



Trauma and reconstruction

## “A button in my Benjamin” – Self-inflicted insertion of button batteries into the male urethra: Management and complications

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### ABSTRACT

We present a case of self-insertion of multiple button batteries into the urethra. Button batteries are corrosive and tissue liquefaction and necrosis can occur within 2 hours. Emergent removal, intravenous antibiotics, suprapubic and indwelling catheter insertion and close monitoring are required to prevent further tissue injury. In our case, the batteries were removed with stent grasper forceps. There was extensive caustic circumferential injury to the urethral mucosa on cystoscopic examination. This was complicated by periurethral necrosis and abscess, requiring urgent incision and debridement. No reconstruction was performed due to the very high risk of graft failure.

### 1. Introduction

Urethral foreign bodies are considered a urological emergency and require prompt intervention. Various urethral foreign bodies have been reported in the literature including electrical wires, cutlery, metal screws and batteries. Button batteries are corrosive, and when inserted into the urethra, can cause tissue liquefaction and necrosis. Emergent removal is required to prevent further tissue injury and complications. Clinical presentation therefore typically occurs following onset of urinary symptoms such as urethral pain, urinary retention, infection, dysuria or haematuria.

### 2. Case presentation

A 73-year-old male presented to the Emergency Department 24 hours after inserting three button batteries into his penile urethra. He reported a behavioural pattern of urethral foreign body insertion for sexual gratification and had not had issues in the past with removal. During this episode, the batteries had migrated more proximally within the penile urethra, due to repeated failed attempts at self-removal. He subsequently presented to the Emergency Department with moderate penile pain, severe paraphimosis and obstructive urinary symptoms including weak urinary flow, straining and a sensation of incomplete bladder emptying.

His past medical history was relevant for type 2 diabetes mellitus managed with metformin and an SGLT-2 inhibitor, moderate aortic

stenosis, hypertension, hypercholesterolaemia, asthma and gastro-oesophageal reflux. Erectile dysfunction had been present for 3 years. He had previously undergone shockwave therapy and utilised intracavernosal alprostadil injections as needed. He had no history of any previous surgeries to his abdomen or external genitalia. There was no history of psychiatric illness.

Clinical review revealed a painful and oedematous penis with paraphimosis. His urethral meatus was stained black. His bedside bladder scan showed a postvoid residual of 250mL.

### 3. Investigations

A pelvic x-ray revealed three button batteries of size 13.5 mm in width and 3.2 mm in height, located in the region of the penile urethra (Fig. 1).

On initial bedside cystoscopic examination, the most distal battery had a black tar-like appearance, concerning for corrosive discharge and ongoing caustic erosion into the mucosa. The scope could not be passed beyond the most distal battery. Removal of batteries was attempted by the bedside using stent graspers, baskets and artery forceps, however, the patient struggled to tolerate the procedure and this was abandoned.

### 4. Treatment

Due to difficulty directing the tip of the cystoscope beyond the batteries and concerns of ongoing urinary obstruction, a Bonano suprapubic

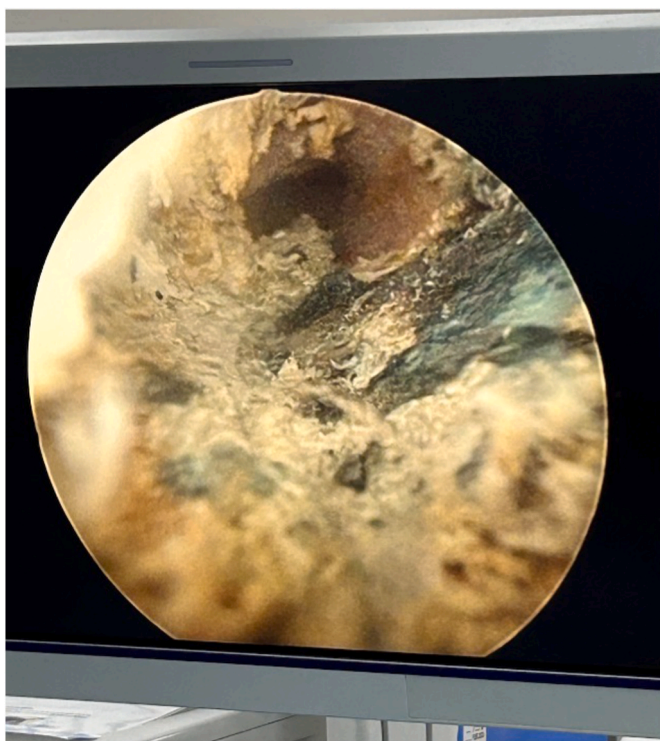
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**Fig. 1.** Plain pelvic radiographs demonstrating three button batteries within the penile urethra.

