



# Calcium oxalate giant bladder stone; case study and literature review

Samer Al-Rawashdah<sup>1\*</sup>, Saddam Al Demour<sup>2</sup>, Ismail J Nassar<sup>3</sup>, Mohammad Talal Al-Zubi<sup>4</sup>, Antonio Carbone<sup>5</sup>, Antonio L. Pastore<sup>5</sup>, Malik Ayyad<sup>1</sup>

<sup>1</sup>Department of Special Surgery, Urology Unit, Faculty of Medicine, Mutah University, Al-Karak 61710, Jordan

<sup>2</sup>Department of Special Surgery, Division of Urology, Faculty of Medicine, The University of Jordan, Amman 11972, Jordan

<sup>3</sup>Department of Radiology, Al-Essra Hospital, Amman, Jordan

<sup>4</sup>Department of Urology, School of Medicine, Yarmouk University, Irbid 21110, Jordan

<sup>5</sup>Unit of Urology, Department of Medico-Surgical Sciences and Biotechnologies, Faculty of Pharmacy and Medicine, Sapienza University of Rome, Latina, Italy

## \*Correspondence to

Samer Al-Rawashdah, Email:  
Samer.Rawashdah@gmail.com

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## Abstract

Giant urinary bladder stones (UBSs) are a rare occurrence in urological practice. Reports documenting cases of giant bladder stones presenting with mild lower urinary tract symptoms (LUTS) and microscopic hematuria are limited in the literature. A 43-year-old male visited the urology clinic with mild LUTS persisting for a year. Laboratory investigations, including urinalysis, revealed microscopic hematuria without any other abnormalities. Imaging through ultrasound and non-contrast computed tomography confirmed the presence of a large bladder stone occupying a significant portion of the bladder. The patient underwent suprapubic cystolithotomy, during which a calcium oxalate stone measuring 9×8×5 cm and weighing 150 g was successfully removed. His postoperative course was uneventful. Giant UBS is an uncommon condition, particularly in younger males. Its clinical presentation varies from being asymptomatic to causing severe LUTS, hematuria, and dysuria. While minimally invasive approaches exist, open cystolithotomy remains the preferred treatment for managing giant bladder stones effectively.

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## Introduction

Urolithiasis is a common urological disorder that has shown a steady increase in incidence and prevalence worldwide over the past few decades (1). This rising trend is influenced by environmental, dietary, genetic, and metabolic factors, which contribute to the formation of urinary stones. Among the various types of urolithiasis, urinary bladder stones (UBSs) account for approximately 5% of all urinary calculi cases, making them a relatively uncommon manifestation (2). While most bladder stones are small and symptomatic, some grow to an exceptional size, leading to significant lower urinary tract dysfunction. A giant bladder stone is defined as a stone that weighs more than 100 grams and exceeds 4 cm in diameter (3). These stones can cause progressive urinary symptoms and, in some cases, serious complications if left untreated. Despite their clinical significance, giant bladder stones remain rare, with fewer than 100 reported cases in the medical literature, most of which are strongly linked to bladder outlet obstruction (4).

The development of bladder stones is multifactorial, and their etiology can be classified into three main types; primary, secondary, and migratory. Primary bladder stones originate in the upper urinary tract and descend into the bladder, where they gradually increase in size over time. Secondary bladder stones, in contrast, form directly within the bladder due to urine stagnation, chronic infection, or anatomical abnormalities such as bladder diverticula or prolonged catheterization. Migratory bladder stones, on the other hand, result from pre-existing kidney or ureteric stones that become trapped in the bladder, where they continue to grow and calcify (5). Regardless of the origin, bladder stones can cause significant morbidity if not diagnosed and treated early.

Several lithogenic factors contribute to the formation and progression of bladder stones. These include low urinary pH, decreased urinary magnesium levels, and increased urinary uric acid supersaturation, which together create an ideal environment for crystal aggregation and stone formation (6).

**Key point**

- Giant urinary bladder stones (UBSs) are uncommon, particularly in young males without bladder outlet obstruction or recurrent urinary tract infections (UTIs).
- Patients with giant UBSs may present with mild lower urinary tract symptoms (LUTS) and microscopic hematuria, making early diagnosis challenging.
- Ultrasonography and non-contrast computed tomography are essential for accurately identifying and characterizing large bladder stones.
- Open suprapubic cystolithotomy remains the preferred treatment for giant bladder stones due to their size and associated complications.
- Physicians should consider bladder calculi in young patients with unexplained LUTS and hematuria to ensure timely intervention and prevent long-term complications.

In addition to these biochemical imbalances, metabolic disorders such as hyperoxaluria and hypercalciuria, combined with a low urine calcium-to-oxalate ratio, play a crucial role in the development of calcium oxalate monohydrate stones, the most commonly encountered bladder stone composition (7). Furthermore, dietary habits, chronic dehydration, and underlying systemic conditions such as gout and hyperparathyroidism may also increase the risk of urinary stone formation.

