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GIANT BLADDER CALCULUS PRESENTING AS A RARE CAUSE OF RENAL IMPAIRMENT IN A YOUNG ADULT WITH SUBSTANCE USE DISORDER

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ABSTRACT

Background: Giant vesical calculi, defined as stones larger than 40 mm and weighing over 100 grams, are uncommon in young patients. In developed countries, only a limited number of case reports have been published, and no previous cases have been reported in patients with substance use disorder.

Case report: The rare case of a young male presenting with a giant bladder calculus causing obstructive nephropathy and renal impairment is reported. The patient had a history of substance use disorder, mainly opioids, and suffered from chronic urinary retention. Clinical and biochemical recovery was achieved after open cystolithotomy and antibiotic treatment for concomitant urinary infection.

Conclusion: Vesical lithiasis can occur in young individuals with chronic substance abuse due to urinary stasis. Opioids have been implicated in the development of chronic urinary retention. In severe cases, the progressive formation of giant stones can be complicated by chronic renal impairment, obstructive hydronephrosis and urinary tract infections. Surgical management with open cystolithotomy remains the gold standard treatment when not contraindicated.

KEYWORDS

Bladder stones, substance use disorder, urinary retention, chronic kidney failure

LEARNING POINTS

- Despite their rarity, giant vesical calculi should be an important diagnostic consideration in young individuals presenting with renal impairment
- Hidden predisposing factors such as chronic substance abuse may result in chronic urinary retention and stone formation.
- Delayed diagnosis and treatment of giant stones can result in chronic kidney injury with bilateral hydronephrosis, necessitating invasive therapeutic interventions.

EFIM European Federation of Internal Medicine

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INTRODUCTION

Urinary bladder lithiasis is a type of urolithiasis involving the formation of calculi inside the urinary bladder cavity. It occurs mainly in individuals with chronic urine stasis, like benign prostate hyperplasia or neurogenic bladder[1]. Giant stone formation is uncommon and refers to calculi weighing >100 g and measuring >4 cm which have been rarely reported[2]. It is a slowly-evolving condition and patients usually present with chronic symptoms including suprapubic pain, dysuria, frequent urination and hematuria[3].

Severe impairment of renal function is uncommon, whereas typical complications are recurrent urinary tract infections and urinary retention[3]. Bladder lithiasis treatment consists of cystoliphotripsy, whereas open cystolithotomy is reserved for giant calculi [4]. We present the case of a giant bladder stone complicated by obstructive kidney injury and chronic renal impairment found in a 35-year-old male with history of substance use disorder.

CASE DESCRIPTION

A 35-year-old male with history of intravenous opioid drug use presented with fever, chronic dysuria and intermittent urination. Physical examination revealed mild suprapubic tenderness and a left elbow ulcer. Renal biochemical markers and inflammation reactants were elevated (urea 80 mg/dl, serum creatinine 2 mg/dl, C-reactive protein 60 mg/l), while other laboratory tests were within normal limits. Urine analysis indicated presence of pyuria, while urine culture grew 10^5 colony-forming units (CFU)/ml of *Providencia stuartii*.

Abdominal and pelvic ultrasound revealed bilateral dilatation of ureteral tracts. A kidney, ureter and bladder (KUB) X-ray revealed shadows of solid giant bladder stones *(Fig. 1)*. A computed tomography scan confirmed bilateral hydronephrosis and the presence of a giant vesical calculus, which occupied the bladder cavity *(Fig. 2)*. Initially, the patient received antibiotic treatment with piperacillin-tazobactam according to the antibiogram. After urological consultation, open cystolithotomy under general anaesthesia was performed, achieving complete stone removal without complications. Two bladder calculi were extracted, measuring 60 × 45 × 30 mm and 26 × 22 × 9 mm respectively *(Fig. 3)*. The larger stone was a giant calculus weighing 310 g. Postoperative creatinine levels progressively decreased to normal and the patient exhibited smooth urination.

