



Case report

Giant bladder stone resulting in renal failure and concurrent bladder cancer: A case report

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ABSTRACT

Introduction and importance: Giant bladder stone is a rare entity in the modern urological practice. There have been limited reports on giant bladder stone with concomitant renal failure and bladder cancer available in the literature.

Case presentation: A 43-year-old male patient presented to the ER with chronic gross hematuria, dysuria, intermittent urination, and bilateral flank pain. Laboratory investigations showed markedly elevated blood urea and serum creatinine levels at admission. Urinalysis revealed pyuria and hematuria with positive nitrite. The kidney-ureter-bladder (KUB) film showed a large single urinary bladder stone measuring 10 × 9 cm. Ultrasound examination revealed bilateral hydronephrosis. Suprapubic cystolithotomy was performed, and the stone was extracted from the bladder. A suspicious bladder mass was found incidentally. Biopsy of the mass showed a low-grade urothelial carcinoma with glandular differentiation and invasion of lamina propria, staged pT1NxMx. The kidney function test marked unimprovement of serum urea and creatinine after the surgery.

Clinical discussion: Open cystolithotomy was performed to release the obstruction and preserve renal function. Chronic obstruction, long-standing chronic inflammation, and urinary tract infection might play a vital role in the progression of kidney injury and the development of bladder cancer.

Conclusion: Complications that follow giant bladder stone could be long-lasting and taxing for the sufferer. The risk of renal failure and bladder cancer precipitated by chronic obstruction and mucosal injury should be considered when encountering such case.

1. Introduction

Urolithiasis is a relatively common disease worldwide with increasing prevalence and incidence in the past few decades [1]. With advances in imaging, urolithiasis can usually be identified and managed early before any complications ensue. In the past, bladder stones accounted for 30–94% of all stones. However, this prevalence gradually changes, with lower urinary tract stones now only taking up 3–15% of all stones [2]. Therefore, giant bladder stone is a rare clinical entity in the modern urological practice. Here we report a case of giant bladder stone resulting in renal failure and concurrent bladder cancer in a 43-year-old male patient. This case report has been reported in line with the SCARE criteria [3].

2. Presentation of case

A 43-year-old male patient presented to the Emergency Room (ER) with a history of gross hematuria in the last three months prior to the hospital visit. The patient had a history of chronic dysuria that had been neglected for years. The patient also complained of intermittent urination, bilateral flank pain, and a history of passing stone five years ago. The patient had never received any medical examination prior to this hospital visit. The patient regularly smoked one pack of cigarettes per day. A family history of cancer had not been noted.

Physical examination revealed that the patient was hypertensive (170/110 mmHg), and the bladder was palpable and painful on palpation. Ballotement for both kidneys was positive with simultaneous costovertebral angle pain. Digital rectal examination revealed normal

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prostate, while laboratory tests showed that the hemoglobin and white blood cell counts were 9 g/dL and 15,300/mm³, respectively. Blood urea and serum creatinine levels were markedly elevated (142 mg/dL and 9 mg/dL, respectively), and the serum electrolyte measurement showed the presence of hyponatremia and hyperkalemia (128 mmol/L and 6.0 mmol/L, respectively). Urinalysis showed a pH of 8.0, +3 protein, +3 leukocyte esterase, + nitrite, 30–35 white blood cells per high-power field, and >50 red blood cells per high-power field. Urine culture and 24-h urine specimens were not collected due to the limited capacity of the facility. Plain abdominal radiography showed a single large stone measuring 10 × 9 cm (Fig. 1), while the abdominal ultrasonography revealed bilateral hydronephrosis grade IV (Fig. 2).

The patient was then consulted to the nephrology department and was promptly scheduled for hemodialysis. The urinary tract infection (UTI) was treated with broad-spectrum intravenous antibiotics. On the

following day, the patient underwent suprapubic cystolithotomy under general anesthesia. A single large stone measuring 10 × 9 × 7 cm was removed (Fig. 3), and the stone analysis result was positive for calcium, oxalate, carbonate, magnesium, and ammonium. A suspicious mass was coincidentally found intraoperatively. Lymph node and adjacent organ involvement were not observed, although a further imaging study was needed for confirmation. A biopsy sample was taken from the mass for histopathological analysis. The result revealed a low-grade urothelial carcinoma with glandular differentiation and invasion of lamina propria according to the WHO 2016 classification system (Fig. 4). The tumor was staged as pT1NxMx based on the TNM classification 8th edition.

