CASE REPORT

Large prostatic stones with staghorn renal calculus in a 61-year-old man: an unusual presentation of uncommon disease

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SUMMARY

Prostatic parenchymal calculi are common in ageing men who are evaluated for benign prostatic hyperplasia or prostate cancer. Giant prostatic calculi are very rare, usually associated with local predisposing factors for urinary stasis and infections, and traditionally managed by open surgery. We present the first case of its kind to be associated with a concurrent staghorn nephrolithiasis, and removed successfully by endoscopic approach using an access sheath through the urethra.

BACKGROUND

Prostatic parenchymal calculi are common in ageing men who are evaluated for benign prostatic hyperplasia or prostate cancer. Generally, they are of little clinical importance, and incidentally diagnosed on pelvic X-ray, ultrasonography or CT.¹ However, giant prostatic urethral calculi are extremely rare. They affect younger men with lower urinary tract abnormalities, are usually symptomatic and traditionally managed by open surgery.² We present a case of a 61-year-old man who presented with lower urinary tract symptoms (LUTS) and abnormal digital rectal examination findings. He was diagnosed as having giant calculi in prostatic urethra coexisting with staghorn renal stone. We have discussed the implication of this uncommon association and described our endoscopic approach to remove such large prostatic stones.

CASE PRESENTATION

A 61-year-old man presented to the urological outpatient department with an 18-month history of urgency, frequency, dysuria and pelvic discomfort. He did not have any gross haematuria or fever. No history of urethral structure, neurogenic bladder or prostate disease was elicited. Abdominal and external genitalia examinations were normal. Digital rectal examination, however, revealed enlarged, stony-hard and irregular prostate suggesting advanced prostate cancer. There was no lower back pain, no loss of weight or appetite, and he denied any family history of prostate malignancy.

INVESTIGATIONS

Laboratory studies showed low serum prostate specific antigen (PSA) of 0.14 ng/mL and his urine culture indicated pure heavy growth of *Proteus mirabilis*. Serum investigations also showed normal

kidney function, normal white blood cell count and C-reactive protein of 25 mg/L (reference range 0–6). Bladder ultrasonography showed small capacity thick-walled urinary bladder with post-void residual of 85 mL and large stones in the prostate region. Pelvic X-ray and abdominal CT scan showed large prostatic calculi replacing the entire gland with what was thought to be a radiopaque middle lobe protruding into bladder, along with a right staghorn calculus and smaller left lower-pole calyceal stone (figure 1A–C). After 3 weeks of sensitivity-based oral antibiotics, a cystoscopy performed in the office showed normal distal urethra with obstructing stone within large prostatic fossa. We decided at this point that endoscopic transurethral management should be attempted.

TREATMENT

The patient underwent in situ pneumatic lithotripsy, using an access sheath inserted through the urethra into the prostatic fossa (figure 2A,B). A total of 125 g of disintegrated stones was removed. The sheath was removed and urethral integrity verified on cystoscopy. The patient was thought to be stone free at the end of the procedure; but the first postoperative kidneys, ureters and bladder (KUB) film revealed small residual stones (figure 3A, B), which were endoscopically retrieved at the time of open staghorn stone surgery.

OUTCOME AND FOLLOW-UP

The postoperative course was uneventful, and his symptoms improved dramatically. Biochemical analysis of retrieved fragments showed mixture of magnesium ammonium phosphate (70%) and carbonate apatite (30%), more consistent with infection-induced stones. A voiding cysto-urethrogram, done 6 weeks after, showed large cavity in prostatic urethra with no stricture in the downstream urethra (figure 4). Thereafter, staghorn and calyceal stones were successfully removed via open surgery and extracorporeal shock wave lithotripsy (ESWL), respectively.

His metabolic evaluation did not reveal any demographic or lifestyle characteristics, serum or urinary factors that might increase the risk of forming such urolithiasis within multiple organs. Besides post void dribbling, he experienced neither stone recurrence nor urethral stricture during 12 months follow-up.

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Figure 1 Pelvic X-ray (A) and abdominal CT (B, C) showing large prostatic stones in 61-year-old patient with right staghorn renal calculus and smaller left lower-pole calyceal stone.