Patients with bladder stones often present with a wide range of clinical symptoms, which vary depending on the size, location, and degree of obstruction caused by the stone. Dysuria (painful urination), lower urinary tract symptoms (LUTS), hematuria, suprapubic pain, urinary retention, and recurrent urinary tract infections (UTIs) are among the most commonly reported symptoms (8). In some cases, patients may remain asymptomatic, and bladder stones may only be incidentally detected during imaging for unrelated conditions. Delayed diagnosis and treatment can lead to progressive bladder dysfunction, increased risk of infections, and potential renal complications, making early detection and intervention critical.

This report describes a rare case of a giant calcium oxalate bladder stone in a 43-year-old male, presenting with microscopic hematuria and LUTS. The case emphasizes the importance of considering bladder stones as a differential diagnosis in patients with persistent urinary symptoms, especially when there are no clear predisposing factors such as bladder outlet obstruction or chronic infection. Early evaluation, accurate imaging, and appropriate surgical management are essential in preventing complications associated with large bladder stones. This case has been documented in accordance with the SCARE criteria to provide a structured and detailed clinical report (9).

**Case Presentation****Patient information and clinical findings**

A 43-year-old male visited the urology clinic with dysuria and mild LUTS, primarily storage-related, which had

been persisting for one year and had worsened over the past month. Before seeking medical attention at the clinic, he had undergone empirical antibiotic treatment with ciprofloxacin (500 mg twice daily for seven days); however, this regimen did not result in any significant symptom relief. On physical examination, the patient exhibited mild suprapubic pain and tenderness, but there was no palpable suprapubic mass detected. His symptoms suggested a possible underlying urological pathology, warranting further diagnostic evaluation.

**Diagnostic evaluation**

Laboratory investigations, including a complete blood count, revealed no indications of infection, and kidney function tests, specifically urea nitrogen and creatinine levels, were within normal limits, ruling out renal impairment. Urinalysis identified microscopic hematuria and the presence of white blood cells, suggesting potential bladder irritation or inflammation. Nevertheless, urine culture yielded no bacterial growth, indicating the absence of an active UTI.

Imaging studies were performed to further evaluate the patient's condition. Ultrasonography of the urinary tract demonstrated normal renal and prostate anatomy, but the urinary bladder wall appeared thickened, with evidence of a large intravesical calculus. To obtain a more detailed assessment, a non-contrast computed tomography (CT) scan was conducted, which confirmed the presence of a giant UBS measuring 8×9×5 cm (Figure 1). This significant finding prompted the need for definitive surgical intervention to prevent further complications.

**Treatment procedure**

The patient was admitted for an elective surgical procedure to address the giant UBS. Under general anesthesia, an open cystolithotomy was performed through a lower abdominal midline incision. Upon opening the bladder, a large stone measuring 8×9×5 cm was successfully extracted (Figure 2). To facilitate postoperative bladder



**Figure 1.** Non-contrast urinary tract CT scan shows the giant bladder stone in the urinary bladder.



**Figure 1.** Turtle-like giant bladder stone which was extracted from the patient.

drainage and healing, a three-way urethral catheter was inserted and remained in place for one week.

Following the procedure, the extracted stone was sent for chemical analysis, which confirmed its composition as calcium oxalate with a total weight of 150 g. The postoperative period was uneventful, with no reported complications. The patient demonstrated a smooth recovery and was discharged on the second postoperative day in stable condition, with recommendations for follow-up evaluation and preventive measures to reduce the risk of recurrence.

## Discussion

Over the past few decades, the prevalence of urolithiasis has significantly increased, with reported rates rising from 4% to 19.1% in several Asian countries (10). This upward trend can be attributed to various environmental, dietary, metabolic, and genetic factors that contribute to stone formation and recurrence. Among the different types of urolithiasis, UBSs account for approximately 5% of cases, making them a relatively uncommon manifestation (10,11). The formation of bladder stones is often associated with predisposing conditions such as benign prostatic hyperplasia, previous lower urinary tract surgeries, metabolic disorders, intravesical foreign bodies, spinal cord injuries, and upper urinary tract calculi (10,11). These factors contribute to urine stasis, chronic infections, and altered urinary composition, which in turn facilitate stone nucleation and growth.

Bestari et al documented a case of a single large UBS measuring 10×9×7 cm, which was successfully treated through suprapubic cystolithotomy under general anesthesia. The patient had markedly elevated blood urea and serum creatinine levels (142 mg/dL and 9 mg/dL, respectively) at admission, which returned to normal upon follow-up after stone removal. Additionally, an unexpected intraoperative mass was detected, and histopathological examination confirmed low-grade urothelial carcinoma with glandular differentiation and lamina propria invasion (8). This case highlights the potential oncogenic risk associated with chronic bladder stone irritation, necessitating further investigation into the correlation between bladder calculi and bladder malignancies.

