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Endourological Treatment of Foreign Bodies in the Urinary System

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ABSTRACT

Background and Objectives: In this retrospective study, nature, clinical presentations, diagnostic modalities, and endoscopic treatment of urinary system foreign bodies were evaluated.

Methods: A total of 8 cases were treated with endoscopic surgery between February 15, 2007 and June 12, 2012. Clinical findings, radiologic diagnosis, and management were reviewed.

Results: We observed that urinary tract foreign bodies were generally secondary to iatrogenic causes; however, bladder/urethral foreign bodies could also be due to self-insertion. Clinical findings were different secondary to their location in the urinary system. All foreign bodies were treated endoscopically.

Conclusions: Foreign bodies of the urinary system can successfully be treated with endoscopic modalities without any complications.

Key Words: Endoscopic treatment, Foreign body, Urinary system

INTRODUCTION

Foreign bodies (FBs) in the urinary tract are among the most common urologic problems due to different etiologies. Although they are usually iatrogenic in the upper urinary tract, FBs in the bladder and/or urethra may be due to iatrogenic, self-insertion, and rarely migration from adjacent organs.[1]

Recently, minimally invasive operations have been used in urologic surgery. Endoscopic and laparoscopic techniques have been performed in common, and so, some equipment such as guidewires, nephrostomy tubes, laser fibers, and Hem-o-Lock (Weck Surgical Instruments, Teleflex Medical, Durham, NC) clips are being used by many urologists. As a result, retention of part of these external equipment has increased the incidence of FBs in the urinary system. Urological surgery is estimated to be the third most common cause of iatrogenic-retained FBs.[2] Besides, bladder/urethral FBs can be observed in various circumstances such as exotic impulse, mental illness, borderline personality disorders, sexual curiosity, or sexual practice in addition to iatrogenic causes. During sexual activity or self-stimulation, FBs can be pushed forward into bladder via the urethra. Despite endoscopic surgery being reported as one of the most common causes of urinary FBs, ironically it is also the preferred treatment.

In the present study, we reviewed our experience about urinary tract FBs treated with endoscopic extraction using retrograde approaches. We also looked at the etiology of FBs in upper and lower urinary tracts, methods of diagnosis, and management in different localizations.

MATERIALS AND METHODS

A total of 8 patients (6 men, 2 women; mean age 46.4 ± 4.9 years) with a diagnosis of FB in the urinary system were treated between February 2007 and June 2012 at our institute. In all cases, laboratory evaluation including kidney function tests and urinary analysis were done after detailed history was recorded, and urinary ultrasonography and/or computed tomography (CT) were performed for radiologic diagnosis. Migrated ureteral stents and the patients treated with open surgery were excluded from

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the presented study. Radiological evaluation was done to confirm the stone and FB-free status if a previous surgery of endoscopic stone treatment was present. Treatment decision was made according to clinical and radiographic findings.

Preoperative antibiotic prophylaxis (first-generation cephalosporin) was given in all cases. Patients with bladder and urethral FBs underwent cystourethroscopy and cystoscopic removal of the FBs under general anesthesia. For patients with upper urinary tract FBs, retrograde flexible ureteroscopy using 9-F flexible ureteroscope was carried out under general anesthesia. Intracorporeal lithotripsy was also performed with a holmium laser lithotripter when necessary, and fragmented calcifications around the FB were extracted. Lastly, for patients who underwent retrograde intrarenal surgery (RIRS), a 4.8-F 26-cm JJ stent was placed at the end of the procedure for 1 month.

RESULTS

Patient demographics, nature and location of FBs, clinical presentation, indwelling time, and types of treatment are shown in **Tables 1** and **2.**

All patients but 1 were symptomatic at presentation and reported various urinary symptoms. Hematuria and flank pain were the most common symptoms especially for upper urinary tract FBs. However, lower urinary tract symptoms and difficult urination were reported in cases having bladder/urethral FBs.