DISCUSSION

Giant calculi in prostatic urethra are very rare; less than 20 cases have been listed in literature.² They occur more frequently in younger men, unlike microscopic prostatic calculi, which are usually seen in men older than 50 years as a part of the normal ageing process.³ The exact aetiology of symptomatic prostatic calculi is not clear. However, they are formed in association with urethral stricture or diverticulum, neurogenic bladder or following open prostate surgery.^{2–6} These factors lead to urinary stasis and recurrent infections, predisposing to development of large stones.⁷ Risk factor for in situ formation of such large calculus in our patient is not clear, but the existence of a large residual cavity may suggest congenital diverticulum or persistent utricle.⁸

To our knowledge, this is the first documented case of large prostatic calculi to be associated with such bilateral nephrolithiasis. Underlying metabolic disorders should be considered,

but both conditions seemed to be associated with *Proteus mirabilis* cultured in this case. These species actually degrade urea into ammonium and carbon dioxide, thus providing a major substrate for the development of large calculi such as staghorn stones.⁹

Although LUTS are common presenting complaints, patients with giant prostatic stones may be symptomless at the beginning or present with urinary retention, pain or haematuria.^{2–7} On digital rectal examination, large calculi could be felt under a thin prostatic capsule, giving the gland a stony-hard consistency, mimicking advanced prostate cancer. Consequently, prostate biopsy could have been performed in our patient but the PSA value was very low, which might result from complete destruction of the gland, also known as ‘auto-prostatectomy’ phenomenon caused by stasis and recurrent infections.^{2,10}

There are currently no formal guidelines on surgical management of large symptomatic prostatic calculi. Traditionally, they were extracted *en bloc* during retropubic prostatolithotomy,

Figure 2 Intraoperative view (A) showing an access sheath in the urethra. Prostatic stones were removed using in situ pneumatic lithotripsy via a nephroscope passed through the sheath (B).

Figure 3 Preoperative (A) and postoperative (B) kidneys, ureters, and bladder (KUB) films showing small residual stones within the prostatic fossa.

radical prostatectomy or suprapubic cystostomy.^{2,3} Percutaneous suprapubic approach was previously attempted; but potential risk factors include bowel perforations and vascular injuries.^{6,11} Recently, such calculi are successfully managed via endoscopic approach with in situ pneumatic, ultrasonic or laser lithotripsy.^{7,12–14} Open surgery is then reserved only for rare difficult cases; with huge impacted stones and/or multiple urethral strictures. Endoscopic stone removal was the first choice in our patient who presented with normal anterior urethra and adequate working space around the stone. However, potential risk factors include urethral stricture and urinary incontinence, which may result from multiple entries and trauma caused by large fragments, especially when in situ laser lithotripsy is not available. Hence, urethra and striated sphincter need to be protected during the procedure, mostly when treating young patients.

Use of an access sheath in male urethra could prevent such iatrogenic injuries. This approach seemed feasible, safe and effective in management of large bladder calculi.¹⁵ However, use of such access has never been described in case of giant prostatic calculi. Amid protecting both urethra and striated sphincter, it allowed us to achieve successful removal of large fragments

and irrigation of residual stones. In the current patient, it might also decrease pressure in both non-compliant prostatic fossa and bladder, leading to a clear visibility and shorter operating time.

Residual prostatic cavities after complete stone removal usually result in stasis and infection,¹³ predisposing to growth of residual fragments or recurrent stone formation. There is currently no available treatment for such residual cavities. It is therefore necessary to achieve complete stone clearance and to suggest long-term follow-up as part of stone management.

Learning points

- ▶ Giant prostatic calculi are uncommon. Concurrent staghorn nephrolithiasis with such stones is unusual. These two conditions may be caused by urinary tract infections with urease-producing bacteria.
- ▶ In individuals with symptomatic prostatic calculus, the urethra should be assessed either by endoscopy or voiding cystourethrogram to detect local risk factor, and to guide stone management.
- ▶ Open surgery can be used in selected patients. Nevertheless, endoscopic management should be attempted for cases with normal anterior urethra or uncomplicated urethral stricture.
- ▶ Use of an access sheath during transurethral lithotripsy for large symptomatic prostatic calculi may be feasible, safe and effective, especially when in situ laser lithotripsy is not available.
- ▶ Concurrent staghorn stone must be removed completely, especially when a urease-producing bacterium is cultured, to minimise the risk stone recurrence within remnant prostatic fossa.

Figure 4 Voiding cystourethrogram showing large residual prostatic cavity with no urethral stricture.

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