

CASE REPORT

Renal failure with a large bladder calculus related to a foreign body: a case report

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Key Clinical Message

We encountered a patient with renal failure in the setting of long-standing difficulty urinating, which he previously treated with intermittent self-catheterizations. Imaging showed a large urinary calculus in the bladder. This case illustrates the importance of taking a detailed history and the dramatic long-term effects of bladder calculi.

Keywords

Bladder calculus, foreign body, renal failure.

Introduction

Urinary calculi are common, usually forming in the kidneys. Less common are bladder calculi, which are more common in men and usually secondary to a pathologic condition such as a urethral stricture, benign prostatic hypertrophy, bladder neck contracture, flaccid or spastic neurogenic bladder, or foreign bodies in the bladder [1]. Often bladder stones are relatively small, remain asymptomatic, and require no treatment. However, some common complications of bladder stones include abdominal pain, infections, and hematuria. More serious complications can occur with larger bladder stones. Foreign bodies in the bladder are a major risk factor for larger bladder stones. We report a case of a man with a long history of benign prostatic hypertrophy who was admitted for renal failure in the setting of using self-catheterization to relieve his urinary retention.

Case Report

A 58-year-old man with long-standing enuresis and positional difficulty with urination presented with shortness of breath. He was found to have a creatinine of 11.5 mg/

dL, a blood urea nitrogen of 169 mg/dL, and a potassium of 6.5 mmol/L. A foley catheter was inserted and drained turbid urine. Urinary analysis was notable for a pH of 8.00, >180 white blood cells, and strongly positive leukocyte esterase. The urine culture grew pan-sensitive *E. coli* and he was started on antibiotics. Renal ultrasound demonstrated bilateral hydronephrosis with ureterectasis, and computed tomography of the abdomen and pelvis revealed a large bladder calculus, measuring 5.3 × 4.3 cm and organized in concentric rings (Fig. 1).

On further questioning, the patient described more than 10 years of difficult voiding. To relieve his urinary symptoms, approximately 5 years prior to admission he purchased plastic tubing from a pharmacy and used it to perform self-catheterizations intermittently over the course of 2 months. This provided only temporary relief and eventually urination required such significant intraabdominal straining that he suffered from frequent rectal prolapse.

On hospital day 5, he underwent cystolithotomy. A large, homogenous bladder calculi was removed and opened, demonstrating the presence of a plastic foreign body at the center; thought to be a retained piece of plastic tubing (Fig. 2A, B). The patient recovered from sur-

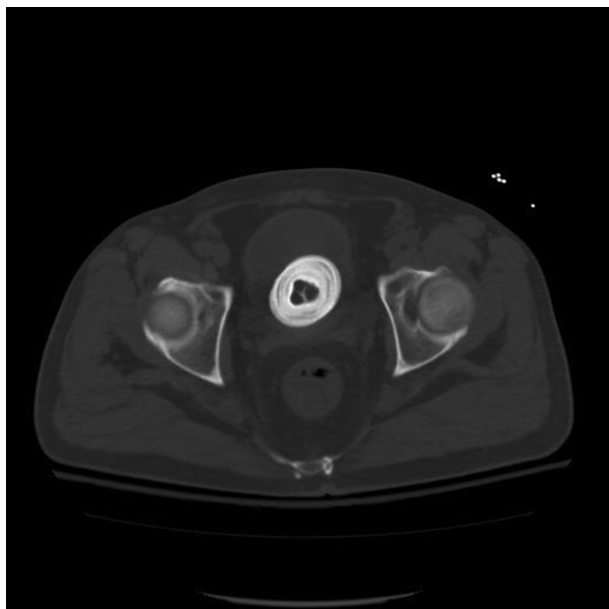


Figure 1. A computed tomography of the abdomen and pelvis showed a large bladder calculus, measuring 5.3×4.3 cm and organized in concentric rings.

gery uneventfully and was discharged with a stable creatinine of 4.5 mg/dL. Stone analysis revealed carbonate apatite (Dahllite) composition. Bladder lavage did not demonstrate malignant cells.

Discussion

Bladder stones have been affecting human health for centuries and have even been found in Egyptian mummies [2]. In modern times, they account for only about 5% of urinary calculi and are often asymptomatic [3, 4]. While bladder outlet obstruction with resulting urinary stasis (often from benign prostatic hypertrophy) is the most common cause of bladder stones in developed countries, the presence of infection or foreign bodies are also risk factors [5].

