Multiple preputial stones: A case report and literature review

Muhammad Asykar Palirunghi\textsuperscript{a,}\textsuperscript{a}, Khoirul Kholis\textsuperscript{a}, Syakri Syahrir\textsuperscript{a}, Syarif\textsuperscript{a}, Muhammad Faruk\textsuperscript{b}

\textsuperscript{a} Division of Urology, Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia
\textsuperscript{b} Department of Surgery, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia

\section*{A R T I C L E  I N F O}

\textbf{Article history:}
Received 14 January 2020
Received in revised form 22 April 2020
Accepted 23 April 2020

\textbf{Keywords:}
Preputial stone
Smegma
Infection
Phimosis
Circumcision
Case report

\section*{A B S T R A C T}

\textbf{INTRODUCTION:} Preputial stones are a very rare form of urinary tract stone, and only small number cases have been reported in the literature, and tend to occur in uncircumcised males with poor genital hygiene, low socioeconomic status, and phimosis.

\textbf{PRESENTATION OF CASE:} Here, we report a case in a male who presented with more than 100 preputial stones. The stones were evident on clinical examination by palpation on the preputial. The patient was treated by dorsal slit circumcision.

\textbf{DISCUSSION:} Preputial stones can occur at any age but are far more common in adult males. All cases of preputial stone are associated with severe phimosis in uncircumcised males. The symptoms and signs are due to phimosis, like in these patients, which causes urinary stasis beneath the foreskin. The stone is often palpable on examination of the prepuse, and a plain radiograph can confirm this. Neglected preputial stones can cause serious morbidities. Treatment involves the removal of stone and elimination of the predisposing cause.

\textbf{CONCLUSIONS:} This case reminds us of the necessity of circumcision for adult uncircumcised males.

© 2020 The Author(s). Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

\section*{1. Introduction}

Preputial stones are a very rare form of urinary tract stone, and few cases have been reported in the literature [1], occurring especially in uncircumcised males [2] with poor genital hygiene, and low socioeconomic status [3]. The first report of a preputial stone in an adult was by Robert Clarke in 1794 [4]. Preputial stone is primarily regarded as a result of severe phimosis; other causes are smegma solidification and accumulation of urine flow on the preputial area [1]. Here we report a case of an adult male with multiple preputial stones, in line with the updated consensus-based surgical case report (SCARE) guidelines [5].

\section*{2. Case presentation}

A 50-year-old man came to an outpatient clinic with the chief complaint a mass at the tip of the penis and progressive difficulty voiding for the past year, with a history of passing a stone on 48 occasions. Vital signs were within normal limits. On physical examination, the prepuce appeared to be phimosis and was palpable, with a thick preputial skin and stone inside the preputial cavity (Fig. 1). On upper tracts ultrasound, serum creatinine level and other biochemical parameters were within normal limits. Urinalysis revealed 10–14 leukocytes/high-power field (HPF) on microscopic examination. A plain film and urethrogram x-ray showed multiple radio-opaque shadows in the tip of the penis, with a normal caliber of the urethra, and no evidence of stricture (Fig. 2).

Dorsal slit circumcision and preputial stone extraction were done (Fig. 3), recovering 134 stones of up to 4 × 8 mm (Fig. 4). The stone analysis revealed 44% carbonate apatite phosphate, 38% ammonium urate, 10% amorphous calcium phosphate carbonate, and 8% matrix (unknown matter).

\section*{3. Discussion}

Preputial stones can occur at any age but are far more common in adult males [6]. In Indonesia, childhood circumcision is a traditional practice; which likely accounts for this being the first reported case of preputial stones in Indonesia. All cases of preputial stone are associated with severe phimosis in uncircumcised males [1]. Stones usually occur singularly or as a few; only five cases have reported the presence of more than 100 stones (Table 1).

The symptoms and signs are due to phimosis, which causes urinary stasis beneath the foreskin [3]. In some cases, the urinary obstruction can be severe, causing obstructive uropathy [6]. Preputial stones might be associated with complications, such as dysuria, stranguria, hematuria, and preputial ballooning during...
Table 1
Comparison of our case with other literature.