catheter was inserted under radiological guidance to drain the bladder. The patient was commenced on broad-spectrum intravenous antibiotics in an attempt to limit the risk of progression to Fournier's gangrene and urgently transferred to formal operating theatres. Under general anaesthesia (GA), his paraphimosis was reduced utilising the Dundee technique.<sup>1</sup> Next, rigid stent grasper forceps were used to remove all three foreign bodies via cystoscopic guidance. All extracted batteries were coated with black tar-like material. The urethra was re-examined following extraction of all batteries: extensive circumferential burns to the anterior penile urethra were noted (Fig. 2). The penile urethra

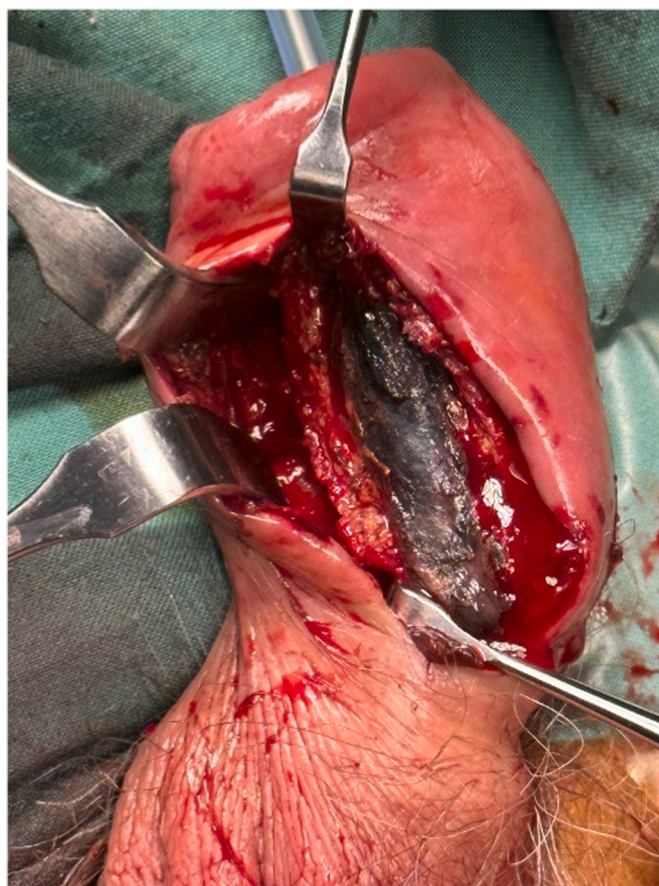


**Fig. 2.** Circumferential burns visualised on cystoscopically examination of penile urethra.

proximal to the batteries, as well as the bulbar, membranous and prostatic urethra were of normal appearance. There was no involvement of the bladder neck. The Banono catheter was changed to a standard 18Fr suprapubic catheter and an 18Fr urethral IDC was inserted and kept on free drainage.

