Case Report

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Urinary Retention Caused by a Urethral Stone Diagnosed with Point-of-Care Ultrasound: A Case Report

Urgent Message: Urethral obstruction can occur due to impacted urinary calculi. This etiology should be considered in patients with known or suspected history of kidney stones who present with urinary retention. Point-of-care ultrasound can be used to evaluate for and confirm this diagnosis in male patients, in whom the phenomenon is most likely.

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Abstract

Introduction: Nephrolithiasis may lead to passage of calculi that can become lodged in the penile urethra and lead to urinary retention. This is traditionally a diagnosis made with computed tomography (CT), x-ray (XR), or retrograde urethrography.

Clinical presentation: A 69-year-old man presented to urgent care (UC) after he developed flank pain, hematuria, and urinary retention. As his symptoms progressed, he later developed penile pain.

Case Resolution: Point of care ultrasound (POCUS) showed a small hyperechoic mass in the penile urethra. Urethral stones can be managed with watchful waiting, milking of the stone, or in our case, placement of a catheter.

Conclusion: POCUS is a useful adjunct that should be considered in patients with suspected urethral or penile stones. It can provide a quick reliable diagnosis and forgoes radiation.

Introduction

Diagnostic ultrasound's utility in the evaluation of the urinary system (ie, kidneys and bladder) has been well established.[1] However, in patients with acute flank pain in which there is clinical concern for ureteral colic, CT imaging, especially in emergency department

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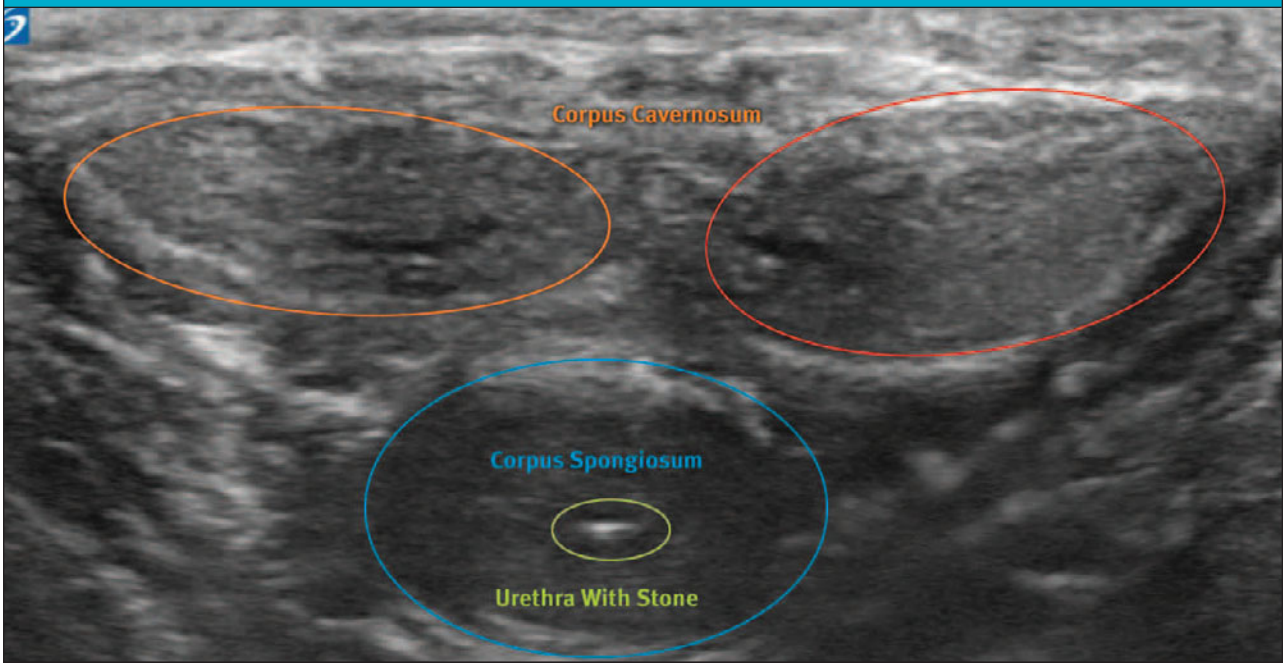
Figure 1. Point of Care Ultrasound



(ED) settings, is commonly performed as the initial imaging modality, despite evidence that CT confirmation in cases of likely ureterolithiasis often does not affect management.[2] If a urinary calculus becomes lodged in the penile urethra, an x-ray or retrograde urethrography can also be used to aid in diagnosis.[3] When available, POCUS can be a useful tool in the evaluation of patients with suspected renal colic and penile pain and reduce radiation exposure without delaying care or affecting patient outcomes.[4]

"POCUS can be a useful tool in the evaluation of patients with suspected renal colic and penile pain."

Clinical Presentation

A 69-year-old man with a past medical history for nephrolithiasis, hypertension, and prostate cancer (in remission after radiation therapy) presented to UC with a 1-day history of flank pain, suprapubic pressure, hematuria, urinary dribbling, and the sensation of incomplete bladder emptying. He denies any vomiting, fevers, nausea, vomiting, or testicular pain. He reported that the pain began in the right flank but became more prominent in the suprapubic area and penile shaft on the day of his presentation. Current medications included tamsulosin 0.4mg daily and losartan 25mg daily.

