

Giant urinary bladder stones

Charles Azuwike Odoemene

ABSTRACT

Introduction: Giant urinary bladder stone is one that weighs 100 grams or more and more than four centimeters in diameter. It is a rare occurrence in modern urological practice. Most patients have associated bladder outlet obstruction predisposing to recurrent urinary tract infections (UTI), urinary frequency, urinary incontinence, hematuria, urinary retention. Most giant bladder stones are radiopaque and plain abdominal radiographs will be useful in diagnosis. They preferred form of treatment is open cystolithotomy. **Case Series:** Three cases of giant urinary bladder stones were encountered in a period of nine years. Two (66.7%) patients had neurogenic bladder and one (33.3%) patient had benign prostatic hyperplasia. The three were symptomatic for more than five years before presenting due to poverty, ignorance and unavailability of health facilities with common imaging techniques. All the patients had open cystolithotomy and did well post operatively. **Conclusion:** Giant urinary bladder stones is still a rarity in modern urological practice causing enormous morbidity when presentation is late as in the cases in this series. The three stones were radiopaque and open cystolithotomy was safe in extracting the stones completely without

damage to the urinary bladder. All the stones were mixed in nature.

Keywords: Cystolithotomy, Giant urinary bladder stones, Hematuria, Late presentation

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INTRODUCTION

Bladder stones account for 44.4% of urinary tract calculi in Nigeria [1–3]. In the western world, bladder stones account for 5% of urinary tract stones [3–6], and 1.5% of urologic hospital admissions [7, 8]. The higher proportion of lower urinary tract stone in the developing world has been attributed to increased incidence of urinary tract infections and infestations [3]. Bladder stones are commoner in men than in women with an incidence of 95% [4, 6, 9].

Risk factors that promote bladder stone formation include urinary tract infection by urease producing organisms, chronic urinary retention and bladder outlet obstruction. These conditions are resultant effects of prostatic diseases, bladder diverticulum, genital prolapse in females, neurogenic bladder dysfunction, urethral stricture, foreign body and prolonged urethral catheterization [4, 10]. Vesical calculus is said to be giant when it weighs 100 grams (gm) or more and more than 4 centimetres (cm) in the greatest diameter [3, 5, 6, 11, 12]. The biggest vesical calculus weighed 6294 gm and was reported by Arthure in 1953 and found in a bladder diverticulum [4, 6, 10, 11, 13]. The calculus reported by

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Randall in 1921 weighed 1914 gm and by Powers and Matfferd in 1952 weighed 1410 gm [13].

Below is my experience in the management of three giant bladder stones encountered over a period of nine years.

CASE SERIES

Case 1

A 62-year-old Nigerian farmer presented with a seven year history of urinary incontinence. The urinary incontinence was noticed 27 days after spinal anesthesia for bilateral herniorrhaphy in another hospital. Six months after the onset of the urinary incontinence, he experienced lower abdominal pain, urinary frequency, painful micturition, pyuria and hematuria. He was febrile to touch. There were three vesico-cutaneous discharging fistulae and marked suprapubic tenderness. The prostate was minimally enlarged, firm and tender on digital rectal examination (DRE).

His hemoglobin (Hb) was 11.7 gm/dl, total white blood cell count (TWBC) 14,300/mm³, neutrophil count of 86%, erythrocyte sedimentation rate (ESR) of 60 mm/hr, serum urea was 19 mg/dl and creatinine was 1 mg/dl. Urine culture yielded heavy growth of *proteus* and *klebsiella* both sensitive to levofloxacin.

Abdomino-pelvic ultrasonography (US) showed large stone in the bladder 5.3 cm in diameter, bilateral hydroureter, hydronephrosis and heteroechoic prostate with a volume of 16 cm³. A plain abdominal X-ray and intravenous urography (IVU) showed huge egg shaped stone 7x5 cm at the bladder neck Figure 1 (A and B).