The patient was discharged on the third postoperative day with a urethral catheter. During the follow-up visit one week postoperatively at the urology clinic, the patient complained of urinary retention due to blood clots. Manual spooling of the catheter was performed, and the

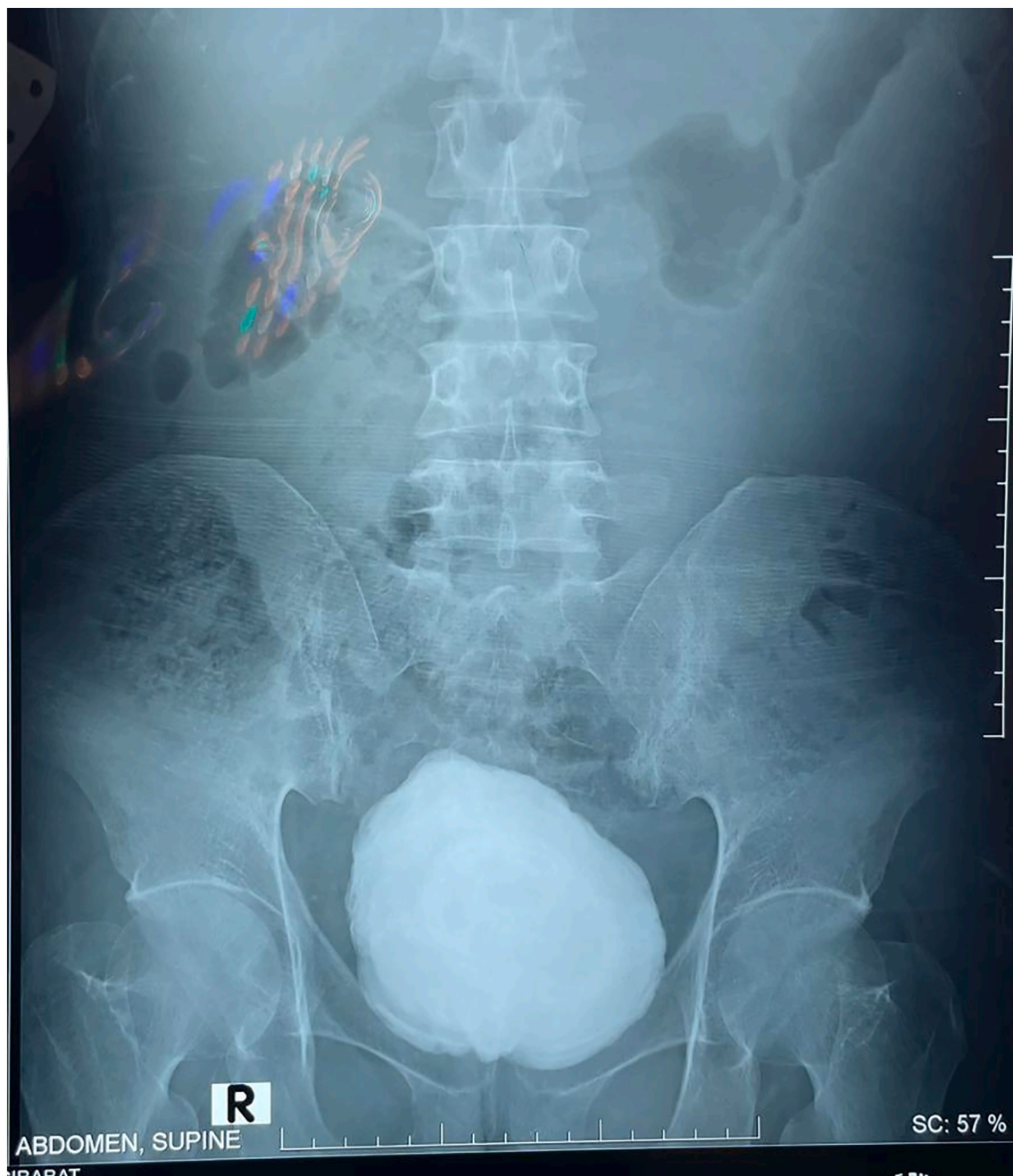


Fig. 1. Plain abdominal radiography shows a single large stone occupying the bladder.



Fig. 2. Ultrasonography showing bilateral hydronephrosis grade IV.



Fig. 3. Bladder stone measuring 10 × 9 × 7 cm.

patient was discharged. The patient was readmitted to the ER on the 14th day postoperatively due to recurrent urinary retention caused by blood clots. Serum urea and creatinine levels were markedly elevated (303 mg/dL and 23.8 mg/dL, respectively), and the ultrasound showed a lack of improvement in the hydronephrosis. Ascites and bilateral pleural effusion were also present.

