

## PREPUTIAL CALCULUS: A CASE REPORT

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### ABSTRACT

A preputial calculus developed postoperatively in a child with epispadias. Analysis of the pathophysiological development of this lesion and a review of the literature are presented. The inert subpreputial space may become calculogenic in the presence of phimosis and urinary stasis.

Preputial calculi have been reported infrequently in the English literature. They occur primarily in adults, and are associated with phimosis, poor genital hygiene and low socioeconomic status. The rarity of this entity in children is manifested by only 1 previously reported case.<sup>1</sup> We describe a child with epispadias in whom a large preputial calculus occurred postoperatively.

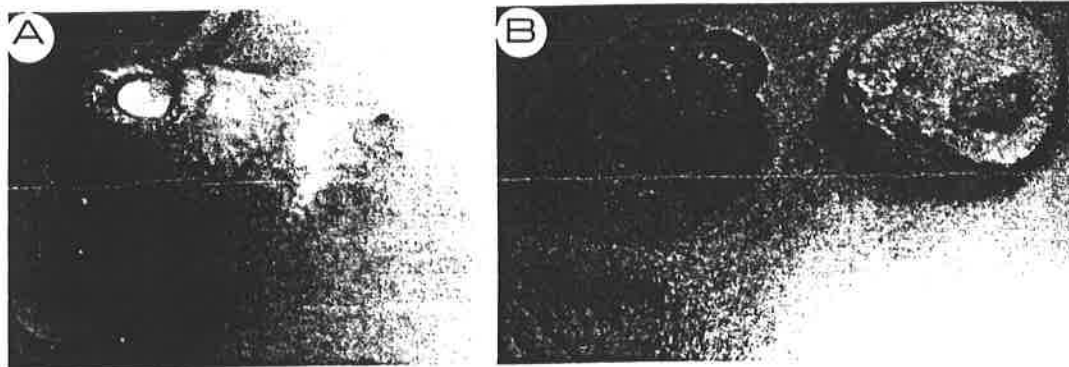
### CASE REPORT

A 4-year-old white boy was evaluated for a whitish penile discharge and progressive difficulty in voiding. He had been

### DISCUSSION

Preputial calculi are such a rare entity that they can be considered a clinical curiosity. They occur most commonly in underdeveloped third world nations, particularly India, and their incidence has decreased with improvement in living standards and industrialization. They are exceedingly rare in children, being a disease of advanced years.<sup>1-3</sup>

The symptoms and physical findings in patients with preputial calculi often are secondary to severe phimosis, causing urinary stasis beneath the foreskin. This may be compounded further by a ball-valve effect created by an entrapped calculus,



A, phimosis with subpreputial calculus. B, phallus and calculus after extraction

born with a low imperforate anus and glanular epispadias with chordee, for which repair and penile lengthening had been performed when he was 2 years old. After postoperative suture removal the patient was lost to followup for 2 years. Continence was achieved when he was 3 years old.

On physical examination the prepuce appeared to be phimotic and a calculus was beneath the foreskin, preventing visualization of the glans and urethral meatus (part A of figure). Despite vigorous manipulation the calculus could not be removed. With the patient under general anesthesia the calculus was extracted successfully from the subpreputial space without skin incision. The stone was tan-brown and smooth, measured 14 × 18 mm. and filled the longest dimension of the preputial sac (part B of figure). The underlying glans was completely intact. Cystourethroscopy demonstrated a normal caliber urethra with no evidence of stricture. Stone analysis revealed 50 per cent ammonium acid urate and 50 per cent magnesium ammonium phosphate hexahydrate. Monofilament suture-like material was noted at the core. A preputial culture yielded light growth of *Enterococcus*.

as in our patient. Obstruction may manifest with strangury, decreased force and caliber of the urinary stream, and prolongation of voiding time.<sup>1,2</sup> Also a foul-smelling, blood-stained discharge or pain and distension of the preputial sac with voiding have been reported.<sup>2</sup> The whitish discharge seen in our case represented particulate matter fragmented from the stone. The presence of the preputial calculus obscures visualization of the glans penis or urethral meatus. Palpation of the penis often reveals a mass underlying the prepuce, which cannot be differentiated easily from the glans. Superficial inguinal adenopathy may result from reaction to the inflammatory process.<sup>4</sup> Wilford has characterized preputial calculi according to their pathogenesis: 1) inspissated smegma with lime salts, 2) struvite composition secondary to infection and 3) stones formed in the proximal urinary tract, which are trapped during migration.<sup>4</sup> Winsbury-White has characterized them by their composition: 1) inspissated smegma, 2) smegma and urinary salts, 3) and urinary salts alone.<sup>5</sup> Chemical analysis often reveals preputial calculi to be composed of calcium oxalate and calcium phosphate.<sup>1,2</sup> Stone analysis in our case demonstrated a combination of ammonium acid urate and magnesium ammonium phosphate hexahydrate.

The key risk factors for urinary tract stone formation include



obstruction with stasis, infection with alkalization and presence of a foreign body. In the presence of phimosis the subpreputial space acts as a reservoir that promotes urinary stasis, infection and mineral crystallization, similar to the pathogenesis of vaginal calculi.<sup>6</sup> Urinary infection can induce stone formation via urea degradation with consequent alkalization and precipitation of struvite crystals. Culture of the subpreputial space in our patient yielded a light growth of *Enterococcus*, which is a known urea-splitter.<sup>7</sup>

A foreign body in the urinary tract, such as suture material, may serve as a calculogenic nidus. Smegma also has been implicated in this process. Smegma (Greek, meaning soap<sup>8</sup>) is an accumulation of cellular debris in the preputial fold and has a dual role in preputial stone formation. In addition to functioning as a nidus smegma can be a direct irritant, inducing inflammation, adhesions and preputial stenosis and leading to obstruction with stasis.<sup>8</sup> In our patient the presence of monofilament suture at the core of the calculus represented the foreign body nidus. Polypropylene suture had been used during the initial epispadias repair. Presumably, incomplete suture removal promoted calculogenesis.

The treatment of preputial calculi is removal of the offending calculus and elimination of the predisposing conditions. Dorsal preputial slit or circumcision has been effective in eliminating the obstructive process.<sup>1,2,9</sup> In our case the prepuce was preserved for future use in reconstruction. If untreated preputial calculi may result in significant morbidity. Wilford has reported chronic inflammation with urinary fistula formation. When a phlegmon and associated inguinal adenopathy are present carcinoma must be suspected. Although the predisposing factors in penile carcinoma and preputial calculi are similar, an association between the 2 conditions has not been reported.

## CONCLUSION

In summary, preputial calculi occur primarily in adults with phimosis and poor hygiene, and are virtually never seen in children. We report a variant of a preputial calculus occurring postoperatively in a child with epispadias. Factors contributing to urinary tract stone formation, including obstruction, stasis, infection and nidus deposition, likewise are implicated in the genesis of preputial calculi.

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