Management of genitourinary foreign bodies in a predominantly incarcerated population

Tyler J. Maiers, MD,¹ David J. Abramowitz, MD,¹ Raymond Pominville, MD,¹ Ajay A. Myneni, MBBS,² Katia Noyes, PhD,^{2,3} John J. Bodkin III, MD^{1,4}

¹Department of Urology, Buffalo General Medical Center, Buffalo, New York, USA

²University at Buffalo Surgical Outcomes and Research, Department of Surgery, Jacobs Institute, Buffalo, New York, USA

³Division of Health Services Policy and Practice, Department of Epidemiology and Environmental Health, University at Buffalo, Buffalo, New York, USA

⁴Western New York Urology Associates, Cheektowaga, New York, USA

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Introduction: Genitourinary foreign body (FB) insertion is a rare occurrence. Commonly reported reasons for insertion include autoeroticism and intoxication, however psychiatric illness is thought to contribute in most cases. In the incarcerated population, malingering plays a prominent role. We examined clinical patient characteristics and management patterns for cases of genitourinary FB insertion and sought to identify risk factors for recidivism. Materials and methods: A retrospective review was performed of all patients presenting to a tertiary trauma center with a genitourinary FB between January 2001-June 2019. Patient demographics, presentation, work up, and management were reviewed. Bivariate and multivariate statistical analyses were performed.

Results: Patients were primarily young (33 yo, range: 21-93), male (92%), incarcerated (67%), and had at least one

Introduction

In recent years, healthcare spending per inmate in the United States has reached a median of \$5,720 annually, attributed in large part to a rise in the share of older inmates nationwide.^{1,2} In 2015, large discrepancies in the annual cost of healthcare per inmate were described between states, ranging from \$2,173 in Louisiana to \$19,796 in California.¹ In the state of New York, healthcare costs per inmate increased 5% from

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Address correspondence to Dr. Tyler J. Maiers, Department of Urology, Buffalo General Medical Center, 100 High Street, Suite B280, Buffalo, NY 14203 USA psychiatric diagnosis (71%). Concomitant FB ingestion was present in 56 (41.5) encounters. Risk factors for repeat FB insertion included incarceration (100.0% versus 51.5%, $\rho = < 0.01$), psychiatric comorbidity (100.0% versus 51.5%, $\rho = < 0.01$), and other concomitant FB insertion/ingestion (68.7% versus 18.2%, $\rho = < 0.01$). Common methods of FB extraction included flexible cystoscopy (33.8%), extrinsic pressure (21.0%), rigid cystoscopy (12.8%), and open surgery (8.1%). Fifty-three (39.2%) encounters required anesthesia and 64 (47.4%) encounters required admission.

Conclusions: Genitourinary FBs are usually removed via endoscopic or minimally invasive extraction techniques and the majority are located within the anterior urethra. Special consideration should be given to patients with psychiatric comorbidity, concomitant FB insertion/ ingestion, or those presenting from a correctional facility as these characteristics are associated with repeat insertion attempts.

Key Words: genitourinary, foreign body, incarcerated, economic burden, prisoner, mental health

2010 to 2015, from \$6,701 to \$7,047.¹ Due to a lack of reporting uniformity and standardization measures, a direct comparison between states on the overall value and efficiency of healthcare provided to inmates is challenging. Furthermore, incarceration facilities are faced with unique healthcare challenges that increase the cost of care compared to the general population, including a relatively high proportion of inmates that engage in various forms of self-harm.³ Genitourinary foreign body (FB) insertion is a relatively common form of self-harm encountered in incarceration facilities which may contribute to a rise in total healthcare expenditure.

