



## Acquired male urethral diverticulum complicated by calculi: A case report

Angelica Griggs-Demmin<sup>a,\*</sup>, Sunil Patel<sup>b</sup>, Farzana Faisal<sup>b</sup>, Carla Saoud<sup>c</sup>, Kevan Salimian<sup>c</sup>, Andrew Cohen<sup>b</sup>

<sup>a</sup> Johns Hopkins University School of Medicine, 733 N. Broadway, Baltimore, MD, 21205, USA

<sup>b</sup> Brady Urological Institute, Johns Hopkins Medicine, 4940 Eastern Avenue, Baltimore, MD, 21224, USA

<sup>c</sup> Department of Pathology, Johns Hopkins Medicine, 4940 Eastern Avenue, Baltimore, MD, 21224, USA

### ARTICLE INFO

#### Keywords:

Urethral diverticulum  
Calculi  
Urethroplasty

### ABSTRACT

We present the case of a 38-year-old male with a past presumed history of traumatic genitourinary injury. Twenty-one years later, he presented with dysuria, urinary frequency, and urinary urgency and was found to have membranous stricture as well as a urethral diverticulum filled with calculi. For this rare case, we elected surgical management via urethroplasty and a urethral diverticulectomy. We present his clinical course and brief review of the diagnosis and management of male urethral diverticula.

### 1. Introduction

Urethral diverticula are congenital or acquired saccular urethral dilations that communicate with the urethral lumen via an orifice. They are more commonly observed in females because of poor anatomical support of the urethra and physical trauma sustained during childbirth.<sup>1</sup> In males, etiologic causes of acquired urethral diverticula include peri-urethral and prostatic abscesses, urethral strictures, blunt force trauma, urethral stones, and iatrogenic trauma after urethroplasty.<sup>1</sup> We report the case of a 38-year-old male with prior genitourinary trauma who presented to our clinic with urinary symptoms and a palpable scrotal mass. Imaging confirmed a diagnosis of urethral diverticulum. We describe our experience in repair.

### 2. Case description

A 38-year-old male presented to the emergency department with a month-long history of dysuria and urinary frequency and urgency. The patient's past medical history was significant for an unclear history of bladder and urethral surgery after an accident twenty-one years prior. He had a stellate scar consistent with a suprapubic tube location and recollection of urethral surgery requiring catheterization. We presumed, albeit without written record, urethroplasty for pelvic fracture urethral defect. In the ER, he was diagnosed with a urinary tract infection (UTI) and treated with antibiotics. After completing the course of antibiotics, the patient presented to the urology department with persistent

symptoms. Physical exam discovered a midline perineal mass; when pushed, urine evacuated from the penis. The mass felt multinodular with mobile contents concerning for stones. A cystoscopy confirmed a stricture at the bulbomembranous junction. A retrograde urethrogram and a voiding cytourethrogram confirmed these findings and opacification of a midline structure of the scrotum (Fig. 1). A computed tomography urogram demonstrated normal upper tracts and bladder, but also a 4 cm × 1.8 cm × 2.9 cm high-intensity midline lesion corresponding with prior findings (Fig. 1). This was consistent with a stone-filled diverticulum. The patient was counselled and elected a urethroplasty.

A typical midline perineal incision with fixed retractor was used. The urethra was mobilized off the underlying corpora in a normal-appearing region. This dissection was carried proximally, and ventrally we encountered the diverticulum. There was a clear plane between the normal urethra and this diverticulum. A fistula tract to the diverticulum was found extremely proximally within membranous urethra (Fig. 2). The diverticulum was so large we could not access the membranous urethra with it in-situ. We therefore tied off the fistula tract and transected the diverticulum, filled with small calculi upon examination. We continued our proximal urethral dissection, and ultimately a 1.5 cm segment of urethra was removed, incorporating the remaining fistula tract. The urethra was mobilized distally until the penoscrotal junction. We re-approximated the remaining urethral tissue off-tension in the typical fashion for an excision and primary anastomosis. A 16-inch indwelling Foley catheter was placed for two weeks. Pathology of the excised urethra and diverticulum revealed keratinized squamous

\* Corresponding author.

E-mail addresses: [agriggs2@jhmi.edu](mailto:agriggs2@jhmi.edu) (A. Griggs-Demmin), [acohen65@jh.edu](mailto:acohen65@jh.edu) (A. Cohen).

<https://doi.org/10.1016/j.eucr.2021.101837>

Received 10 August 2021; Received in revised form 31 August 2021; Accepted 3 September 2021

Available online 10 September 2021

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mucosa and underlying fibroconnective tissue with mild chronic inflammation, as well as calculi by gross diagnosis (Fig. 3). Ultimately a post-operative retrograde urethrogram revealed patency with no evidence of residual diverticulum or stones.

