

Foreskin and penile problems in childhood

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Abstract

This article outlines the embryology, natural history, and management of different conditions of the foreskin and penis in children. Although the classification of hypospadias is included, the management of this condition is not. Epispadias is not covered at all.

Keywords Phimosis; BXO; circumcision; buried penis; congenital megaprepuce; hypospadias

Embryology and natural history of the penis and foreskin

The embryology of the external genitalia of the male is a complex developmental process. It starts at the 4th gestational week with genital tubercle. At the 8th week of gestation, the external genitalia is in the indifferent phase: a genital tubercle is present as well as paired labioscrotal folds and an endodermal urogenital sinus (Figure 1). The SRY gene on the Y-chromosome leads to differentiation of the gonad into a testis, with production of testosterone by the Leydig cells. This is converted into dihydrotestosterone by the action of 5-alpha reductase present in the external genitalia epithelium. Androgen stimulation causes elongation of the genital tubercle as well as fusion of the urethral folds enclosing the urethral groove moving proximally to distally creating the urethra. On the other hand, mesoderm within the urethral folds gives rise to the corpus spongiosum which fuses with the glans distally as well as the corpora cavernosa. Another peak of testosterone happens during the first 4 weeks after birth with subsequent enlargement of the penis that remains almost the same until further growth at puberty.

The prepuce forms between 13 and 18 weeks' gestation, overlapping with urethral development.¹ The preputial fold moves from the base of the glans distally until fusion with the glans and forms the midline raphe at the midline. Arrest of the final phase of urethral development will lead to 'hooded' foreskin that is deficient ventrally. Subsequent desquamation of the epithelial fusion allows foreskin separation and ultimately retraction. However, non-retractility occurs in 90% of boys at 6 months, 50% at 2 year, and 10% at 5 years, 1% at 16 years.^{2,3}

Phimosis

Phimosis (Latin for 'muzzled') is narrowing of the preputial orifice that leads to inability to retract the foreskin. At birth, physiologic phimosis is present as adhesions between the

prepuce and glans prevents retracting the foreskin. As the child grows, the two layers begin to separate as sloughed epithelial debris, or smegma, accumulates between them. However, physiological phimosis occurs in 90% of boys at 6 months, 50% at 2 years, 10% at 5 years, and 1% at 16 years.^{2,3} Clinically this can be recognized by the lack of scarring at the tip of the prepuce and by its mobility. Gentle retraction along the shaft will result in the introitus 'pouting'; if the introitus is gently held and the foreskin pulled distally then the skin will 'funnel' revealing a good sized opening (Figure 2a,b). 'Ballooning' of the foreskin is a normal occurrence during voiding in physiological phimosis. Recognition of normal physiological phimosis is important as the boy and family simply require reassurance and instructions for the boy to gently retract his own foreskin every time he passes urine and every night in the bath or shower, and time for his foreskin to become retractile. The boy needs to be the only