In the general population, genitourinary FB insertion is a relatively rare occurrence and the overall incidence of urethral or bladder FB insertion is poorly described in the literature, with several case reports and series previously published.⁴⁷ Patients have come from all age groups, with males reportedly 1.7 times more likely to perform genitourinary FB insertion than females, with high rates of recidivism.⁴⁻⁸ While the underlying reasons for FB insertion are highly variable, the most commonly reported reasons include psychiatric illness, intoxication, autoeroticism, and perceived contraception.⁵ Malingering, or secondary gain, is a common reason for FB insertion specifically within the incarcerated population.⁹ Urethral FB insertion as a social contagion among inmates in a maximum-security prison was first described by Rada et al in 1982.¹⁰ Episodes of self-injurious behavior have been described within the incarcerated population at a rate slightly over 1% of inmates per year, but the prevalence of genitourinary FB insertion within this population remains unclear.¹¹

As described by Ophoven et al, the type of foreign objects inserted into the genitourinary tract are highly variable and defy imagination, ranging from headphone cables, pieces of food, thermometers, small organisms, and pens, among many others.^{57,12,13} Patients often present late due to associated shame and stigma surrounding the act of FB insertion. The most commonly reported presenting symptoms include dysuria, hematuria, urinary retention, suprabubic and/or penile pain, and swelling of the penis and external genitalia.^{4,6}

Retrieval of self-inserted genitourinary FBs may be performed by a wide variety of techniques ranging from minimally invasive maneuvers such as extrinsic pressure, the novel Retrieval of Anterior urethral Materials Safely (RAMS) technique, or forceps extraction, to more invasive methods such as endoscopic procedures with or without anesthesia, and open surgical interventions.⁷ While management algorithms have been proposed, the diversity of genitourinary FB types, locations, degree of impaction, patient preference, and provider skill makes strict use of an algorithmic approach challenging.^{4,7} To date, most of the literature on genitourinary FB insertion consists of case reports and several case series with relatively small numbers of patients and total episodes of insertion. Herein, we characterize the presence of several important risk factors for repeat genitourinary FB insertion attempts and review the management patterns and characteristics of patients from a large tertiary trauma center serving multiple correctional facilities.

Materials and methods

A single-institution retrospective review was performed of all patients presenting to the emergency department of a large, urban, county medical center with a urethral or bladder FB between January, 2001 and June, 2019. This level I trauma center serves a population of approximately 2.6 million with service contracts at several regional correctional facilities.

Encounters were identified using ICD-9-CM and ICD-10-CM diagnostic codes linked to a diagnosis of urethral or bladder FB (ICD-9-CM: 939.0, ICD-10-CM: T19.0XXA, T19.1XXA). Patient demographics, presenting symptoms, type and location of FB, work up, management, and complications were manually abstracted from electronic health records. Anterior urethra was defined as bulbar urethra, pendulous urethra, fossa navicularis, and urethral meatus. Posterior urethra was defined as bladder neck, prostatic urethra, and membranous urethra. This study was completed with approval from our institutional review board.

We performed bivariate and multivariate statistical analyses comparing demographic, clinical, and treatment characteristics between patients to characterize the presence of possible risk factors for repeated genitourinary FB insertion. Statistical analysis was performed using SAS 9.4 software (Cary, NC, USA)

Results

Forty-nine patients presented with a urethral or bladder FB between January, 2001 and June, 2019. Collectively, there were 135 distinct episodes of FB insertion identified. Patient demographic information is summarized in Table 1. Patients were mostly male (n = 45, 92%) with a median age of 33 years (range: 21-93). Thirty-three patients (67.3%) were incarcerated and 35 patients (71.4%) had at least one previously documented psychiatric comorbidity. Concomitant FB insertion/ ingestion was present in 56 encounters (41.5%).

TABLE 1. Patient demographics

49
45
4
33 (21-93)
26 (53.1)
17 (34.7)
33 (67.3)
35 (71.4)
56 (41.5)
64 (47.4)
2 (1-36)
27.3 (0-141.5)

FB insertion episode characteristics are described in Table 2. The most common presenting symptoms included penile pain (39.2%), urinary retention (35.5%), dysuria (22.2%), and gross hematuria (16.3%). Patientreported reasons for FB insertion are summarized in Table 3. Retrieved FB types are summarized in Table 4.

FB locations included anterior urethra (78.0%), posterior urethra (3.6%), bladder (9.9%), and unspecified (8.5%). Methods of FB extraction included flexible cystoscopy (33.8%), extrinsic pressure (21.0%), rigid cystoscopy (12.8%), spontaneous passage (5.4%), and other interventions including variations of open surgery such as open cystotomy or urethrotomy (8.1%). Pelvic imaging was obtained in 82.2% of encounters. Most of the FBs were located in the anterior urethra (78.0%).

