Acute urinary retention in young adult and middle-aged males due to calculi in the urethra: A single centre experience from North India

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Abstract
Objective: To present our experience of managing acute urinary retention (AUR) in young and middle-aged male due to stone/s in the urethra at a tertiary care centre.

Material and methods: Between July 2004 and April 2011, 102 male patients, young and middle-aged (18–40 years), who suffered from AUR due to calculus in the urethra were managed at our center. Initial management consisted of urethral catheterization or suprapubic trocar cystostomy. Definitive management was performed immediately or after a couple of days depending upon the availability of anesthesia and/or operation theatre. Stone was fragmented by mechanical lithotrite, pneumatic lithotrite or holmium:YAG laser.

Results: All the patients were completely free of their stone/s following the definitive procedure. Voiding trial was successful in all the cases. Postoperative urinary tract infection was observed in eight patients who had undergone immediate endoscopic management. Mild hematuria for approximately 48 h was noted in six patients who underwent suprapubic cystolithotripsy.

Conclusion: Endoscopic management is currently the treatment of choice for stone/s in the urethra which may cause AUR in young and middle-aged males.

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PALABRAS CLAVE
Uretra; Cálculos urinarios; Retención urinaria; Joven; Mediana edad; Varón

Retención urinaria aguda en varones jóvenes y de mediana edad debida a cálculos en la uretra: una experiencia de un solo centro del norte de India

Resumen
Objetivo: Presentar nuestra experiencia en el tratamiento de la retención urinaria aguda (RUA) en hombres jóvenes y de mediana edad, debido a piedra/s en la uretra en un centro de atención terciaria.

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**Introduction**

Acute urinary retention (AUR) in young and middle-aged males is most commonly caused by stone/s in the urethra, and it is an uncommon urological emergency.\(^1\)\(^2\) Other causes of AUR in this age group may be stricture of the urethra or, rarely, urinary tract infection (UTI) in the form of cystitis, prostatitis, or urethritis.\(^1\)

Herein, we present our experience of AUR management caused by urethral calculi in young or middle-aged males. We also discuss the possible mechanism of AUR due to urethral calculi, its association with urethral stricture, and the current management of this problem. We also discuss the world literature related to this topic and share the current knowledge related to the composition of this/these stone/s and its/their possible etiologies.

**Material and methods**

Between July 2004 and April 2011, 102 patients with AUR (caused by stone/s in the urethra) were treated at our center. These patients were in the age group of 18-40 years (mean age was 28 years). Twenty-five of these patients had a history of ureteric calculi. Renal calculi were evident in 20 patients; 10 of whom had undergone treatment by extracorporeal shock wave lithotripsy in the last 3 months. Urinary bladder calculi were present in 26 patients.

Of the 102 patients, 12 were known to have stricture of the bulbar urethra and had undergone direct visual internal urethrostomy few months before. Eight patients had diabetes while five were hypertensive.

At our center, initial management of these patients starts by instilling the urethra with 2% xylocaine jelly, followed by insertion of a 16 French (F) urethral catheter to relieve the AUR. If this maneuver fails (due to impacted stones), suprapubic catheter insertion (by trocar puncture) is performed. Then, the patients are selected for immediate or delayed management of the calculus, depending on the availability of the operation theatre and/or anesthesia. Before definitive management, tests such as complete hemogram, blood sugar measurement, renal function tests, serum uric acid and calcium level measurements, urinalysis, urine culture, plain X-ray of kidney, ureter and bladder (KUB), urethra and renal, and/or ultrasonography (USG) of KUB are ordered. The location and size of the calculus are determined by X-ray and USG.

**Operative procedure**

The definitive procedure is performed either under spinal anesthesia (preferably) or general anesthesia. The operative details are mentioned in Table 1. For patients having comparatively smaller or a single calculus without any history of stricture of the urethra, transurethral approach is preferred. For patients with larger stones or those having a suprapubic cystostomy or history of stricture of the urethra, suprapubic approach is selected. The technique for stone fragmentation via either of the routes is based on the choice of the operating urologist (Table 1).

A 24F (Wolf) nephroscope with a pneumatic lithoclast/holmium laser or a 24F mechanical lithotrite may be used through the suprapubic route. A mechanical lithotrite or nephroscope with pneumatic lithoclast/holmium laser may also be used via the transurethral approach. At the end of the procedure, stone clearance is confirmed by endoscope

<table>
<thead>
<tr>
<th>Operative procedure</th>
<th>Number of patients</th>
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<tr>
<td>Suprapubic cystolitholapaxy</td>
<td>12</td>
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<tr>
<td>Suprapubic pneumatic cystolithotripsy</td>
<td>17</td>
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<tr>
<td>Suprapubic holmium:YAG laser cystolithripsy</td>
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<tr>
<td>Transurethral cystolitholapaxy</td>
<td>38</td>
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<tr>
<td>Transurethral pneumatic cystolithotripsy</td>
<td>10</td>
</tr>
<tr>
<td>Transurethral holmium:YAG laser cystolithripsy</td>
<td>17</td>
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Results

The operative procedure was uneventful in all the patients and they were given tamsulosin 0.4 mg once a day, which was continued till voiding trial was ordered following the procedure. The voiding trial was given 24–48 h after the operative procedure, and it was successful in all the patients. Antibiotics and analgesics were given to all the patients following the procedure. Complete stone removal was achieved in all the patients. In the postoperative period, UTI was observed in eight patients who underwent immediate endoscopic intervention while mild hematuria (for approximately 48 h) was seen in six patients out of the 12 who underwent suprapubic cystolitholapaxy.