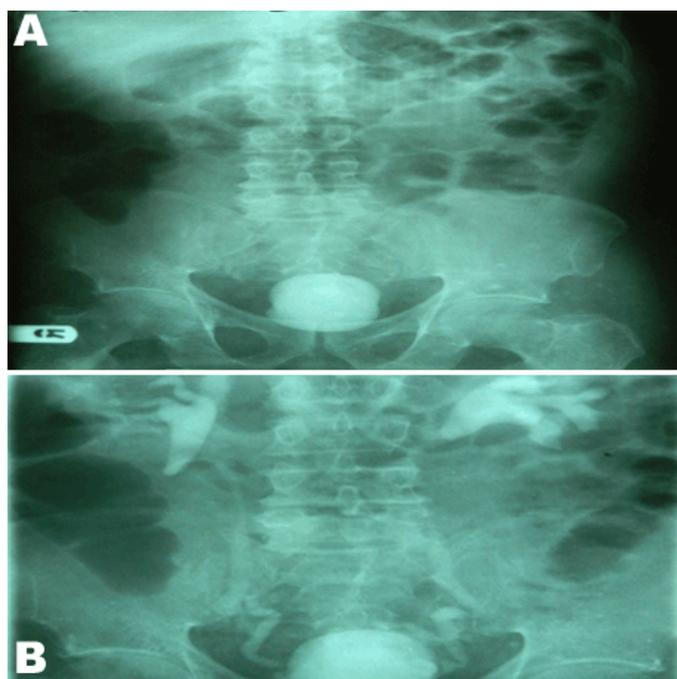


Figure 1(A and B): Plain X-ray of the abdomen (Case 1). (B) Intravenous urography showing bilateral hydroureter and hydronephrosis (Case 1).

Attempt at urethral catheterization failed as the stone occluded the internal meatus. The urinary tract infection (UTI) was treated with parental levofloxacin. Under general anesthesia, open cystolithotomy, bladder and prostatic biopsies were done. The weighed 512 gms and qualitative analysis using the Uldall, a wet chemical analysis of urinary calculi [14] showed mixed stone comprising calcium (Ca²⁺), magnesium (Mg²⁺), ammonium (NH₄⁺), phosphate (PO₄⁻) and carbonate (CO₃⁻) (Figure 2). Bladder mucosa biopsy showed no malignant change while the prostate showed chronic prostatitis. The patient had an artificial sphincter inserted to control the urinary incontinence. Six months after discharge, the patient was very stable with the suprapubic fistulae healed up.

Case 2

A 48-year-old Nigerian farmer and a known diabetic presented with a more than 5-year-old history of lower abdominal pain, day time frequency/nocturia, urgency with urgency urinary incontinence. He had a one year history of intermittent, total and painful hematuria. There was progressive weight loss, intermittent vomiting, abdominal distension, hiccough and painful defecation of two months duration. He was ill looking, pale, had sunken eye balls and febrile. The blood pressure (BP) was 90/60 mmHg, radial pulse of 122/minute, regular and low volume. The abdomen was distended. A hard immobile mass was palpable from the pubic region to the umbilicus. On DRE, a fixed hard mass was felt anteriorly. Urethral catheter could not be passed into the bladder due to the mass. The Hb was 5 gm/dl, ESR was 85mm/hr, total WBC was 15,635 mm³, platelet count was 138,000/mm³, fasting blood sugar (FBS) was 270mg/dl, urea was 130 mg/dl, creatinine was 3.2 mg/dl, Ca²⁺ was 8.9mg/dl, PO₄⁻ was 7.6 mg/dl, total serum protein was 4.3gm/dl and albumin was 2.2 gm/dl, urine culture yielded heavy growth of *klebsiella* and *Escherichia Coli* (E Coli). Urinalysis showed protein ++, glucose +++, nitrite was positive. Abdomino-pelvic US showed huge stone within the bladder measuring 19.8x12.3x9.2 cm, bilateral hydroureter, and hydronephrosis. Plain abdominal X-ray



Figure 2: Giant bladder stone (Case 1).