Characteristics of patients with repeat genitourinary FB insertion are summarized in Table 5. All 16 patients that engaged in repeat episodes of FB insertion were male, incarcerated, and had at least one diagnosed psychiatric condition. A majority of those who engaged in repeat genitourinary FB insertion presented with simultaneous

TABLE 2. Insertion episode characteristics

Variable	n (%)
Number of episodes	135
Recurrent episodes	86 (63.7)
Presenting symptoms Penile pain Urinary retention Dysuria	53 (39.2) 48 (35.5) 30 (22.2)
Gross hematuria	22 (16.3)
Location Anterior urethra Posterior urethra Bladder Unspecified	110 (78.0) 5 (3.6) 14 (9.9) 12 (8.5)
Imaging	
X-ray CT Ultrasound	92 (68.1) 28 (7.4) 5 (3.7)
Retrieval method	
Spontaneous passage Extrinsic pressure Flexible cystoscopy Rigid cystoscopy Cystotomy/urethrotomy Declined/left AMA Other	6 (4.4) 27 (20.0) 48 (35.6) 25 (18.5) 7 (5.2) 19 (14.1) 3 (2.2)
Anesthesia administered	53 (39.2)

TABLE 3.	Patient-reported	reasons	for	insertion
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Reason	n (%)
Desire to harm self	57 (42.2)
Unknown	27 (20.0)
Hearing voices	20 (14.8)
Unintentional	5 (3.7)
Attempt to leave prison	4 (3.0)
Depression	3 (2.2)
Upset at prison guards	3 (2.2)
Gunshot wound	3 (2.2)
Relief of obstruction	2 (1.5)
Sexual pleasure	2 (1.5)
Upset during isolation	2 (1.5)
Anger	2 (1.5)
Sexual assault	1 (0.7)
Surgical procedure	1 (0.7)
Urethral dilation	1 (0.7)
Urge to insert	1 (0.7)
Saving inserted objects for later use	1 (0.7)

FB insertion in another orifice (68.7%). Notably, a majority of repeat offenders were also admitted at least once for the purpose of FB removal compared to non-repeat offenders, although this result did not achieve statistical significance (68.7% versus 36.4%, $\rho = 0.06$).

TABLE 4. Genitourinary foreign bodies retrieved

Toothbrush	Broken glass
Bullet	Plastic piece
Staple	Ballpoint pen
Needle	Pen cap
Hook	Beaded necklace
Severed foley catheter tip	Apple stem
Cardboard	Rice
Paint chip	Zipper handle
Corn	Nail clipper piece
Styrofoam	Paperclip
Hospital bracelet	Piece of food tray
IV line knob	Apple seed
Metal piece	Candy wrapper
Button	Plastic utensil piece

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Characteristic	Repeat insertion		p value*
	Yes n (%)	No n (%)	-
Total	16	33	
Age [mean (sd)]	33.3 (8.0)	42.9 (18.2)	0.16
Gender			0.28
Female	0 (0.0)	4 (100.0)	
Male	16 (100.0)	29 (87.9)	
Race			0.61
Caucasian	5 (31.2)	13 (39.4)	
African American	9 (56.3)	18 (54.6)	
Other	2 (12.5)	2 (6.1)	
Incarcerated patients	16 (100.0)	17 (51.5)	< 0.01
Diagnosed with mental health disorder	16 (100.0)	17 (51.5)	< 0.01
Concomitant FB insertion/ingestion	11 (68.7)	6 (18.2)	< 0.01
Admission required for FB removal	11 (68.7)	12 (36.4)	0.06
FB = foreign body (urethral and/or bladder) *p value derived from Fisher's Exact test			

Anesthesia was required during 53 encounters (39.2%). Sixty-four encounters (47.4%) required inpatient admission. For patients requiring admission, median length of stay was 2 days (range: 1-36). Complications included urethral stricture formation in five patients and a urethral false passage identified in one patient. Median follow up was 27.3 months (0-141.5 months).