DISCUSSION

Bladder stones account only for 5% of urolithiasis[5]. They are mainly reported in developing countries, where nutritional factors and delays in access to health services remain a major cause of increased morbidity[1]. In the rest of the world, urinary stasis is the main contributing factor[5]. Incomplete bladder emptying is usually the result of prostate hyperplasia, neurogenic bladder or uncommon causes of urinary retention including chronic opioid use. Furthermore, patients with intravesical foreign bodies are prone to stone formation[4]. Older age and male sex are considered predisposing characteristics[2].

The association between vesical lithiasis and chronic substance abuse is complex. Generally, illicit drug use, especially opioid abuse can cause urinary complications like urinary retention[6,7]. Urinary tract effects vary depending on the offending agent. Renal infarcts and priapism are linked to cocaine, whereas amphetamine abuse can lead to renal cell carcinoma[6]. Cannabis is related to prostate, testicular and bladder cancer, as well as infertility issues[6]. Heroin and other opioids have



Figure 1. *Kidney, ureter and bladder X-ray revealing two bladder stones.*



Figure 2. *Computed tomography scan of the abdomen revealing the giant bladder calculus.*



Figure 3. *Vesical stones measuring 60 × 45 × 30mm and 26 × 22 × 9mm, extracted after open cystolithotomy.*

been considered contributing factors to bladder cancer[8]. Renal complications can also be severe. Opioid overdose can result in acute kidney injury due to dehydration, hypotension, rhabdomyolysis, and urinary retention[7].

Bladder lithiasis results from chronic impaired bladder emptying with increased residual urine caused by opioids due to their anti-cholinergic properties. The micturition reflex is interrupted and the bladder sphincter tone is increased[9]. The mechanism is similar to that of other drugs causing urinary retention, including antidepressants, anticholinergics, alpha-agonists and antipsychotics. Additionally, morphine can bind to spinal receptors leading to complete bladder relaxation. In animal studies, mu-opioid receptors and delta receptors situated in the central nervous system are considered to play a key role in the centrally mediated inhibition of urinary bladder motility by opioids[10].

Once bladder stones are formed, their dimensions progressively grow and can present with subtle symptoms which may be neglected. Post-renal impairment may occur in case of giant stones, although it is considered relatively uncommon. As urinary flow is obstructed causing urine backflow, hydronephrosis develops, resulting in renal impairment.

The case described has several unique aspects. Reports of giant bladder stones are rare in the literature. Moreover, chronic kidney disease related to bladder stones has seldom been reported[1-5]. Bladder stones infrequently cause bilateral hydronephrosis and obstructive nephropathy, since they are usually not large enough. Our case is also exceptional because the patient was young and had two stones. Presentation in young patients is rare, since benign prostate hyperplasia or urethral stricture are uncommon at this age[2]. Common presentation involves a single stone, whereas multiple stones have been described in up to 30% of sufferers[5]. No case reports published to date[1-5] involve chronic substance abuse as an underlying pathology. Interestingly, the patient's history of illicit drug abuse, including opioids, was associated with an increased risk of stone formation, as chronic urinary retention is a recognized adverse effect of opioid use resulting in urine stasis and stone formation. In summary, giant vesical calculi are a rare entity in young individuals, even with history of substance use disorder, and carry the risk of delayed diagnosis and treatment, leading to renal impairment.

Therefore, the initial diagnostic approach for males presenting with features suggestive of urinary tract infection should include imaging testing with plain X-rays and ultrasound. Urine analysis, biochemical markers including serum creatinine, calcium, uric acid, sodium and potassium should be performed. Performing a metabolic assessment and taking a careful substance use history is essential in young patients with bladder lithiasis and unidentified other underlying causes. The chronicity of symptoms contributes to delayed presentation and eventually obstructive hydronephrosis. The considerable dimensions of the calculi limit available treatment strategies. Although modern minimally invasive surgery in urology has significantly evolved, treatment of giant bladder calculi involves timely surgical management with open cystolithotomy to improve the patient's quality of life and prevent severe complications like renal failure[1].

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