| No. | Authors/year of publication | Age (year) | Chief complaint | Obstructive uropathy | Causative factor | Characteristics of stone | Composition of stone | Surgery          |
|-----|------------------------------|------------|-----------------|----------------------|-----------------|--------------------------|----------------------|-------------------|
| 1   | Present case                 | 50         | Mass at the tip of the penis | No                   | Phimosis         | Multiple stones, ranging from 4 to 8 mm; the total weight of the stones was 26 g | Carbonate apatite phosphate, ammonium urate, amorphous calcium phosphate carbonate | NA                |
| 2   | Tze Huat Chong et al. [7]    | 27         | Difficulty in passing urine and leaked urination | Yes                  | Phimosis         | A single stone, measured 50 × 50 mm | NA                | Dorsal slit circumcision |
| 3   | Gajanan S. Bhat [6]          | 65         | Mass at the tip of the penis | Yes                  | Phimosis         | Twenty-five stone ranging from 4 to 15 mm | Calcium phosphate | Dorsal slit circumcision |
| 4   | Kekre et al. [2]             | 11         | Continuous urine leakage with history meningomyelocele and placement of VP shunt incontinence for urine in a history of myelomeningocele operation | NA                   | Phimosis         | Multiple stones; total weight, 9.96 g | Uric acid, urates, phosphates, xanthine, calcium, magnesium, oxalate, and ammonia. Calcium oxalate | Circumcision |
| 5   | Spataru RI et al. [9]        | 5          | Urinary tract infection with preputial skin fistula in a history of myelomeningocele operation | No                   | Phimosis         | A single stone, 3–2 cm | NA                | Circumcision |
| 6   | Tuğlu D et al. [11]          | 12         | Acute urinary retention with obstructive uropathy | Yes                  | Phimosis         | Multiple stones ranging from 1 to 2 cm | NA                | Dorsal slit circumcision |
| 7   | Yuasa et al. [10]            | 92         | Acute urinary retention with obstructive uropathy | Yes                  | Phimosis         | Multiple sized stones; total weight, 100 g | NA                | Dorsal slit circumcision |
| 8   | Nagata D et al. [11]         | 32         | Painless macroscopic haematuria | NA                   | Phimosis         | Multiple stones | Magnesium ammonium phosphate, calcium phosphate, and calcium carbonate | Circumcised |
| 9   | Mohapatra TP et al. [12]     | 65         | Progressive difficulty in voiding and foul-smelling penile discharge with cancer of the penis whitish penile discharge and progressive difficulty in voiding. | No                   | Phimosis         | Multiple, faceted stone | Calcium ammonium magnesium Phosphate, Magnesium calcium urate | Partial penectomy |
| 10  | Ellis DJ et al. [3]          | 4          | Post epispadias repair, foreign body induced calculus | No                   | Phimosis         | A single stone, 14 × 18 mm | Ammonium acid urate, magnesium ammonium phosphate hexahydrate | Extracted under general anesthesia |
| 11  | Kim SO et al. [6]            | NA         | NA              | NA                   | NA              | NA                       | NA                | NA                |
| 12  | Sharma SK [6]                | NA         | NA              | NA                   | NA              | NA                       | NA                | NA                |
| 13  | Sharma SK et al. [6]         | NA         | NA              | NA                   | NA              | NA                       | NA                | NA                |
| 14  | Shahi UN et al. [1]          | 2 cases: (1) 55 (2) 60 | (1) Acute urinary retention; (2) Dribbling of urine | NA                   | Phimosis         | (1) Two stones; diameters, 2.5 and 0.7 cm (2) Five stones; diameter, 1–2 cm | Calcium, magnesium, phosphate, carbonate, and urate | Circumcision |
| 15  | Wilford EC [6]               | NA         | NA              | NA                   | Phimosis         | NA                       | Sodium and calcium phosphate | NA                |

NA: Data not available.
Fig. 1. A. Gross appearance of the penis. B. Phimosis on examination (arrow).

Fig. 2. A. Plain film showing the multiple preputial stones (arrow). B. Urethrography x-ray showing multiple radio-opaque shadows in the tip of the penis (arrow), a normal caliber urethra with no evidence of stricture.

voiding, rarely with urinary retention [2], obstructive uropathy, foul-smelling discharge from prepuce [6], and preputial skin fistula [1].

Metabolic evaluation can provide clues about the cause of stone formation, especially in a situation where the stone is found in the other parts of the urinary tract, such as the kidney, ureter, and bladder (KUB) [6]. The stones are often palpable on examination of the prepuce; however, a plain radiograph can confirm the existence [7]. Ultrasound or KUB, or both, are essential to rule out any proximal stones, as the treatment will be either minimally invasive (e.g., shock wave lithotripsy) or involve endoscopic or open surgery [7].

Wilford characterized preputial stones according to their pathogenesis [3]: 1) inspissated smegma with lime salts, 2) struvite composition secondary to an infection, and 3) stone formed in the proximal urinary tract, which is trapped during migration. Winsbury-White characterized preputial stones by their composition [3]: 1) inspissated smegma, 2) smegma and urinary salts, 3) and urinary salts alone. In our case, the stones were mostly composed of carbonate apatite phosphate and ammonium urate, thus indicating a combination of a nidus of smegma acting as a condensation nucleus for the precipitation of urinary salts and urinary tract infection. Smegma is an accumulation
Fig. 3. After the dorsal incision, multiple white stones were apparent in the preputial cavity.
of cellular debris in the preputial fold and has a dual role in preputial stone formation [8]. 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 [3].