showed radiopaque mass occupying the entire pelvis up to the umbilicus reported as stone (Figure 3). The blood sugar was brought under control by the attending endocrinologist. Blood transfusion and crystalloids were used to correct anemia and dehydration respectfully. He was worked up for surgery. Using epidural anesthesia, via a transverse suprapubic incision the bladder was explored and the stone dissected off the bladder mucosa as it was adherent to it partially occluding the two ureteric orifices. Biopsy of the bladder mucosa was done. Urine was ejecting copiously from the two ureteric orifices. Urethral catheter was passed into the bladder and the suprapubic wound closed. The patient did well post operatively and by 15 days the renal impairment had normalized. He was discharged to the out-patient department and was stable at seven months post-surgery. The stone measured 20x9.5x12.5 cm and weighed 1736 gm (Figure 4). Qualitative analysis showed Ca^{2+} , PO_4 , CO_3 , Mg^{2+} , NH_4^+ , oxalate and urate. There was no malignant change of the bladder mucosa.

Case 3

A 73-year-old male retired public servant presented with a more than five year history of lower abdominal pain, day time urinary frequency/nocturia, urgency and urgency urinary incontinence. He was a known asthmatic

and hypertensive. He had intermittent hematuria and painful micturition of 15 months duration. He was not pale, febrile to touch both inspiratory and expiratory high pitch rhonchi were heard on chest auscultation. His blood pressure was 190/80mmHg and radial pulse of 110 per minute, regular and full volume. There was suprapubic tenderness. The prostate was enlarged, firm and tender on DRE. Attempt at urethral catheterization failed. The Hb was 13gm/dl, ESR-77mm/hr, TWBC-13,456/mm, serum urea-29 mg/dl, creatinine-1.1mg/dl, FBS- 87mg/dl. Urine culture yielded heavy growth of *E. coli* and *pseudomonas* both sensitive to meropenem. Abdominal US showed a huge oval shaped stone in the bladder 5.6 cm in diameter, prostate measuring 49x50x47 cm with a Vol. 58.14 cm³. Parentalmeropenem was used to treat the infection and the blood pressure and asthma brought under control by the attending physician. Under spinal anesthesia, open prostatectomy, cystolithotomy and biopsy of the bladder mucosa was done. An indwelling urethral catheter was left in place which was removed 10 days post operatively. The stone weighed 725 gm and measured 7x7x5.7 cm (Figure 5). Qualitative analysis showed Ca^{2+} , PO_4^{2-} oxalate, CO_3 , NH_4^+ and urate. There was no malignant change of the bladder mucosa. The histology of the prostate (Figure 6) was benign prostatic hyperplasia and chronic prostatitis. Six months post-surgery, the patient was stable.



Figure 3: Plain abdominal X-ray showing the stone (Case 2).



Figure 5: Giant urinary bladder stone (Case 3).



Figure 4: Giant urinary bladder stone (Case 2).

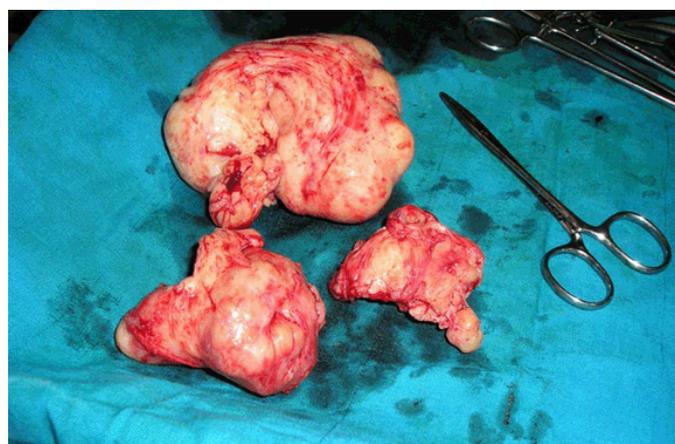


Figure 6: Prostate specimen (Case 3).