Foreign bodies in the bladder may be iatrogenic in origin, resulting from retained catheter tips or sutures from bladder surgery [6, 7]. There are also reports of a wide array of self-inserted objects as diverse as light bulbs, pipe cleaners, wax candles, drinking straws, and even wrist watches [8–10]. Any object that makes its way into the bladder can act as a nidus or scaffolding for stone formation.

The formation of stones is a stepwise process that has been well described in the literature. First, once the solubility product has been exceeded, supersaturation begins as a metastable process with slow crystal growth. This continues until a critical limit of supersaturation is

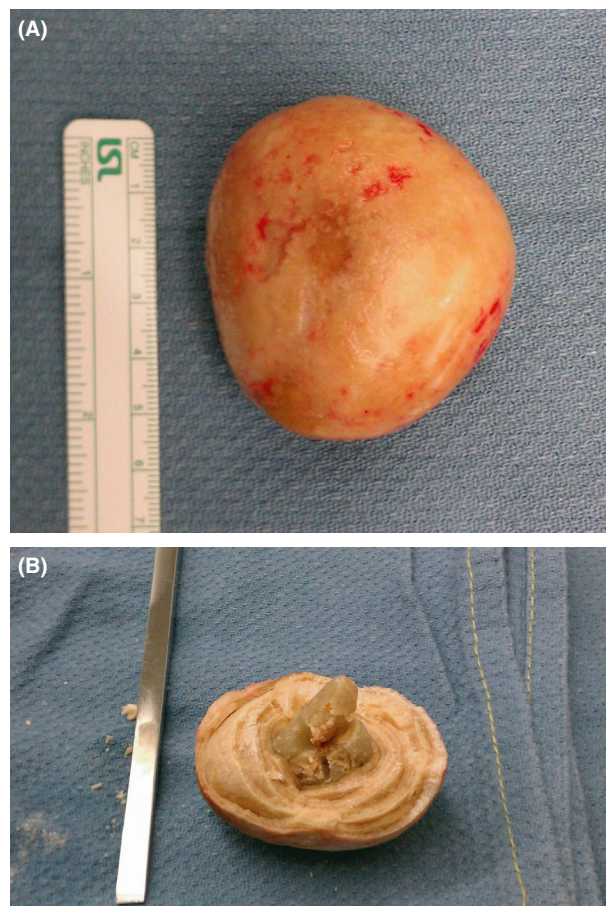


Figure 2. (A) Large, intact bladder calculus removed from the patient via cystolithotomy. (B) Opened bladder calculus demonstrating the presence of a plastic foreign body at the center; thought to be a retained piece of plastic tubing.

exceeded and the crystals spontaneously precipitate out on the initial small collection of crystals, acting as a nidus [11]. In our patient, the retained piece of plastic tubing served as a nidus for stone formation with resulting supersaturation, aggregation, and proliferation of crystal growth around the foreign body.

It is important to understand that there are several different types of urinary calculi differentiated by the chemical composition of the stone. The different calculi compositions determine if the stone will be seen on imaging. Starting with a plain abdominal radiograph is reasonable as approximately 90% of urinary calculi are radiopaque since they consist of calcium phosphate and calcium oxalate [12]. Less radiopaque stones include magnesium-ammonia-phosphate (struvite) and cystine, while uric acid and matrix stones are radiolucent [12]. Upon stone analysis it was determined that our patient had a carbonate apatite stone, a type of phosphate stone. Phosphate stones account for 12–20% of all urinary calculi [11].

It is rare for bladder stones to grow to a size large enough to cause renal failure [7, 11]. When this occurs, treatment involves cystolithotomy or endoscopic cytolithotripsy along with concomitant treatment of bladder outlet obstruction [13, 14]. After cytolithotomy and eventually transurethral microwave of the prostate, our patient had improvement in his renal failure. However, due to the long-standing nature of his outlet obstruction, he continues to have stage IV chronic kidney disease.

Conclusion

Bladder stones should be considered on the differential diagnosis in any patient with urinary symptoms as the presentation of bladder calculi is variable ranging from microscopic hematuria to severe renal failure as seen in our patient. It is important to remember that foreign bodies are one of the many risk factors causing bladder calculi. Once the diagnosis of bladder calculi is made, it is necessary to treat the bladder calculi as well as the underlying problem that lead to the formation of the stone to prevent recurrent bladder calculi. As illustrated by our patient, prompt diagnosis and treatment must be pursued aggressively as significant complications can occur in long-standing, symptomatic bladder calculi.

Conflict of Interest

None declared.

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