Treatment involves the removal of stones and elimination of the predisposing cause [7]. As in this case, the patient underwent a dorsal slit circumcision procedure to remove the stone. Neglected preputial stones might cause serious morbidities, such as hydronephrosis and renal failure secondary to obstructive uropathy [1,7] and preputial skin fistula [1] (Table 1).

4. Conclusion

Preputial stones occur primarily in adults with phimosis and poor hygiene. Factors contributing to urinary tract stone formation, including obstruction, stasis, infection, and nidus deposition, are implicated in the genesis of preputial stone. Our findings

Fig. 4. A. Multiple extracted stones. B. The total weight of the stones was 26 g. C. Multiple stones, ranging from 4 to 8 mm.
support the necessity of circumcision for adult uncircumcised males.

**Declaration of Competing Interest**

Nothing to declare.

**Funding**

No funding or sponsorship.

**Ethical approval**

The study is exempt from ethical approval in our institution.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

**Author contribution**

Muhammad Asykar Palinrungi and Muhammad Faruk: study concept, surgical therapy for this patient. Syakri Syahrir: Data collection, Writing - Original draft preparation. Khoirul Kholis: senior author and the manuscript reviewer. Syarif: reviewed the manuscript. Muhammad Faruk: Editing, Writing. All authors read and approved the final manuscript.

**Registration of research studies**

Not applicable – single case report.

**Guarantor**

Muhammad Asykar Palinrungi.

**Provenance and peer review**

Editorially reviewed, not externally peer-reviewed.

**References**

[1] D. Tüşiﬂü, E. Yuvanç, E. Yılmaz, E. Batıslam, Y.K.Y. Gürer, Unknown complication of preputial calculi: preputial skin fistula, Int. Urol. Nephrol. 45 (5) (2013) 1253–1255, http://dx.doi.org/10.1007/s11255-013-0496-x.

[2] C.A. Kekre, P.R. Kothari, A.R. Gupta, et al., A rare case of preputial calculi in a child with balanitis xerotica obliterans: a short communication, Afr. J. Urol. 22 (3) (2016) 227–229, http://dx.doi.org/10.1016/j.ajuf.2015.05.002.

[3] D.J. Ellis, A.L. Siegel, J.S. Elder, J.W. Duckett, Preputial calculus: a case report, J. Urol. 136 (2) (1986) 464–465, http://dx.doi.org/10.1016/S0022-5347(17)44910-X.

[4] N.R. Ingraham, Preputial calculus, a clinical rarity, J. Am. Med. Assoc. 105 (2) (1935) 106, http://dx.doi.org/10.1001/jama.1935.02760289018006.

[5] R.A. Agha, M.R. Borrelli, R. Farwana, et al., The SCARE 2018 statement: updating consensus surgical Case Report (SCARE) guidelines, Int. J. Surg. 60 (2018) 132–136, http://dx.doi.org/10.1016/j.ijsu.2018.10.028.

[6] G.S. Bhat, Preputial calculus: a case report and review of literature. Indian J. Surg. 79 (1) (2017) 70–72, http://dx.doi.org/10.1007/s12262-016-1452-7.

[7] T.H. Chong, M.Z. Asyraf, F. Hayati, et al., Giant preputial calculus: the first reported case in Malaysia, Case Rep. Surg. 2018 (2018) 1–3, http://dx.doi.org/10.1155/2018/606253.

[8] S. Parkash, S. Jeyakumar, K. Subramanyan, S. Chaudhuri, Human subpckhautial collection: its nature and formation, J. Urol. 110 (2) (1973) 211–212, http://dx.doi.org/10.1016/S0022-5347(17)44910-X.

[9] R.-I.-I. Spataru, D.A. Ioza, M. Ivanov, Preputial calculus in a neurologically-impaired child, Indian Pediatr. 52 (2) (2015) 149–150, http://dx.doi.org/10.1007/s13312-015-0951-4.

[10] T. Yuasa, S. Kaageyama, T. Yoshiki, Y. Okada, Preputial calculus: a case report, Hinyokika Kiyo 47 (7) (2001) 513–515.

[11] Sasaki Nagata, Kohri Umemoto, Preputial calculi, BJU Int. 83 (9) (2001) 1076–1077, http://dx.doi.org/10.1046/j.1464-410x.1999.00134.x.

[12] T.P. Mohapatra, S. Kumar, Concurrent preputial calculus and penile carcinoma: a rare association, Postgrad. Med. J. 65 (762) (1989) 256–257, http://dx.doi.org/10.1136/pgmj.65.762.256.