood. Overall, paraphimosis accounts for around 0.9% of boys presenting to hospital in a Western society.

Aetiology/Pathophysiology

There is sometimes, but not always, a partially tight foreskin in the history prior to the incident leading to the paraphimosis.

Clinical Presentation

History

The history is that of acute swelling of the glans penis after retraction of the foreskin, and the patient then not being able to return the foreskin to its normal position. Most cases in children occur after retracting the foreskin during micturation. In older children, it may be related to a sexual activity. There may or may not be a history of difficult retraction, due to a partial tightness, prior to the event.

Physical examination

The foreskin is retracted over the glans and is tight. The glans and foreskin are swollen and oedematous (Figure 96.3). With progression of time, the glans may become severely blue and swollen as evidence of venous engorgement. Gangrene is an extremely late sign.



Figure 96.3: Paraphimosis.

Management

Paraphimosis is an emergency, requiring prompt reduction. In appropriate cases, this can be done with local and systemic pain relief and sedation in the emergency department. In some cases, general anaesthetic is needed.

Most cases of paraphimosis can be reduced with initial constant pressure applied to the glans and foreskin to “squeeze” out the oedema. Some pressure is maintained on the glans by forcefully pushing on the glans with the thumbs and pulling the foreskin over the glans with the fingers. In about 95% of cases, this is successful.

Severe cases may require a dorsal slit procedure, in which a dorsal incision is made along the length of the foreskin to release the tight band. The foreskin is then retracted over the glans. The incision can be left to heal by secondary intention after haemostasis is achieved.

Postoperative Complications

Postoperative dysuria is often mild. Pathological phimosis is rare. Recurrence is uncommon.

Prevention

Prevention of paraphimosis revolves around careful education of boys and their caregivers about routine foreskin care.

Evidence-Based Research

Table 96.2 presents an overview of foreskin development and its conditions, addressing indications for circumcision. Table 96.3 presents a randomised control study of the use of steroid cream for phimosis.

Table 96.2: Evidence-based research.

Title	The fate of the foreskin, a study of circumcision
Authors	Gairdner D
Institution	United Cambridge Hospitals, Cambridge, UK
Reference	British Medical Journal 1949; 2:1433–1447
Problem	The widespread and sometimes indiscriminate use of circumcision to treat phimosis is questioned and addressed in this paper.
Comparison/control (quality of evidence)	Epidemiological and follow up study on foreskin development and conditions in childhood and the incidence of pathological conditions affecting the foreskin.
Outcome/effect	Physiological phimosis is most often a self-limiting stage in prepubertal development postnatally. Pathological phimosis is less common and is established as an indication for circumcision.
Historical significance/comments	Establishes a basis of the incidence and natural history of physiological phimosis.

Table 96.3: Evidence-based research.

Title	Topical steroid application versus circumcision in pediatric patients with phimosis: a prospective randomized placebo controlled clinical trial
Authors	Esposito C, Centonze A, Alicchio F, Savanelli A, Settini A
Institution	Department of Experimental and Clinical Medicine, Magna Graecia University, Campus SVenuta, Catanzaro, Italy
Reference	World J Urol 2008; 26(2):187–190
Problem	Phimosis.
Intervention	A prospective study was carried out over a 24-month period on an outpatient basis on patients with phimosis. One-hundred twenty patients applied a steroid cream twice a day for 4 weeks, and another group of 120 patients used a placebo cream twice a day for 4 weeks. Patients were assigned to either group by computer-generated random choice.
Comparison/control (quality of evidence)	Randomised control study with placebo control
Outcome/effect	This study showed that topical steroids represent a good alternative to surgery in case of phimosis. Steroid therapy gave better results than placebos, with an overall efficacy of 65.8%.

Key Summary Points

1. Physiological phimosis does not require circumcision.
2. Pathological phimosis and physiological phimosis presenting with complications or into puberty should be treated with circumcision.
3. Topical steroid therapy is an alternative therapy to circumcision for physiological phimosis in those requiring treatment.
4. BXO is a common cause of pathological phimosis and can also cause meatal stenosis.
5. Meatal stenosis is best treated by meatotomy as a daycase procedure, with good results.
6. Paraphimosis is an emergency often easily resolved with simple reduction of the glans through the foreskin, with little sequela.

References

1. Shankar KR, Rickwood AM. The incidence of phimosis in boys. *BJU Int* 1999; 84(1):101–102.
2. Kizer WS, Prarie T, Morey AF. Balanitis xerotica obliterans: epidemiologic distribution in an equal access health care system. *South Med J* 2003; 96(1):9–11.
3. Gargollo PC, Kozakewich HP, Bauer SB, et al. Balanitis xerotica obliterans in boys. *J Urol* 2005; 174(4 Pt 1):1409–1412.
4. Berdeu D, Sauze L, Ha-Vinh P, Blum-Boisgard C. Cost-effectiveness analysis of treatments for phimosis: a comparison of surgical and medicinal approaches and their economic effect. *BJU Int* 2001; 87(3):239–244.
5. Magoha GA. Circumcision in various Nigerian and Kenyan hospitals. *East Afr Med J* 1999; 76(10):583–586.
6. du Toit DF, Villet WT. Gangrene of the penis after circumcision: a report of 3 cases. *S Afr Med J* 1979; 55(13):521–522.
7. Sandler G, Patrick E, Cass D. Long standing balanitis xerotica obliterans resulting in renal impairment in a child. *Pediatr Surg Int* 2008; 24(8):961–964.
8. Webster TM, Leonard MP. Topical steroid therapy for phimosis. *Can J Urol* 2002; 9(2):1492–1495.
9. Das S, Tunuguntla HS. Balanitis xerotica obliterans—a review. *World J Urol* 2000; 18(6):382–387.