He remained clinically well postoperatively with improvement in inflammatory markers and was prescribed a 14-day total course of antibiotics. He was discharged home on postoperative day 3, with a plan to leave his urethral IDC in for at least 2 weeks, followed by a trial of void, with a view to cystoscopically examine his urethra thereafter to assess healing.

Ten days following discharge, the patient re-presented to the Emergency Department with a 3-day history of increased penile swelling and urethral discharge. On examination, he had an erythematous fluctuant area on the left side of his penis, which expressed purulent discharge between his urethral meatus and foreskin and difficulty retracting the foreskin. There was no crepitus. He was commenced on intravenous vancomycin and piperacillin/tazobactam and urgently transferred to theatre. Under GA, an incision was made to the penile skin over the region of fluctuance and a large amount of purulent fluid was expressed. The necrotic underlying tissue was exposed, revealing an 8cm segment of necrotic urethra proximal to the meatus with necrosis of the surrounding corpus spongiosum (Fig. 3). This necrotic region was debrided. The incision was then extended to expose the entire segment of necrotic urethra. Given the extensive degree of necrosis affecting the distal urethra, the decision was made to perform a partial urethrectomy with excision of all necrotic tissue including the tunica of both corpora cavernosa and necrotic penile skin, followed by curettage down to healthy tissue. The healthy proximal urethra was sutured to skin allowing for



**Fig. 3.** Intraoperative finding at the time of debridement of an 8cm segment of necrotic urethra proximal to the meatus with necrosis of the surrounding corpus spongiosum.

partial closure of the defect, in a procedure similar to Johanson stage 1 (Fig. 4).<sup>2</sup> His penile wound swab grew *Enterococcus faecalis* sensitive to amoxicillin and he was treated with a 7-day course of Augmentin Duo Forte.

## 5. Outcome and follow-up

Outpatient review on postoperative day 14 from the day of his urethral excision and repair revealed fibrinous slough and granulation tissue along ventral aspect of penis which appeared healthy and non-infected. His neo-meatus appeared healthy. The patient was counselled on options for ongoing management. Given the complexity of his injury, it was deemed that formal penile urethral reconstruction would likely require a 3-stage repair consisting of buccal mucosal graft onlay urethroplasty, followed by a 6-month graft take and then a second graft onlay to achieve complete urethral tubularisation. Due to the anticipated prolonged course of penile urethral reconstruction, it was decided that the best option would be for no further penile reconstruction. His urethral IDC was removed on the same day while his suprapubic catheter was spigotted and he had a successful trial of void.

## 6. Discussion

To the best of our understanding, this is the first reported case of urethral necrosis with button battery insertion. Our case demonstrates the damaging effects that button batteries can cause on the genitourinary system and the need for emergent removal to prevent further tissue injury and long-term complications.

With any foreign body inserted into the urethra, the first step is to identify the foreign body, its size, shape and location through imaging such as plain pelvic radiographs. Urethral catheterisation and manipulation of the objects should be avoided until these details have been



Fig. 4. Partial urethrectomy with excision and curettage of all necrotic tissue down to healthy tissue and suture of healthy proximal urethra to skin (Johanson stage 1 procedure).

determined. In our case, a suprapubic catheter with interventional radiological guidance was inserted in the first instance given the multiple urethral batteries and difficulty traversing passed them with bedside cystoscopy.

Three methods of retrieval are described. Non-operative methods of retrieval should be considered in the first instance, using grasping forceps, snares or a basket. The second option is endoscopic retrieval, which can be aided by grasping devices. Surgical procedures are of last resort and may include internal or external urethrotomy, cystostomy or meatotomy.<sup>3</sup> Immediate management post extraction should include adequate pain relief, broad spectrum antibiotics and appropriate urinary diversion, generally achieved with a suprapubic catheter. Symptom control to reduce irritative symptoms should be instigated. In our case, all three button batteries were able to be removed endoscopically with stent grasper forceps, however, it was evident that acid leakage had occurred within 24 hours of insertion. Cystoscopy revealed circumferential burns to the anterior penile urethral mucosa due to battery discharge, highlighting the need for early intervention to remove the irritant source.