The average size of the stone according to measurements on plain X-ray or USG was 0.9 cm (range 0.8–3.5 cm). The serum uric acid level was raised (>7 mg %) in 16 patients, and serum calcium increased (>10.0 mg/dl) in 20 patients; nine patients overlapped between these two groups as they had raised levels of both serum calcium and uric acid. Stone analysis was performed in selected patients, and, in the majority, the composition was calcium oxalate monohydrate followed by mixed calcium oxalate and uric acid, or pure uric acid in a few. Selected patients were advised metabolic analysis for stone formation, but the majority refused due to the cost or the complexity of the procedure, or because they came from far off places and were lost to follow-up.

Discussion

The origin of the calculi that are discovered in the urethra is the upper urinary tract in most of these patients. These calculi pass the ureterovesical junction and reach the urinary bladder, where they reside for a variable period of time before entering the urethra.²,³ Most of the calculi in the urethra are trapped in the proximal membranous urethra, because this portion of the urethra is non-distensible, and the lumen here is comparatively narrow. Some of the stones may migrate distally, but they might get impacted in the bulbar or penile urethra.³,⁴

By applying gentle pressure during urethral catheterization, the stones can be pushed back into the bladder, and immediate respite from the pain of acute urinary retention is achieved.¹,⁵⁻⁷ Definitive management of stone/s can then be performed immediately or in a delayed manner as described above. Suprapubic cystolithotomy or urethrotomy were traditional open surgical methods for extraction of stone/s. The drawbacks of these methods are pain in the postoperative period, the scar, urethral fistula, or prolonged hospital stay. With the advent of endoscopic treatment e.g. intracorporeal lithotripsy or litholapaxy, stone removal has become comparatively easier, even for larger ones.⁸⁻¹¹ The advantages of endoscopic compared to open surgery are less post-operative pain, no scar, and early discharge.⁸⁻¹¹,¹²⁻¹⁵

The presentation of stone/s in the urethra varies from irritative lower urinary tract symptoms, perineal or rectal pain, external meatal pain, pain in the urethra, interrupted urinary stream, or weak stream with dribbling, palpable urethral mass, and/or AUR.⁵,¹⁶⁻¹⁷

The incidence of AUR varies in the literature. Kamal et al. reported that 78% of their patients presented with AUR, while Amin reported the incidence as 89%,⁵,¹⁶ Sharfi reported that only 22% of their patients had AUR, which is much lower than that reported above. Selli et al.⁶ did not come across any case of AUR in their 14 patients.

The diagnosis of stone/s in the urethra is confirmed by plain KUB X-ray with image of the urethra depicting radiopaque shadow in approximately 98% of cases.³ USG of the bladder with concomitant scan of the urethra can diagnose suspected radiolucent stone/s. Many authors state that only 40% of the stones in the urethra can be diagnosed by USG.⁵,⁹

The association of stone/s in the urethra with concomitant stricture of the urethra is a controversial topic. Some studies have shown that changes in the mucosa of the urethra due to inflammation lead to stricture formation. Selli et al. reported anatomical changes in the mucosa of the urethra in 56% of their patients, and a similar observation was also reported by Sharfi in a study related to stones in the posterior urethra.⁶,⁷

We did not observe significant inflammation either in the anterior or posterior urethra in our patients, although 12 of them had had stricture of the urethra and had been treated by direct visual internal urethrostomy in a recent past. Our observation corroborates that by Kamal et al.,⁵ who stated that 98% of their patients did not have stricture associated with stones, and they did not observe any change in the mucosa of the urethra.

In our study, 45 patients (25 had ureteric stone/s and 20 had renal stone/s) were known cases of upper urinary tract stone/s, while 26 patients had urinary bladder stone/s. Overall, 71 patients had history of stone disease which links the origin of the stone/s in the urethra to the upper urinary tract. So, it seems that stone/s in the urethra in the majority of our patients migrated from the upper urinary tract and ultimately caused AUR.⁵ This contradicts the common belief that calculi in the urethra of patients from developing countries are primarily bladder stones of infectious etiology.¹⁸

Kamal et al.⁵ in their series reported that 86% of the stones recovered from the urethra were composed of calcium oxalate, and only 2% were uric acid stones. Our observation is similar since the majority of the stones in our patients were also composed of calcium oxalate monohydrate followed by mixed calcium oxalate and uric acid, or pure uric acid in a few.

Common methods of fragmenting such stone/s through the transurethral or suprapubic route using an endoscope are mechanical lithotrite, pneumatic lithotrite, or holmium laser lithotripsy.¹¹⁻¹⁵ At our centre, in the past 2 years, we have gravitated towards holmium:YAG laser lithotripsy, perhaps because of the novelty of the machine. Many times, when the stone is hard and smooth, it is difficult to hold or crush, these stones move in the bladder when the pneumatic lithotrite is used. At that point, the laser is very useful for making holes in the stone which can then be used for fragmentation with a pneumatic lithotrite.

The patients who underwent immediate endoscopic treatment for stone removal had a higher rate of UTI. Those in the delayed treatment protocol group were initially
investigated properly and treated according to the antibiotics sensitivity, if their urine culture showed growth of the organisms. This could have been the reason why none of the patients in the delayed treatment protocol had postoperative UTI.

In conclusion, stones in the urethra are one of the leading causes of AUR in young and middle-aged males. Catheterization of the urethra or suprapubic trocar cystostomy followed by endoscopic management of such stone/s is the treatment of choice. The UTI is more common if the patients are taken up for immediate endoscopic treatment in comparison to delayed treatment.

Conflict of interest

The authors declare that they have no conflict of interest.

References