



## Case report

## A large renal bullet that resembles a large renal stone. A rare case scenario

Diaa-Eldin Taha<sup>a,b,\*</sup>, Ali Abdel Raheem<sup>a,c</sup>, Abdulhkam Aljarbou<sup>a</sup>, Salem Bahdilh<sup>a</sup>,  
Abdelkarim Alrubat<sup>a</sup>, Ibrahim Alowidah<sup>a</sup>

<sup>a</sup> Urology Department, King Saud Medical City, Riyadh, Saudi Arabia

<sup>b</sup> Urology department, Kafrelsheikh University, Egypt

<sup>c</sup> Urology Department, College of Medicine, Tanta University, Tanta, Egypt

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## ABSTRACT

**Introduction:** Genitourinary trauma secondary to a gunshot wound is uncommon as it only occurs in about 10% of cases. We present a case of a gentleman who suffered a gunshot wound to the kidney.

**Presentation of case:** A 28 year old man presented with irritative lower urinary tract symptoms (LUTs) since three months. The medical history was irrelevant. He is known case of neurogenic bladder maintained on regular clean intermittent catheterization (CIC). He has history of gunshot to the back since few years that resulted in spinal injury. CTUT showed retained bullet inside the right kidney that look alike hyperdense renal stone. Moreover, multiple vesical stones. The vesical stones were treated with cystolitholapaxy. Given that the patient is asymptomatic, conservative management for the retained right renal bullet is the feasible option.

**Discussion:** Based on the ASST classification, renal gunshot injury results in a grade IV injury. Abdominal exploration was reserved only in selected scenarios. Gunshot injuries to the kidney are commonly associated with thoracic and abdominal injuries. Gunshot injuries may be caused by low-velocity or high-velocity bullets. Given the paucity of cases reported in the literature, it is not obvious what is the optimum management of such patients with a retained renal bullet? We present the radiological findings and a clinical case summary as well for those who have Grade IV kidney injury and retained bullet managed conservatively.

**Conclusion:** Retained renal bullet post gunshot injury to the back is unusual presentation. A characteristic star-like pattern produced by lead shots and not by "stone," consisting of plastic detonating cap will aid the urologist to differentiate retained renal bullet from renal stone. In such scenario, asymptomatic renal bullet look alike renal stone doesn't necessitate treatment.

## 1. Introduction

Genitourinary trauma secondary to a gunshot injury occurs in approximately 10% of cases (1). We present a case of a gentleman who suffered a gunshot wound to the back. The right kidney has associated retained renal bullet that mimic a renal stone. The confusion harbored from lookalike renal stone confer the urologist in management of such cases. The characteristic star-like pattern produced by lead shots and not by "stone," consisting of plastic detonating cap, can be achieved by CT urinary tract (CTUT). The migration of bullet is a potential option (2), where it might obstructed the ureter (3) causing renal deterioration. Moreover, the bullet can pass to the bladder then after dislodge in the urethra (4,5). Neurogenic bladder is a risk factor for bladder stone development. Treatment option was mainly related to stone size and number as well as concomitant causative disease (6). The treatment of

such retained bullet in the kidney can be managed either by endoscopy (7,8) or open approach (9). This case report manuscript follows the surgical case report (SCARE) Guidelines (10).

## 2. Case presentation

A 28 year old man presented with irritative LUTs since three months. He has irrelevant drug history, family history including any relevant genetic information, and psychosocial history. He is a known case of neurogenic bladder maintained on regular CIC. He has history of gunshot to the back since three years that resulted in spinal injury.

The lab profile was within normal range, serum creatinine was 82 μmol/L, HB was 13 g/dl, and negative preoperative urine culture. The CTUT showed retained bullet inside the L2 lumbar vertebra and the right kidney that look alike hyperdense renal stone as well (Figs. 1 and 2).

\* Corresponding author at: Department of Urology, Faculty of Medicine, Kafrelsheikh University, Kafrelsheikh, Egypt.