Physical Exam Findings

In general, the patient appeared uncomfortable but non-toxic. His vitals were normal except for a mildly elevated blood pressure (158/82), and he was afebrile. On abdominal exam, the patient had tenderness and suprapubic fullness; the remainder of the abdomen was nontender without rigidity, rebound, or guarding. Assessment of the back revealed minimal bilateral costovertebral angle tenderness.

Urgent Care Diagnostic Assessment, Case Conclusion

Using a 12-3 MHz linear probe and 5-1 MHz curvilinear probe, POCUS was performed evaluating the bladder, kidneys, and penile shaft. Imaging of the kidneys showed moderate, bilateral hydronephrosis. There was no echogenic material (eg, clot) noted in the bladder. However, the bladder appeared distended, and the ultrasound estimated volume of urine was approximately 700mL. Using a 12-3 MHz linear probe, the penile shaft was then scanned in the short axis. The corpus cavernosum and corpus spongiosum appeared isoechoic (ie, grey). Within the center of the corpus spongiosum, the

urethra was seen and appeared as a small anechoic (ie, black), compressible structure. As the length of the penile shaft was scanned, a small 3mm hyperechoic (ie, white) finding was noted (**Figure 1**). The location of the stone on POCUS exam correlated with the location of the patient's pain. Based on the clinical presentation, an impacted, obstructing urethral stone within the penile urethra was suspected.

Given the evidence of urinary obstruction, after discussion with urology, a 16Fr Coudé tipped Foley catheter was placed. The placement of the catheter allowed the urethral stone to be reduced back into the bladder. A leg bag was placed, and he was then referred to urology as an outpatient for further assessment and determination of timing of catheter removal and stone management.

Discussion

Urinary calculi which are small enough to pass through the ureter and into the urethra usually pass without the need for intervention.[5] Stones sized 1-4mm are passed through the urethra at a rate of around 78%.[5] Urethral stones are more commonly observed in men, accounting for approximately 82% of cases. The reason for this higher prevalence in men is not entirely clear. However, it may be related to the fact that urethral stones in women are often associated with an underlying urethral lesion, which is present in 77% of female cases, compared to 24% in men.[6] Pain in the penile shaft is typically caused by the abrasive nature of the stone as it passes through the urethra. The most common symptom is a palpable mass, occurring in 68% of cases, with other frequent symptoms including voiding difficulties, pain, urinary retention, and hematuria.[6]

The diagnosis of urethral calculi can be made with XR, CT, or XR urography.[3] However, all of these imaging studies are associated with radiation exposure and may not be available in UC. Additionally, not all stones are radiopaque. Pure uric acid stones and stones composed of mainly cystine or magnesium ammonium phosphate may be undetectable on radiographs.[7] Ultrasound is a highly sensitive modality for evaluating for the presence of foreign bodies and is superior to XR for detection of radiolucent foreign bodies.[8] Thus, although the sensitivity of ultrasound for urethral stones has not been studied, it is a reasonable initial imaging study in UC—if available—as it is quick, radiation-free, and can detect both radiolucent and radiopaque objects.

Previously published case reports have discussed the value and utility of POCUS in detecting urethral stones.[9,10] Other studies have shown how the use of POCUS as the initial imaging modality for suspected renal colic could yield significant national cost savings and reduced ED lengths of stay without adverse outcomes for patients.[2,11,12] By incorporating POCUS into the diagnostic workup for suspected urethral calculi, UC clinicians could effectively reduce unnecessary radiation exposure without compromising the diagnostic accuracy or patient care. Depending on the stone's size, it can present simply as a hyperechoic mass or a larger mass with an acoustic shadow.[13]

"The diagnosis of urethral calculi can be made with XR, CT, or XR urography. However, all of these imaging studies are associated with radiation exposure and may not be available in urgent care."

Urethral calculi are the rarest form of urolithiasis, and as a result, there are no established best-practice consensus guidelines for their management.[3] Many urethral stones pass spontaneously, and allowing for this possibility is reasonable in patients who can adequately void.[3] For stones in the distal urethra, described as stones in the palpable urethra, "milking" the shaft of the penis has also been reported to lead to successful stone expulsion in several cases.[6] If there is complete obstruction of the urethra, patients may require urethral catheterization to reduce the stone into the bladder to allow for passage of urine, as was the case with the patient presented in this case.[3] In cases where urinary retention cannot be resolved in UC, immediate referral to an ED is recommended to prevent permanent renal insufficiency.[14]

Conclusion

This case highlights the use of POCUS in confirming the diagnosis and location of a urethral calculus in a male patient with suggestive symptoms. It also underscores the value of POCUS as an affordable and readily-available, radiation-free modality for locating soft tissue foreign bodies.

Ethics Statement

The patient provided verbal consent for case description and clinical images to be used for education purposes.

Takeaway Points for Urgent Care Providers

- In patients who present with suspected urinary retention, POCUS can provide rapid confirmation of a distended bladder. If additional views of the kidneys demonstrate bilateral hydronephrosis, clinicians can use POCUS to search for causes of obstruction in the distal urinary tract and urethra of male patients.
- In patients who initially have symptoms of renal colic who then progress to having penile pain, POCUS can quickly evaluate for the presence of a urethral calculus.
- Urethral stones causing obstruction can be treated by attempting to expel them by milking (from proximal to distal) the penile shaft or by reducing the stone into the bladder via urinary catheter placement. ■

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