Patients (P1, P2, and P3 in Table 1) had undergone percutaneous nephrolithotomy and RIRS at our hospital, previously. Two patients were admitted to the hospital with flank pain and hematuria 1 and 2 years after the operation, whereas the remaining one was asymptomatic. On radiologic evaluation, stone formation was observed around the sheared piece of sensor guide and broken laser fiber, both of which went unnoticed during the operation. The asymptomatic patient was diagnosed with FB in the urinary system during his routine control follow-up2 years later.

Two other patients (P4 and P5 in Table 2) underwent laparoscopic radical prostatectomy for prostate cancer 2 years ago. Hem-o-lock clips that were used for bleeding control had migrated into the prostatic urethra in both patients. Another patient (P6 in Table 2) with localized prostate cancer had undergone brachytherapy 10 years earlier, and a stone-covered seed was found that had migrated into the prostatic urethra **(Figure 1).** The next patient (P7 in Table 2) was admitted to the hospital requesting a Foley catheter removal. However, his catheter end was cut off by a paramedical staff who was unable to deflate its balloon; after which, the remaining proximal part of the catheter moved back inside the bladder. In the last patient (P8 in Table 2), the FB, used as a vibrator, had been self-introduced into the bladder during sexual gratification.

All patients were evaluated with radiologic investigations including CT and/or ultrasonography **(Figure 2).** Cystoscopy was performed on all patients for both diagnostic and therapeutic means for bladder/urethral FBs **(Figure 3).** Endoscopic surgery was performed without any complications under general anesthesia. Lower urinary tract FBs were removed through the cystoscope with the use of grasping forceps. For the retained piece of Foley catheter, the balloon was punctured with a fine needle inserted through the cystoscope and then removed. Retrograde flexible ureteroscopy and intracorporeal lithotripsy were performed for FBs in the upper tract covered with calcifications, which were broken into small pieces and the FBs were removed by grasping forceps in all cases **(Figure 4).** At the end of these procedures, JJ stents were placed in all

Table 1.
Patients Presented With Upper Urinary System Foreign Bodies

No.	Age, yrs	Sex	Foreign Body	Localization	Cause	Indwelling Time, yrs	Clinical Presentation	Treatment
P1	39	M	Outer sheath of sensor guide	Kidney	RIRS	1	Hematuria, flank pain	RIRS
P2	60	M	Outer sheath of zebra guide	Kidney	PNL	2	Control film	RIRS
P3	35	F	A piece of laser fiber	Kidney	RIRS	1	Hematuria, flank pain	RIRS

Abbreviations: F, female; M, male; PNL, percutaneous nephrolithotomy; RIRS, retrograde intrarenal surgery.

Table 2.
Patients Presented With Lower Urinary System Foreign Bodies

No.	Age, yrs	Sex	Foreign Body	Localization	Cause	Indwelling Time	Clinical Presentation	Treatment
P4	56	M	Hem-o-lock clip	Prostatic urethra	LRP	1 yr	Difficulty with micturition, dysuria	Cystoscopic removal
P5	54	M	Hem-o-lock clip	Prostatic urethra	LRP	2 yrs	Hematuria, dysuria	Cystoscopic removal
P6	64	M	Seed	Prostatic urethra	Brachy-therapy	10 yrs	Dysuria, perineal pain	Cystoscopic removal
P7	35	M	Cut end of Foley catheter	Bladder	Iatrogenic	5 yrs	Acute urinary retention	Cystoscopic removal
P8	38	F	Sexual vibrator	Bladder	Self-insertion	6 h	Difficulty with micturition, dysuria, hematuria	Cystoscopic removal

Abbreviations: F, female; LRP, laparoscopic radical prostatectomy; M, male.

Figure 1. Urethral foreign body due to brachytherapy seed was removed from prostatic urethra 10 years after the treatment.

Figure 2. Left kidney stone surround a sheared piece of sensor guide during RIRS. CT was taken 1 year after of the operation. Patient was admitted with left flank pain.

patients. Patients were discharged on the first day after their operations without any complications.

DISCUSSION

Although FBs in the lower urinary system are not uncommon, they are unusual in the upper urinary tract, and their etiology, clinical presentation, diagnosis, and treatment varies.