The nephrology department was consulted and closely monitored the patient for hemodialysis once more. The serum urea and creatinine

levels two days post-dialysis went down to 77 mg/dL and 7.6 mg/dL, respectively. Percutaneous nephrostomy to relieve the upper urinary tract was considered. However, the patient was anxious regarding the risks and inconvenience it would cause and refused the intervention. The patient was discharged six days after the second hospital admission with improvement. Computed tomography (CT) to determine the extent of tumor invasion was planned for the follow-up visit. Unfortunately, the patient did not return to the clinic and was subsequently lost to follow-

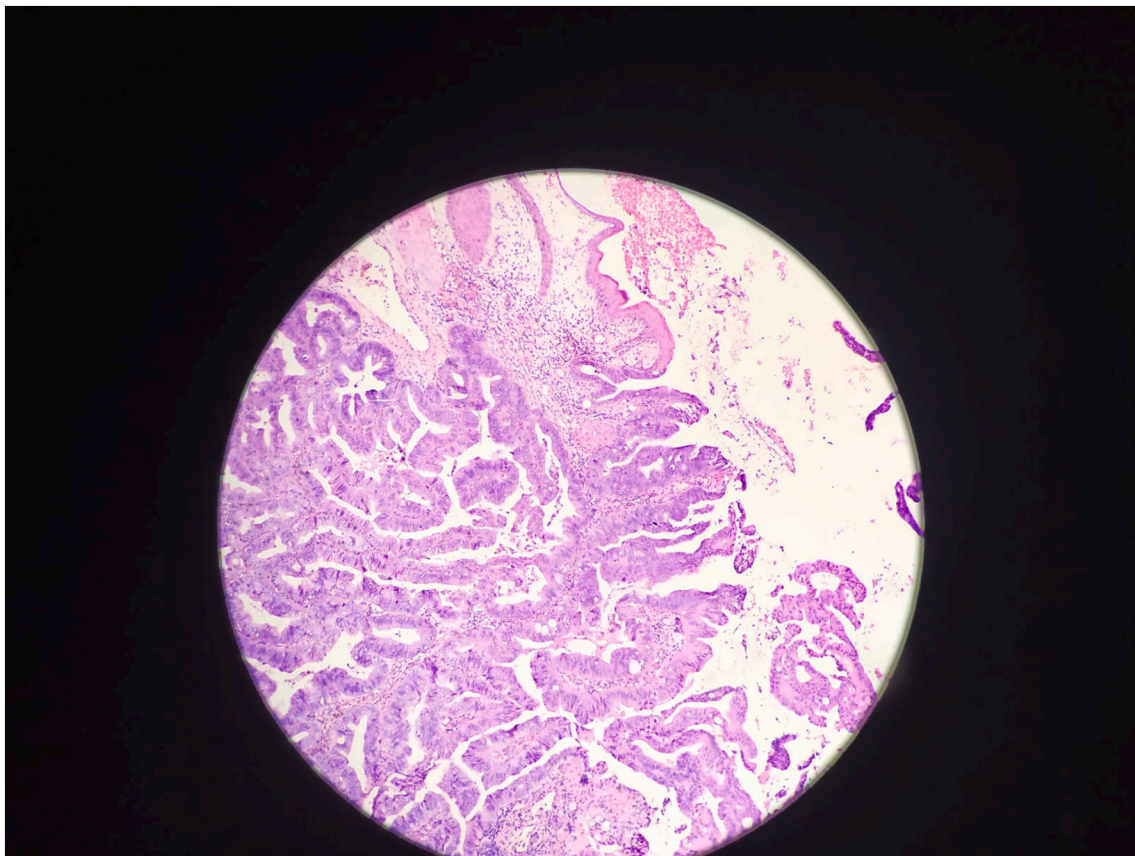


Fig. 4. H&E staining shows urothelial carcinoma with subepithelial connective tissue (lamina propria) invasion.

up.

3. Discussion

The prevalence of urolithiasis has increased significantly in the last few decades, ranging from 4% to 19.1% in most Asian countries [2]. Nationwide data on the incidence and prevalence of urolithiasis in Indonesia is currently lacking. Still, it is estimated to be high as the country situated within the Afro-Asian calculus belt [4].

Bladder stones can typically be classified as primary, secondary, or migratory based on the etiology. Spontaneous bladder stones rarely occur in adults; therefore, predisposing factors must be explored to identify the cause and prevent recurrence [5]. For secondary bladder stones in adults, bladder outlet obstruction (BOO) is the most common predisposing risk factor for stone formation [6]. In our patient, BOO is unlikely to be the cause of the stone formation. The urinalysis and stone analysis indicated that metabolic disturbances and UTI were both present as predisposing factors. We speculated that chronic bacteriuria played a vital role in bladder stone development in our patient. Unfortunately, a direct causality cannot be firmly established due to the absence of the patient's medical history prior to the first hospital visit. This finding is in line with previous literature that stated 25–33% of bladder stones are associated with infection [7]. Other identified predisposing factors in this patient were male, smoking, low socioeconomic status, and tropical climate with high exposure to sunlight. Along with low awareness of the disease, these constituents lead to the formation of giant bladder stone in our patient.