DISCUSSION

Giant urinary bladder calculi are a rare clinical entity in today's modern urological practice buttressed by the fact that only 30 cases have been reported in the English literature [4, 10, 15, 16]. In this series, three cases were seen in nine years. Cases 1 and 2 had neurogenic bladder dysfunctions from cord injury following spinal anesthesia and uncontrolled diabetes mellitus respectively. The third case had bladder outlet obstruction sequel to prostatic disease and prolonged effect of salbutamol on the detrusor muscle. There was recurrent UTI following urine stasis in the three cases. *Klebsiella*, *E. coli*, *proteus* and *pseudomonas* were the bacteria cultured. The stones were mixed in nature comprising of Ca^{2+} , PO_4^{2-} , Mg^{2+} , CO_3^{2-} , NH_4^+ , oxalate, and urate. The chemical composition of the stones in this series is compatible with the colonization status of the urinary tract which plays a role in stone formation. Thus, klebsiella, proteus, pseudomonas, (urease positive organisms) predisposed to magnesium, phosphate, ammonium and carbonate apatite while *E. coli* was associated with formation of calcium oxalate and urate stones. These observations have been documented by other researchers [6]. Most vesical calculi are composed of triple phosphate, calcium carbonate and calcium oxalate [4, 10, 15]. The constituents of the giant bladder stones in this series are the same. Furthermore, Becher et al. reported a giant vesical uric acid calculus weighing 235gm with a minor component of asymmetrical calcium oxalate [4, 10, 15, 17]. Instances of formation of bladder stone around a foreign body, sutures, or other objects introduced into the bladder have been reported [6, 10, 15]. It is thought that a giant vesical calculus develops from a nidus of the infected material or from a solitary ureteric stone with progressive layer wise deposition of calcified matrix. Thus, earlier stated factors may mutually contribute to the formation of a stone [6, 8, 10, 15, 16]. Furthermore, studies have shown that nucleus of bladder stone does not contain struvite or calcium phosphate but subsequent concentric layer contain large amount of these substances. Schwartz and Stoller noted that infection may not be the inciting factor in stone formation but may play a role in subsequent stone crystallization [5, 8]. Apart from the predisposing factors for vesical calculus outlined above, diet and amount of fluid intake are also important [10, 15, 16].

The common presentation of patients with giant urinary bladder stones includes painful micturition, urinary incontinence, hematuria, pyuria, recurrent UTI, suprapubic pain and urinary retention [4, 8, 10, 13, 15]. These were present in the patients in this series. Those with urinary retention pass urine in supine position as the calculus obstructs the bladder outlet in erect position [4, 15]. Giant vesical calculus can occupy the entire bladder cavity occluding the ureteric orifices causing hydronephrosis, hydronephrosis, renal failure [4, 6, 10, 13, 15, 18, 19] and rarely bladder rupture [4, 20]. Cases 1 and 2 in this series had bilateral hydronephrosis and hydronephrosis. Case 2 in

addition had renal failure. The three patients in this series were symptomatic for more than five years. Reasons for the late presentation include poverty, ignorance and absence of health centres with simple imaging facilities. This was noted by another researcher from the same geographical location [3].

Plain abdominal X-rays, abdominal US and intravenous urography (IVU) were the imaging modalities used in this study to make diagnosis. Most of the bladder calculi are radiopaque and are diagnosed with plain radiographs. Other imaging modalities include US, IVU, CT – scan, magnetic resonance imaging. However, contrast enhanced CT is the investigation of choice as it is more sensitive in detecting urinary tract stones including uric acid stones [4, 10, 15]. Treatment in all cases was by open surgery and no case of bladder mucosa malignant change was noted in this series. Other modalities of treatment have evolved such as cystolithotripsy for small or moderate calculus and have added advantage for corrective procedure for bladder outlet obstruction [10, 15]. Though open surgery is preferred for large stones [4, 10, 15], spontaneous expulsion of two giant bladder stones by a female patient has been documented [21].

CONCLUSION

Giant bladder stones are rare in modern urological practice as three cases were seen in nine years in this series. Furthermore, most of the cases in the literature are case reports. Poverty, ignorance, lack of health centres with simple diagnostic facilities and specialist consultation were responsible for late presentation and enormous morbidity in this series. Finally in spite of the many years of sustained vesical obstruction, one patient surprisingly had renal failure.

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Author Contributions

Charles Azuwike Odoemene – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None

Consent Statement

Written informed consent was obtained from the patient for publication of this case series.

Conflict of Interest

Authors declare no conflict of interest.

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