Bladder and urethral FBs can be due to psychological, iatrogenic, and traumatic causes or migration from other organs.[1] Psychologically, various circumstances such as exotic impulse, mental illness, and borderline personality disorder can be observed in these cases. One common motive for FB insertion in the lower urinary tract is sexual or erotic in nature, such as masturbation or other forms of sexual variation.[3,4] During clitoral stimulation and/or self-insertion in the urethra, a FB can be pushed forward into the bladder. In the medical literature, there are several case reports about interesting intraurethral FBs such as crystal glass stirrers,[5,6] fishhooks, metallic cables, and snakes, among others.[1,7,8] Catheters and endoscopic instruments are the most common iatrogenic objects introduced into the bladder by urologists. Catheter tips, parts of catheter balloons, buggies, and beaks of resectoscope sheathes are some things that have been recovered from bladders.[5,9] In our series, there was only 1 patient who used a sexual vibrator and inserted it into the bladder during sexual activity. However, FBs were due to iatrogenic causes in the remaining cases.

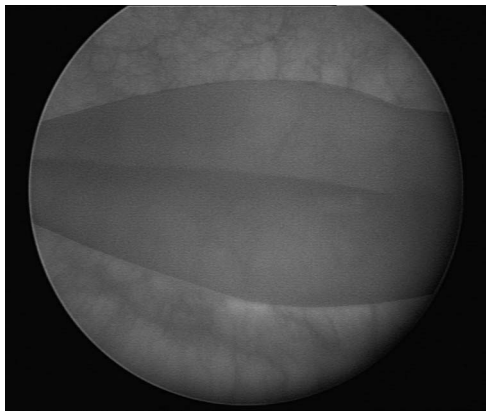

Figure 3. Cystoscopic image of bladder foreign body. A vibrator was self-introduced during sexual gratification.

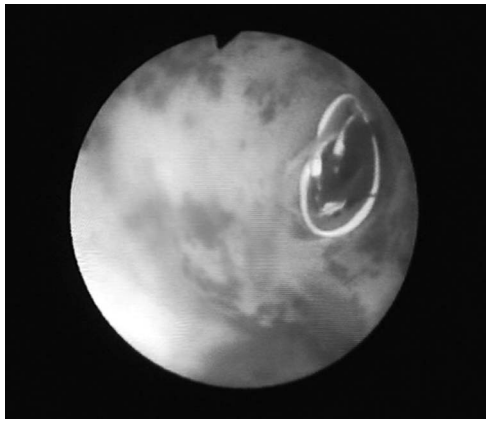

Figure 4. Flexible ultrasonic renal scanning image of sheared zebra guide retained from previous percutaneous nephrolithotomy.

FBs in the upper urinary tract have presented a dilemma and challenge for any urologist. This is not only from the medico-legal implications that are associated with retained material, but also from a management point of view. It was reported that ~92.5% of the FBs of the upper urinary tract were related to previous urological surgery, especially percutaneous renal surgery (35%) and open stone surgery (30%).[10] The most common FBs in the kidney after percutaneous operation are nephrostomy threads, Malecot nephrostomy tubes, nephrostomy catheters, portions of plastic drape bags, and pieces of an Amplatz sheath (Boston Scientific, Spencer, IN, USA).[11–15] On the other hand, laser fibers and fractured guidewires can be detected with urinary ultrasonography.[16,17] In the present study, only 1 of FBs in the upper tract resulted from percutaneous nephrolithotomy, whereas the others resulted from RIRS (Table 1).

Acute cystitis symptoms including urinary frequency, dysuria, urgency, hematuria, and strangury were the most common symptom for lower urinary tract FBs.[9,18,19] Additionally, some patients may present with poor urinary stream and urinary retention. However, complaints of minimal discomfort or asymptomatic condition are very rare in bladder/urethral FBs.[20] We detected similar symptoms in our patients as seen in the literature.