Discussion

The present study is a comprehensive single-institution retrospective review of urethral FB insertion, with 49 patients and 135 unique episodes described between January 2001-June 2019. This study was conducted at Erie County Medical Center, a regional trauma center serving a population of approximately 2.6 million with service contracts at several regional correctional facilities.

The majority of patients identified in the present study were incarcerated at the time of initial evaluation, and this population accounted for all episodes of repeat urethral FB insertion. A single incarcerated patient accounted for 20 discrete episodes of urethral FB insertion, and similarly high rates of repeat urethral FB insertion have been previously described elsewhere.^{4,7} Furthermore, over 40% of episodes of urethral FB insertion occurred in the setting of concomitant FB

ingestion, suggesting a pattern of self-harm or suicidal behavior in a large number of patients.

Risk factors for repeated FB insertion attempts are poorly described in the literature. On retrospective review in the present study, there were several characteristics associated with repeat attempts at urethral FB insertion including incarceration, presence of one or more psychiatric comorbidities, and presentation with other concomitant FB insertion and/or ingestion. A significant number of patients admitted for at least 1 day for the purpose of urethral FB retrieval were found to have repeat encounters, however this trend did not achieve statistical significance ($\rho = 0.06$). Potential risk factors that were identified in the current study carry important implications for patient counseling and targeted prevention efforts to reduce the number of repeat urethral FB insertion encounters.

When potential risk factors for repeat insertion are identified, healthcare providers are presented with a unique opportunity to intervene. Special attention should be paid to explaining the risk of serious infection or stricture, both of which may require further intervention. Those patients presenting with an untreated or poorly treated psychiatric comorbidity should receive psychiatric consultation at time of presentation in the emergency department. In our experience, prisoners frequently return with poorly treated severe psychiatric conditions. While many

incarceration facilities are known to provide psychiatric services, in the case of repeat offenders there should be serious consideration for enhanced communication with psychiatric service providers, closer follow up, complete reevaluation of the current treatment regimen if deemed suboptimal or ineffective, and even complete transfer in ownership of psychiatric care if necessary. While careful psychiatric monitoring at each incarceration facility would be ideal, our longitudinal experience suggests the underlying psychiatric conditions for a number of repeat offenders are managed unsuccessfully. Similarly, among prisoners with known mental health disorders on admission, Reingle Gonzalez et al report greater than 50% did not receive appropriate medical therapy while in prison.¹⁴ This raises a number of questions regarding the role of increased funding and implementing improved state and national healthcare policies to guide the delivery of effective mental health care in this particularly vulnerable population.

Various underlying reasons for urethral FB insertion have been described in detail by other authors including psychiatric disorders, autoeroticism, intoxication, malingering, and perceived contraception, among others.^{5,15-17} We described patient-reported explanations for urethral FB insertion, Table 3, when possible, in an attempt to reduce clinician bias in determining the underlying etiology of insertion, often merely assumed to be malingering in nature. While malingering has previously been reported within the incarcerated population, only a small minority of patients in the present study explained their own behavior in this manner.9 Similarly, autoeroticism or self-pleasure was endorsed by only two patients despite being described previously as a common motive.⁵ Patient-reported reasons for self-insertion included a significant number of episodes preceded by "hearing voices," a form of command hallucination, suggesting a high burden of poorly controlled or undiagnosed psychiatric illness. Similarly, Applebaum et al described a high rate of psychiatric comorbidity in patients who engage in self-injurious behavior, including cluster B personality disorder, mood disorder, mixed personality disorder, psychotic disorder, and intellectual disability.¹¹