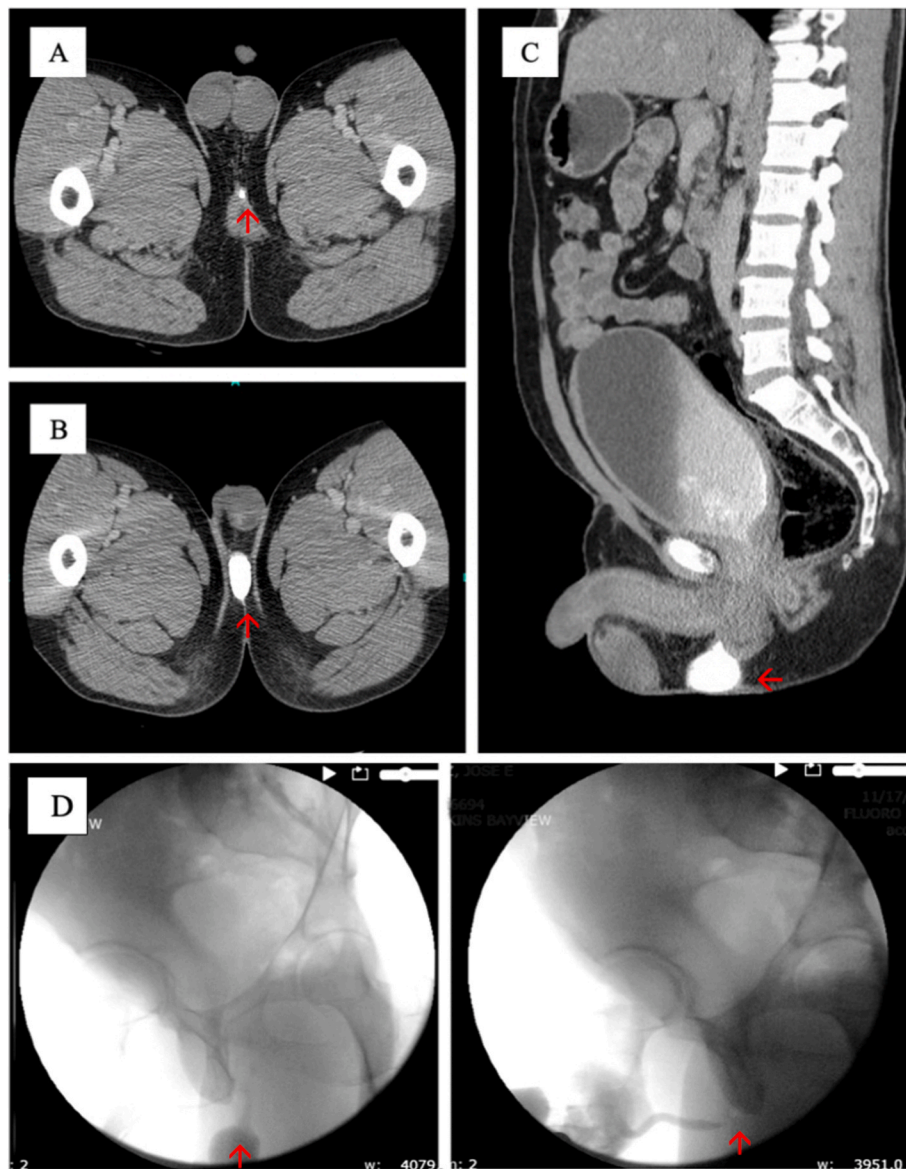
### 3. Discussion

Male urethral diverticulum is a rare entity; according to a PubMed search, 75 cases of acquired urethral diverticula in males were reported in the literature between 2000 and 2020. Up to 90% are acquired and the remainder are congenital, characterized by a full-thickness epithelial lining, including musculature.<sup>1</sup> In contrast, acquired male urethral diverticula have findings of granulation tissue and lack smooth muscle fibers in the epithelial lining.<sup>2</sup> Allen et al. reported that the most common site for both the congenital and acquired types is the penoscrotal junction.<sup>3</sup> Both types of urethral diverticula can present with various combinations of urinary voiding symptoms: lower urinary tract symptoms, recurrent urinary tract infections, post-micturition dribbling, and hematuria.<sup>3</sup> It is thought that congenital diverticula in the male are due