Though the association between urinary calculi and squamous cell carcinoma is well established, the direct link between bladder stones and urothelial carcinoma remains uncertain (11). It is hypothesized that chronic

inflammation and prolonged mucosal irritation caused by large calculi may contribute to bladder carcinogenesis (12). In developed nations, urothelial carcinoma accounts for approximately 90% of all bladder cancers, whereas in developing countries, squamous cell carcinoma is more prevalent, comprising up to 75% of cases (13). This geographic variation in bladder cancer histology suggests differences in environmental exposures, lifestyle factors, and the role of chronic infection in carcinogenesis.

Moreover, Shrestha et al reported an exceptionally large UBS weighing 950 grams and measuring 12.8×9.2×7.2 cm, which occupied most of the bladder and compressed the ureteral orifices, leading to secondary hydronephrosis. The patient underwent open cystolithotomy, resulting in the successful removal of the stone. Stone analysis revealed 91% calcium oxalate monohydrate and 9% oxalate, which is consistent with the most common composition of bladder stones. Following surgery, hydronephrosis resolved within five days, demonstrating the importance of early surgical intervention to prevent long-term urinary tract complications (14).

Preventing bladder stone recurrence requires identifying and addressing underlying predisposing factors, particularly bladder outlet obstruction, which significantly contributes to urinary stasis and stone formation. The occurrence of a giant vesical calculus in a young male without urinary obstruction or recurrent UTIs is exceedingly rare. Vidhyarthi et al reported a 6.5×6×5.5 cm bladder stone weighing 125 grams, emphasizing that such cases should be classified separately and warrant further investigation into their etiology and management strategies (15).

Adhikari et al described a case involving a female patient presenting with acute urinary retention lasting 12 hours, along with a history of recurrent UTIs over one year. Imaging studies revealed a 9×8 cm radiopaque mass in the pelvic region, which was later confirmed as a bladder stone. UBSs typically have a heterogeneous composition, with struvite (ammonium magnesium phosphate) stones being the most frequently observed type in patients with recurrent UTIs caused by urea-splitting bacteria. Common culprits include *Proteus*, *Klebsiella*, *Serratia*, and *Enterobacter* species, which produce alkaline urine and promote rapid stone formation (14,15).

To improve patient outcomes and reduce complications associated with bladder stones, the European Association of Urology (EAU) guidelines recommend minimally invasive techniques as the first-line treatment for most cases (9-11). These approaches include transurethral cystolithotripsy, percutaneous cystolithotripsy, extracorporeal shock-wave lithotripsy, and laparoscopic cystolithotomy, all of which have proven to be safe and effective in reducing hospital stays and improving postoperative recovery (12-14). However, in select cases, particularly those involving giant bladder stones, open cystolithotomy remains the preferred approach due to size-related limitations of minimally



invasive techniques and the risk of incomplete stone clearance (13-16).

### Conclusion

Giant UBSs are an uncommon occurrence in urological practice, particularly in young male patients without a history of intravesical obstruction or recurrent UTIs. These large calculi often present asymptotically or with nonspecific LUTS, making diagnosis challenging. However, in patients exhibiting persistent LUTS, recurrent UTIs, or hematuria, bladder stones should be considered a potential underlying cause. Several surgical interventions are available for bladder stone removal, including endoscopic cystolithotripsy and open cystolithotomy. While minimally invasive techniques such as transurethral or percutaneous cystolithotripsy are preferred for smaller calculi, open cystolithotomy remains the gold standard for managing giant bladder stones. This approach is particularly advantageous in cases where stone size, patient anatomy, or the presence of multiple stones make endoscopic methods less effective. Surgical decision-making should be based on stone characteristics, patient health status, and the risk of recurrence, ensuring optimal clinical outcomes and prevention of further urological complications.

### Authors' contribution

**Conceptualization:** Samer Al-Rawashdah, Antonio L. Pastore.  
**Data curation:** Saddam Al Demour, Ismail J Nassar.  
**Formal analysis:** Mohammad Talal Al-Zubi, Antonio Carbone.  
**Investigation:** Malik Ayyad, Saddam Al Demour.  
**Methodology:** Samer Al-Rawashdah, Mohammad Talal Al-Zubi.  
**Project administration:** Samer Al-Rawashdah, Malik Ayyad.  
**Resources:** Antonio Carbone, Antonio L. Pastore.  
**Software:** Ismail J Nassar, Mohammad Talal Al-Zubi.  
**Supervision:** Samer Al-Rawashdah, Antonio L. Pastore.  
**Validation:** Saddam Al Demour, Malik Ayyad.  
**Visualization:** Ismail J Nassar, Mohammad Talal Al-Zubi.  
**Writing—original draft:** Samer Al-Rawashdah, Malik Ayyad.  
**Writing—review & editing:** Samer Al-Rawashdah, Antonio L. Pastore, Saddam Al Demour.

### Conflicts of interest

The authors declare that they have no competing interests.

### Ethical issues

This case report was conducted according to the World Medical Association Declaration of Helsinki. The patient has given us written informed consent for publication as a case report. Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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