The clinical presentation, work up, and management of genitourinary FBs has been described extensively.^{4,5,7} The most common presenting symptoms include dysuria, urinary retention, hematuria, and suprapubic/ penile pain, and swelling of the external genitalia.^{4,6,7} We observed a high rate of urinary retention, penile pain, dysuria, and hematuria. Work up initially includes a focused history and physical examination related to the FB insertion. Any signs of infection, acute urinary retention, prior history of urethral FB

insertion, concomitant ingestion, and suicidal intent are particularly important to elicit, as they may guide the subsequent management strategy. On arrival we typically obtain a urinalysis to evaluate for hematuria and overt signs of infection, with a urine culture and sensitivity serving to guide antibiotic therapy as needed. We routinely obtain imaging prior to manipulation in order to characterize the location, size, and number of genitourinary FBs. Other authors have reported preferential use of manual extraction techniques before obtaining any imaging, especially for small (< 1 cm), smooth, palpable, and mobile objects distal in location and in the absence of gross hematuria.47,18 In the management algorithm first proposed by Palmer and later modified by Bogdanovich, imaging is recommended if any of the following criteria are met: large (≥ 1 cm), immobile, non-palpable, rough surface, proximal to distal penile urethra, or blood at urethral meatus.^{4,18} We encountered high rates of deception and immediate requests for endoscopic intervention under general anesthesia from highly experienced incarcerated patients seeking to maximize length of stay. In this setting, imaging is useful before intervention and, in select cases, also plays a role in confirming absence of any remaining FBs after manual extraction.

In the 21% of patients who successfully underwent extrinsic pressure or "urethral milking" in the present study, perineal pressure accompanied by firm, steady force along the anterior urethra was adequate for FB retrieval with minimal discomfort in the absence of topical lidocaine jelly insertion which was frequently utilized by Anele et al.⁷ We advocate for a cost-conscious, stepwise approach with use of the RAMS technique if retrieval by simple extrinsic pressure is unsuccessful for an anterior urethral FB. If the RAMS technique is unsuccessful, escalating to more invasive measures may need to be considered as previously described.⁷

Endoscopic retrieval techniques via flexible or rigid cystoscopy are typically reserved for patients in which manual extraction techniques are either unsuccessful or inappropriate. Mobile FBs within the urethra may be extracted endoscopically with a grasper or removed with forceps. Impacted FBs located within the urethra may be fragmented with laser lithotripsy to facilitate removal. When minimally invasive/endoscopic interventions fail, or when a significant component of a FB is located within the bladder, open surgical intervention such as cystotomy or urethrotomy may be performed to facilitate efficient extraction.

While various management algorithms have been proposed, adherence to a strict algorithmic approach is consistently challenging. Limitations include significant patient variation in ability to tolerate bedside maneuvers and interventions in the absence of sedation or general anesthesia. Furthermore, differences in patient-preferred extraction techniques when multiple management options are presented add to the limitations of the algorithmic approach. It is often challenging to determine the type, number, and location of FBs, especially when inserted materials are not radiopaque, the obtained history is unreliable, or when healthcare providers are intentionally deceived by a patient exhibiting malingering behavior. Furthermore, plain films and computed tomography represent static images of a dynamic process, as the location of a non-impacted urethral FB is subject to change between time of imaging and bedside examination by emergency department or urology staff. Nonetheless, there is merit in utilizing the previously described algorithmic approaches to escalate management options from least to most invasive in order to facilitate efficient and cost-effective FB retrieval. As always, healthcare providers should take into consideration any patient-specific factors which may further guide the decision-making process.

The strengths of this study include the relatively large volume described and the extended duration spanning approximately 18 years, making this the most robust single-institution review of genitourinary FB insertion to date. The primary limitations of this study include the retrospective and single-institution nature of the review. The high rate of incarceration and management experience described herein may differ from other institutions. Retrieval techniques were employed by staff members with varying levels of experience. Multi-institutional studies or surveys of national databases could further clarify the cost and incidence of genitourinary FB insertion. The relationship between incidence of genitourinary FB insertion and changes in correctional facility psychiatric funding over time may offer additional insight into this behavior.

Conclusions

Most self-inserted genitourinary FBs are located within the anterior urethra and may be extracted successfully using minimally invasive or endoscopic techniques. Potential risk factors for repeat FB insertion attempts include incarceration, psychiatric comorbidity, concomitant FB insertion/ingestion, and admission. Additional targeted prevention efforts may prove beneficial in patients with possible risk factors for reinsertion. Many questions are raised regarding the role of enhanced psychiatric funding and policy implementation in delivering effective psychiatric treatment and preventative counseling to this vulnerable patient population.

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