There is limited reporting within the literature on the mechanism and effects of caustic injury secondary to battery acid discharge within the urethra. Our understanding of the mechanism of corrosive battery injury mainly originates from reports of button battery ingestion within the paediatric population. The mucosa abutting the button battery completes an electrical circuit, allowing the residual battery charge to generate current, causing hydrolysis of water and generating hydroxide ions at the negative pole. Accumulation of hydroxide ions produce a localised alkaline corrosive injury with tissue liquefaction and necrosis, and perforation can occur within 2 hours of lodgement.<sup>4</sup> Corrosive agents at the extremes of pH can induce mucosal damage, and it is suspected that this caustic injury can increase tissue susceptibility to urethral stenosis, stricture or malignancy.

The literature on the sequelae of other urethral foreign bodies is more extensive and includes infection such as Fournier's gangrene, periurethral abscess, urosepsis and acute cystitis; chronic pain issues and anatomical defects such as penile scarring, fistula formation and urethral diverticula.<sup>3</sup> Some of the listed complications can be highly detrimental, and involve necrosis of urethra and penile tissue. Similar principles should be applied as for treatment of infected necrotic wounds, involving debridement down to healthy vascular tissue, with consideration for partial or complete amputation of the penis in cases of severe necrosis. Assessment of urethral reconstructive options should occur at least 3–6 months after injury to allow adequate time for wound healing. Reconstructive options involve taking into consideration patient factors such as age and likelihood of subsequent self-inflicted destructive behaviours on the urethra, surgeon factors such as level of reconstructive expertise and experience, and disease factors, such as the size and extent of tissue injury and scarred base.

We performed a formal literature review regarding case reports of self-inserted batteries into the urethra and tabulated the method of extraction and main complication (Table 1). We identified a diverse range of foreign bodies reported, such as wires, bones, cutlery, pins, thermometers, cotton-tipped swabs and worms. Very few case reports however have been published to date regarding urethral insertion of batteries. The sequelae of urethral and penile trauma secondary to battery insertion can be highly detrimental and highlights the clinical urgency of any hospital presentation involving foreign bodies inserted into the urethra.

## 7. Learning points

- Urethral foreign bodies are considered a urological emergency and require prompt intervention.
- Hospital presentation is often delayed due to patient factors such as embarrassment and the fear of humiliation.

**Table 1**

Summary review of case reports describing batteries self-inserted into the urethra.

Author and year	Age and Gender	Type and quantity of battery	Method of extraction	Sequalae
Labine et al., 2020 <sup>3</sup>	77 M	Three AAA batteries	Endoscopically – Two batteries extracted with forceps. Third battery removed with Storz nephroscope and Storz grasping forceps with ring handle and serrated double action jaws	Urethral stricture
Hosseini et al. (2022) <sup>5</sup>	49 M	Single AA battery	Non-surgical extraction	Urethral stricture
Bedi et al. (2010) <sup>6</sup>	62 M	Single AAA battery	Endoscopically with grasping forceps	NR
Ayyıldız et al. (2004) <sup>7</sup>	37 M	Single pocket battery	Open surgery as object could not be removed cystoscopically	NR

NR, not referenced; M, male.

•There is a paucity of reported cases on the sequalae of urethral caustic injury and most of the literature on the mechanism of injury originates from button battery ingestion within the paediatric population.

•The principles of treating urethral necrosis are similar to that of infected necrotic wounds, involving debridement down to healthy vascular tissue with consideration for partial or complete amputation of the penis in cases of severe necrosis.

•Penile urethral reconstruction may be an option after at least 3–6 months of recovery, however, for highly complex injuries, no reconstruction may be in the best interest of the patient.

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## CRediT authorship contribution statement

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## Declaration of competing interest

There are no competing interests or conflicts of interest to be declared.

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