INTRODUCTION

“Steinstrasse” is a German word which means “stone street.”. It has been used commonly to refer to multiple stone fragments lined up along the ureter, which may present an obstruction to urine flow. When this occurs in the urethra, it is termed “Urethral steinstrasse.” The risk of an obstruction from urethral steinstrasse increases when the stones are larger than the internal diameter of the urethra. Such stones are referred to as large fragment stones. This phenomenon has been reported to follow interventions such as extracorporeal shock wave lithotripsy, or cystolitholapaxy, resulting in secondary urethral steinstrasse. Primary urethral steinstrasse may arise de novo or result from stasis and recurrent urinary tract infections (UTIs) from a penile urethral stricture. We report a case of spontaneous alignment of multiple nonfragmented stones along the urethra from dislodged bladder stones.

CASE PRESENTATION

A 52-year-old man presented with a year’s history of progressively worsening dysuria and strangury, with intermittent initial and sometimes, total hematuria. He had no prior history of passage of stones in urine. He had increased urinary frequency, nocturia, straining, and spaying of urine. There was no history of prior instrumentation but he had a history of poorly treated purulent urethritis. Examination revealed an apparently healthy man, in pain. The prostate was not clinically enlarged. A preliminary diagnosis of an incomplete postinflammatory urethral stricture was made.

An abdominopelvic ultrasound scan done showed a prostate volume of 31.4 mL and low level echoes within the urinary bladder casting posterior acoustic shadows (Figure 1A). An attempted urethroscopy showed a normal anterior urethra, without any evidence of a urethral stricture, and a foreign body in the bulbar urethra. The procedure was aborted due...
to excessive bleeding and “red-out.” He was scheduled to have a retrograde urethrogram (RUG). There was a 2-week delay in ensuring radiological investigations, due to financial constraints. He re-presented with marked exacerbation of voiding symptoms before the scheduled date of RUG. By this time, an impacted stone could be seen at the urethral meatus. Plain abdominal and pelvic radiographs showed multiple radio-opacities along the length of the urethra, extending toward the meatus (Figure 1B).

A caudal block was administered. A meatotomy was done to release the stone impacted at the meatus, the urethra was lubricated with 2% Xylocaine jelly inserted with a nozzle along the sides of the urethra and milked proximally. The stones were then massaged distally and extracted via the meatus. A meatoplasty was effected using 4/0 vicryl. Eleven large, multifaceted, hard, unfragmented polished stones measuring about 1-1.5 cm in their widest dimensions were removed (Figure 2A-C). He was allowed home that same day.

He defaulted thereafter, presenting 4 months later with persisting strangury. A repeat plain abdominal radiograph showed a solitary vesical stone (Figure 1C). No radiopaque lesions were seen in the upper tract. At cystoscopy, the entire urethra was normal. There were multiple vesical trabeculations and sacculae. A solitary, brittle vesical calculus with an irregular surface was found. This stone was unlike the hard, polished stones removed previously. A cystolitholapaxy was done. The patient was subsequently commenced on daily oral alpha blockers.

Urine microscopy showed cystine crystals. A 24-hour citrate showed normal levels of citrate. Screening test for cystine was negative so a confirmatory test was not done. The patient was still symptom-free 2 years postintervention.

3 | DISCUSSION

The internal diameter of the spongiosal urethra is 6 mm. Stones exceeding this diameter may obstruct the urethral lumen and would not be passed out spontaneously. The rarity of the phenomenon is buttressed by the explanation that unless the implicated urethral stones are of primary urethral origin, it is expected that secondary urethral stones, arising from the ureter, should have been halted at the ureterovesical junction (UVJ), and would only descend to the bladder and thence, the urethra if they formed fragment balls large enough to overcome the UVJ by sheer weight and gravity. The insertion of the cystoscope may have dilated the urethra, allowing the stones to descend caudally.

Documented indications for intervention in urethral steinstrasse include urinary retention, recurrent UTIs or a persistent urethrocutaneous fistula. Our indication for intervention was severe and progressively worsening lower urinary tract symptoms. We used a combination of urethral...

FIGURE 1 A, Hyperechoic Structures Within the Bladder Casting Posterior Acoustic Shadows. B, Anteroposterior view of pelvic radiograph showing multiple radio-opacities in the regions of the bladder and along the urethra, up to the meatus (parentheses shows multiple stones stacked on each other; arrows show urethral and vesical stones). C, Lateral view of pelvic radiograph showing a well-circumscribed bladder stone.
meatotomy, meatolithotomy, and cystolitholapaxy to treat the patient. All surgical procedures were done on an outpatient basis using a caudal block. Okeke et al\(^8\) described this technique for removal of two dislodged stones from a bladder diverticulum, which had escaped into the urethra, and could not be pushed back into the bladder for cystoscopic removal. In our report, there were multiple stones stacked upon themselves. We varied the technique Okeke et al\(^8\) described by not inserting a sinus forceps into the urethra to assist with the extraction. The stones were able to glide along the urethra following the meatotomy and lubrication with Xylocaine jelly, apparently facilitated by the polished nature of the stones. We also did a meatoplasty afterward. Interventions documented in other reports include laser lithotripsy\(^3\) or cystoscopic removal\(^2\) after pushing the stones back into the bladder, stone retrieval at urethroplasty,\(^6\) or spontaneous passage of the stones.\(^5\)

The predisposing factor to multiple stone formation in this patient was not identified. He has no family history of stone-formers. However, judging from the characteristic appearance of the extracted stones, presence of cystine crystals in urine microscopy and poor radiopacity of the stones on plain radiograph, we deduced that the predisposing factor could be cystinuria, aggravated by the stasis from the outlet obstruction. Unfortunately, stone analysis was not done due to technical limitations at our center.

4 | CONCLUSION

Urethral steinstrasse is possible and can be treated using minimally invasive day case procedures under caudal anesthesia.

FIGURE 2  A, Impacted Stone at the Urethral Meatus. B, Meatotomy effected with clearer stone visualization. C, Extracted urethral stones

AUTHOR’S CONTRIBUTIONS

SAA: Patient care; enaction of some therapeutic options; literature search; manuscript write-up; proof-reading; paid for additional tests required. INCC: Patient care; enaction of some therapeutic options; literature search; manuscript write-up; proof-reading; clinical photography; acquisition of informed consent. AOT: Literature search; manuscript write-up; proof-reading; editing. MOI: Patient care; enaction of some therapeutic options; literature search. EOO: Manuscript write-up; proof-reading; editing. LIO: Manuscript write-up; proof-reading; editing. OBS: Manuscript write-up; proof-reading; editing.

CONFLICT OF INTEREST

The authors have none to declare.

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