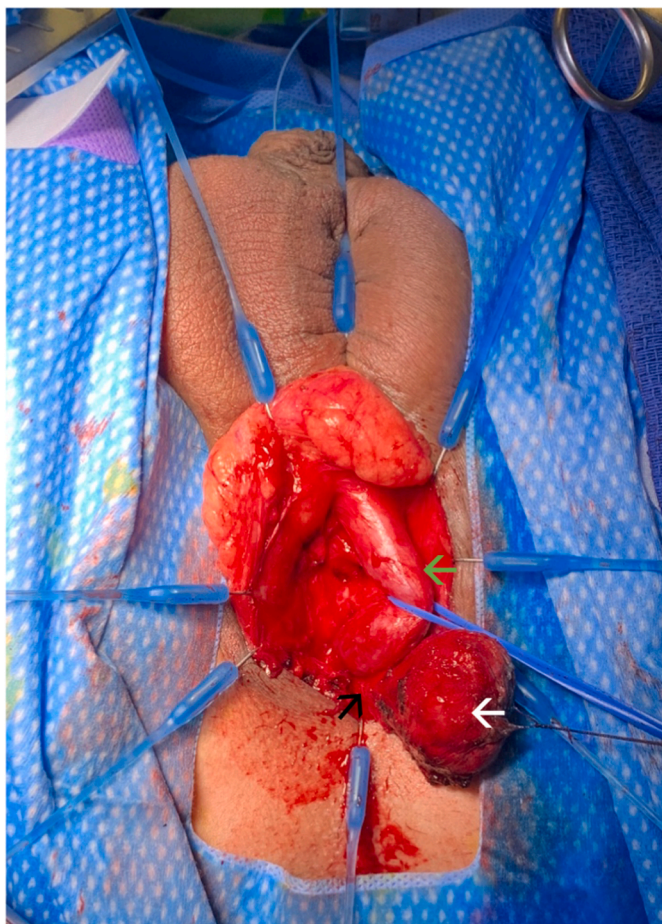
to a developmental defect of the urethral folds on the ventral aspect of the urethral wall, and patients usually present after a secondary complication – infection or calculi – arises.<sup>2,4</sup> Stricture, infection, trauma, and previous surgery are all posed as primary causes of acquired diverticula, through potential mechanisms of increased urethral pressure, fibrosis and scar formation, and suppuration and necrosis of the urethra.<sup>2</sup>

The formation of calculi secondary to urethral diverticulum occurs in approximately 4–10% of cases.<sup>5</sup> It is thought that urinary stasis predisposes to infection, crystallization, and eventually, the formation of stones.<sup>5</sup>

There are nonsurgical and surgical approaches to address male urethral diverticula; the presenting symptoms and anatomical considerations guide management. Small uncomplicated diverticula can be managed by manual compression and external urethral pressure following micturition.<sup>5</sup> Large diverticula, large stone burdens, or complicated surgical histories indicate open reconstruction.<sup>5</sup> In general, male urethral diverticula measuring less than 4cm are treated with excision and primary anastomosis; those measuring greater than 4cm



**Fig. 1.** Axial (A and B) and sagittal (C) computed tomography urography images show the diverticulum as a hyperdense midline lesion (red arrows). Initial retrograde urethrogram (D) shows stricture at bulbomembranous urethra and opaque midline structure (red arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)



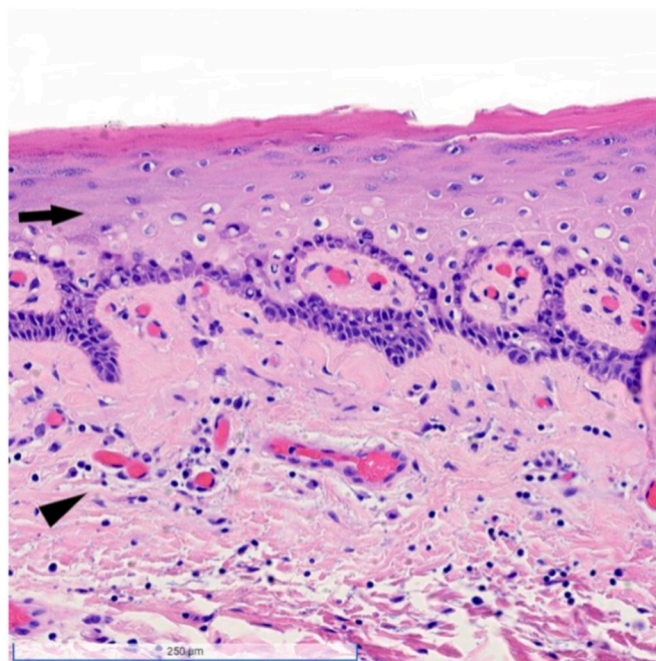
**Fig. 2.** Intra-operative view of the diverticulum with its calculi (white arrow), native bulbar urethra (green arrow), and fistula tract (black arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

are treated with substitution urethroplasty with grafting.<sup>4</sup> As many male urethral diverticula have iatrogenic causes, reconstructive surgeries have higher than usual complication rates than reconstruction of urethral strictures alone.<sup>4</sup> Diverticula are often accompanied by scar tissue and fibrosis, which makes repair more challenging due to larger defects.<sup>4</sup>

The sequence of events in this case is uncertain because of the patient's surgical history. It is most likely that the observed urethral stenosis in the membranous and prostatic urethra was a consequence of a prior urethral surgery the patient underwent when he was 17. The diverticulum itself could have then formed because of this obstruction and subsequent herniation of the urethral epithelium, followed by the formation of the calculi within the diverticulum.

#### 4. Conclusion

In this case, we discussed a 38-year-old male with a significant but uncertain history of penile/urethral trauma and surgery who presented



**Fig. 3.** Pathology from the diverticulum. H&E-stained section shows keratinized squamous mucosa (arrow) and underlying fibroconnective tissue (arrowhead) with mild chronic inflammation. Image taken at 10x magnification.

with lower urinary tract symptoms to the emergency department. An acquired anterior urethral diverticulum filled with calculi was discovered preoperatively and surgically excised. Urethral diverticula in the male, both congenital and acquired, are rare entities. While rare, urethral diverticula should be considered in males presenting with urinary voiding symptoms along with scrotal mass.

#### Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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