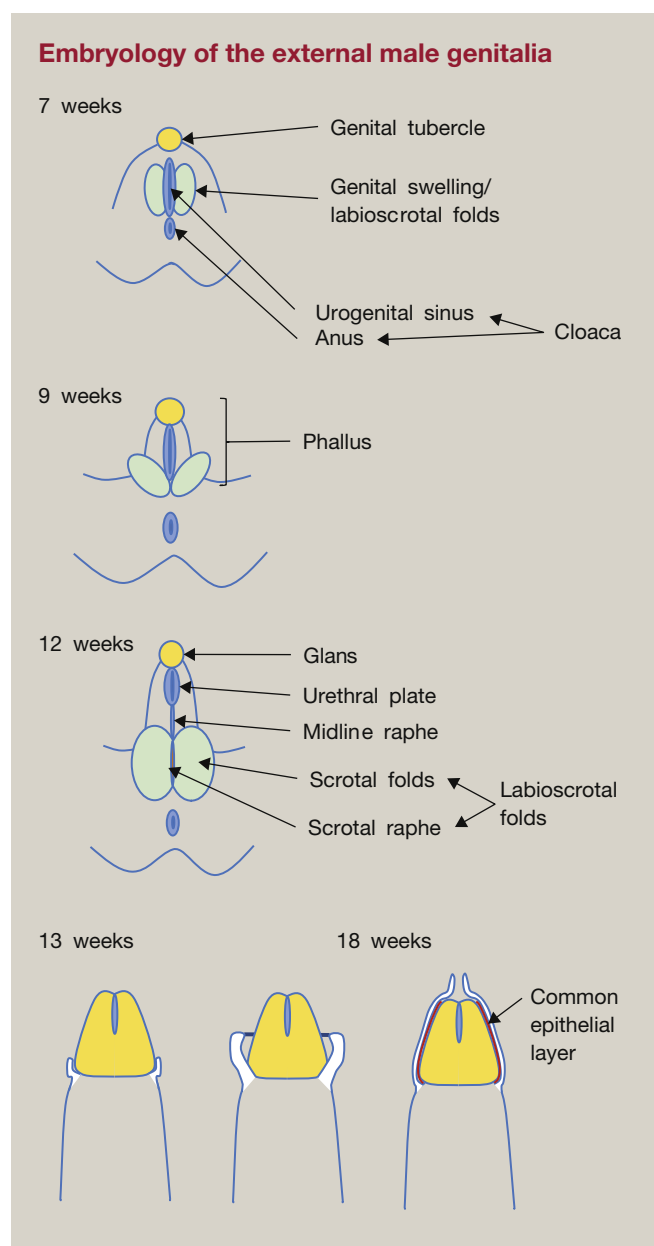


Figure 1

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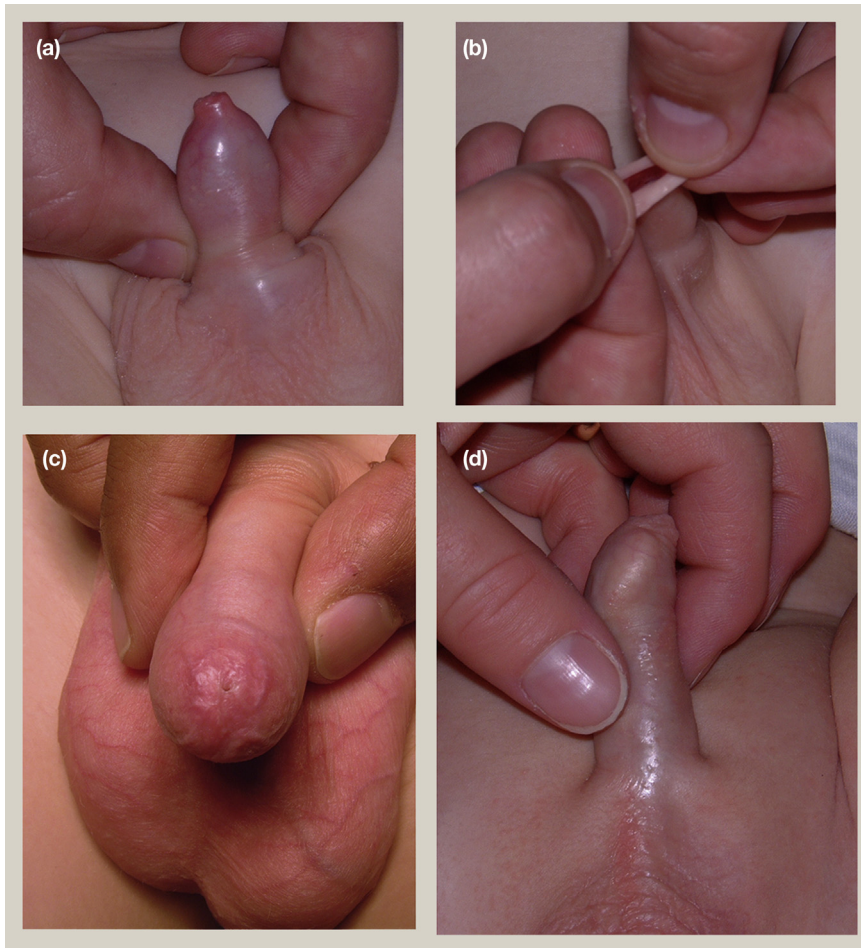


Figure 2 Retraction of normal physiological phimosis will result in pouting, (a) whereas pulling the foreskin distally will show funnelling, (b); (c) balanitis xerotica obliterans; (d) smegma cyst.

person who retracts his foreskin, and generally needs to be over 5 years of age to perform this himself. Conservative treatment of physiological phimosis, particularly in the older child (delayed physiological phimosis), can be augmented by using topical low dose (0.1%) betnovate ointment applied once or twice a day for 3–6 months. Enthusiastic follow-up of this condition in the clinic is unnecessary. Failure to recognize normal physiological phimosis can lead to inappropriate circumcision, with a 2% risk of complications including bleeding, infection or meatal stenosis.^{4,5}

Pathological phimosis results predominantly from balanitis xerotica obliterans (BXO), an idiopathic scarring process, or occasionally from forceful retraction of physiological phimosis, recurrent balanitis, or may be associated with incomplete/inadequate circumcision (Figure 2c).

Balanitis xerotica obliterans (BXO)

BXO is an idiopathic scarring condition of the prepuce. If left untreated, it can extend proximally to involve the glans, and distal urethra. Although rarely it can affect children less than 5 years of age, it is the most common cause of foreskin non-retractability in older boys, with an incidence of 1/100–1/200. This can be recognized clinically by a grey/white scar at the introitus of the foreskin, and by its immobility. This scar does not

‘pout’ or ‘funnel’ (Figure 2c). In adults this is a pre-malignant condition, but there are no case reports to date of development of penile malignancy complicating childhood BXO. Topical steroid application might be helpful in some cases but the mainstay of treatment is circumcision. There is a significant incidence of meatal stenosis (10%) complicating circumcision for BXO.

Smegma cysts

These result from the normal physiological process of separation of the prepuce from the glans (Figure 2d). The separation has occurred in an area of prepuce that has not connected with the outside yet, and results in a yellow painless lump visible through the foreskin/upper penile skin (Figure 2). With time this enlarges and the separation of preputial adhesions occurs resulting in cyst discharge of the smegma.

Paraphimosis

Paraphimosis occurs when a narrow foreskin has been forcibly retracted over the glans. The retracted foreskin forms a constriction ring around the shaft of the penis causing venous engorgement and painful swelling of the glans and distal penis. Retention of urine might occur as well as ulceration of the glans, and this represents an emergency condition. Reduction of the

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