A giant bladder stone is generally defined as a bladder stone of more than 4 cm or weighing more than 100 g. The true incidence of this subtype of urolithiasis is still generally unknown. We believe our patient is on the larger spectrum of this disease entity as the extracted stone measured $10 \times 9 \times 7$ cm. A single-center study from Indonesia reported

that there have only been two cases of large bladder stones measuring more than 9 cm between 2006 and 2010 [8].

Reports of this disease entity causing kidney injury are limited [9,10]. Most bladder stones are usually mobile inside the bladder cavity, leading to an uninterrupted urinary passage from the upper urinary tract [10]. However, larger stones might obstruct the ureteral orifices leading to kidney injury. In our case, the patient presented with lower urinary tract symptoms (LUTS) that had been left untreated for years. Initial workup revealed markedly elevated serum urea and creatinine level, with bilateral grade IV hydronephrosis.

Current European Association of Urology (EAU) guidelines for the treatment of bladder stones have embraced minimally invasive approaches to reduce the risk for complications and shorten hospital time [11]. *Trans-urethral* cystolithotripsy (TUCL), percutaneous cystolithotripsy (PCCL), extracorporeal shock-wave lithotripsy (SWL), and laparoscopic cystolithotomy have been widely adopted and appears to be safe for patients [11]. For a few selected cases, such as cases with giant bladder stones, the first-line treatment is open cystolithotomy [1,7,12].

Interestingly, the kidney function tests in our patient did not improve after the removal of the obstructing stone. We suspected that the kidney injury had been overlooked for years, and the patient had fallen into chronic kidney disease from post renal obstruction.

A suspicious mass was found incidentally during cystolithotomy in our patient. A biopsy sample was taken, and the result revealed a low-grade urothelial carcinoma with glandular differentiation, staged pT1NxMx. It is speculated that chronic inflammation and infection contribute to cytokine release, which assists tumor development and growth [13]. A nationwide population-based study in Taiwan has reported that patients with urinary calculi have an increased risk of developing bladder cancer of 3.3 (95% CI, 2.69–4.00) times higher than the general population [14]. A meta-analysis study also showed a significant association between a history of bladder stone and bladder

cancer, with a 2.17 (95% CI, 1.52–3.08) increased risk of bladder cancer than those without a history of urinary calculi [15]. Nonetheless, both studies do not specify the histologic type of the bladder cancer that was investigated; hence, the conclusion of whether there is an association between bladder stones and urothelial carcinoma - as seen in our patient's - or other malignant cell types cannot be drawn.

What is currently known, however, is that the association between foreign bodies such as urinary calculi and squamous cell carcinoma is well established, while the relationship between urinary calculi and urothelial carcinoma is less clear [16,17]. The pathophysiology involves a series of mechanisms triggered by inflammatory responses, which play a role in bladder carcinogenesis [16]. It is reported that 90% of bladder cancer in the United States are urothelial carcinomas, which differs from developing countries where the predominant bladder cancers (75%) are squamous cell carcinomas [16,18]. Future prospective studies are needed to understand the exact mechanism of how urinary calculi cause urothelial carcinomas of the bladder.

We believe that this case is remarkable because our patient presented with renal failure complicated by bladder cancer, which makes it even rarer. To our knowledge, there have been limited reports on these complications presenting simultaneously.

4. Conclusion

Giant bladder stone is a rare entity in the modern urological practice. When encountering this case, urologists should be aware of the risk of kidney injury and bladder cancer resulting from post-renal obstruction and chronic inflammation from the mucosal injury. The presentation of such a case can be challenging for urologists, especially in the developing world with limited resources. The ensuing complications can further increase the complexity of the already complex case. Open surgical procedure for this subtype of urolithiasis is still the mainstay of treatment.

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None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. The requirement for ethical approval from our institution was waived due to the nature of case reports.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Muhammad Garidya Bestari and Lia Oktarina conceived the idea, designed the study, collected the patient data, and wrote the original draft.

Irvan Octavian and Muhammad Ilhamul Karim confirmed the diagnosis, performed the surgery, and evaluated and led the case management.

Aryanti and Rina Melati performed the histopathological analysis.

Irvan Octavian, Muhammad Ilhamul Karim, Aryanti, and Rina Melati

reviewed and edited the final manuscript.

Irvan Octavian supervised the project.

All authors approved the final manuscript.

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Irvan Octavian.

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Declaration of competing interest

None.

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