FBs of the upper urinary tract are silent only exceptionally. Infection is generally associated with this condition. Fever, general malaise, flank pain, and hematuria are the most common presenting symptoms.[10] In this series, 2 of the 3 patients had presented with hematuria and flank pain, and 1 patient had no symptoms. Clinical presentations of the upper urinary tract FBs are generally similar to urolithiasis, and FB-related stone formation is encountered in 80% of cases.[10] Similarly, bigger FBs of the kidney are encompassed in stone.[11]

Diagnosis of retained renal FBs can be quite difficult. Interestingly, 20% of renal iatrogenic FBs mimicked the appearance of a renal or pararenal malignancy on preoperative radiological imaging.[21,22] After taking a detailed history (including relevant operative reports), optimal imaging including ultrasonography and/or CT is important in diagnosis. In our series, 1 patient who had pieces of a sensor guide was diagnosed by CT scan. Interestingly, other 2 patients were diagnosed with urinary stone disease on radiologic imaging, but they were demonstrated to have retained FBs covered with stones at the time of retrograde flexible ureteroscopy.

Endoscopic removal is associated with minimal morbidity and hospital stay. With the advent of a variety of modern endoscopic instruments, open surgery is rarely required (Figures 3 and 4). Cystoscopy is a diagnostic and therapeutic approach for lower urinary tract FBs. A stone punch, glass syringe, basket, or cutting loop can be successfully removed endoscopically using grasping forceps.[4] Smaller FBs can be retrieved intact, whereas bigger ones require fragmentation. In our cases, they were removed without fragmentation, because they were not too big. Some FBs might be near the dome of the bladder because of their density. For that reason, cystoscopic examination should be performed carefully. In our cases, the FBs were near the dome of the bladder. Removal of the retained catheter tip of an inflated Foley catheter's balloon is difficult and sometimes frustrating. The spherical latex rubber balloon with a small amount of air makes it of lighter density than water. Therefore, it has a tendency to float in the

urinary bladder and rest near the dome, almost hiding itself. Hemal et al[23] reported 2 techniques to tackle such a situation. In the first technique, the bladder was evacuated of excess water and the balloon was trapped in the small space to be punctured with a Sachse urethrotome knife before its removal. In the second technique, a fine hypodermic needle without its hub was mounted on the biopsy forceps to puncture the balloon. We removed the cut end of the Foley catheter using the second technique.

Flexible ureterorenoscopy is a diagnostic and therapeutic method for kidney FBs. Removal of all retained FBs in a single operative setting should be the surgical goal.[13] Although most upper tract FBs are amenable to endoscopic removal, factors such as concomitant urolithiasis may necessitate a multimodal or multiprocedure approach. As such, the minimally invasive retrograde approach with or without shock wave lithotripsy is preferred. Nonetheless, percutaneous, laparoscopic, or open approaches may be necessary when minimally invasive procedures are unsuccessful or contraindicated, especially in the setting of heavy stone burden. Most of the retained renal FBs were removed endoscopically. However, some bigger FBs such as nephrostomy catheters or a piece of a ureterorenoscope that broke off intra-operatively are more difficult to remove, and a percutaneous approach may be necessary in these cases.[11,12,17] In this series, we noted that all of the retained renal FBs had associated stone formations that were not too big and the urinary systems of the patients were not complex. Therefore, all of cases were managed by RIRS.

CONCLUSIONS

The number of iatrogenic FBs found in the lower urinary tract is alarming. Extra care must be taken to avoid such occurrences. Urologists, surgeons, and paramedical staff must be very vigilant when performing procedures. For instance, it is always wise to examine the tip of the Foley catheter after removal. The most suitable method for removal of lower urinary tract FBs will depend on the nature and size of FB and available expertise and equipment. Most lower urinary tract FBs can be retrieved with endoscopic and minimally invasive techniques without resorting to open surgery.

Patients with retained renal FBs benefit from extraction by way of retrograde endoscopic techniques. In the upper tract FBs, the diagnosis can be challenging and direct visualization may be necessary. However, detailed anamnesis may be much more important than the removal techniques. To be sure that an FB has not been retained in the urinary tract, endoscopic instruments should be checked before and after use.

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