E-mail address: [drdiaaeldin@med.kfs.edu.eg](mailto:drdiaaeldin@med.kfs.edu.eg) (D.-E. Taha).

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**Fig. 1.** CTUT (axial cuts) showing lead shot in renal parenchyma. A characteristic star-like pattern produced by lead shots and not by “stone,” consisting of plastic detonating cap.



**Fig. 2.** CTUT showing lead shot in renal parenchyma. Panel D shows characteristic star-like pattern produced by lead shots and not by “stone,” consisting of plastic detonating cap.

Moreover, multiple vesical stones (Fig. 3).

After shared decision making with the patient, discussing the pros and cons of surgical intervention for vesical stone, he was convinced with the procedure. In a tertiary hospital and under the care of expert surgeon, the vesical stones were treated with cystolitholapaxy. The obvious shape of the retrieved stones assures that they were not a migrated bullets. Conservative management for the retained right renal bullet is the feasible option. The patient is doing fine postoperative and continues on CIC.

### 3. Discussion

Based on the ASST classification, renal gunshot injury results in a grade IV injury. Abdominal exploration was reserved only if there were hemodynamic instability, renal hilar involvement, and active haemorrhage (11). Gunshot injuries to the kidney are commonly associated with thoracic and abdominal injuries. Gunshot injuries may be caused by low-velocity or high-velocity bullets. The latter are usually used with military weapons that result in a higher degree of tissue damage (9). Given the paucity of cases reported in the literature, it is not obvious what is the optimum management of such patients with a retained renal bullet?

We present the radiological findings and a clinical case summary as

well for those who has Grade IV kidney injury and retained bullet managed conservatively.

Bullet colic was initially described in 1951 and is defined as renal colic secondary to obstruction caused by the bullet or buckshot fragments following gunshot wounds to the kidney (2). In our case scenario, the shape of the retrieved vesical stones was confirmed that they were not a migrated bullets.

Shotgun renal trauma is of particular importance, as multiple pellets enter the body at multiple sites in a single assault. Because of their small size, the pellets are difficult to locate surgically, and because of their multiplicity, it is very difficult to localize all of them on plain films because of the two-dimensional nature of the radiographs. These small particles can either enter the kidney directly or later erode into the collecting system (2).

As a consequence, a CTUT was requested in our case to exclude lead shot retained in the collecting system working as a nidus for stone formation. The CTUT scan reports the bullet nature because of cap's transparency and the calcium deposition on it (3).

In retrospect, the trauma from a near distance, should have raised suspicion of this specific cause of the renal colic. When urologists are confronted with a gunshot or shotgun injury late in its course, they should keep in mind that some particles of the missile, when calcified,



Fig. 3. CTUT, axial view, showing multiple vesical stones with thickened bladder wall.

may not give substantive radiographic clues to the correct diagnosis (8).

Bladder stones are traditionally classified as migrant, primary idiopathic, and secondary. Patients who have a neurogenic bladder as a result of a spinal cord injury are especially vulnerable to vesical stone formation. According to previous research, 17–25% of spinal cord injury patients have bladder lithiasis, with male gender, complete neurological lesion, coexisting infection, and the presence of an indwelling catheter identified as risk factors (12,13). A more recent study found that 14% of spinal cord injury patients had at least one episode of vesical lithiasis over a mean follow-up of 24 years, with the risk being higher during the first 6 months after injury (14). The mode of bladder management in this group has a significant impact on the risk of bladder stone formation; the risk was 0–0.5% per year for sphincterotomy and condom catheter urine collection, 0.2% per year for intermittent catheterization, and 4% per year for indwelling catheterization (13).

The transurethral route is likely the most common approach in adults. The percutaneous technique has been promoted in patients who do not have adequate urethral access, such as children or patients who have had a bladder neck reconstruction (15,16). The Holmium-YAG laser can fragment all stone compositions and has been shown to be safe as long as the laser fiber is kept at least 0.5 mm away from the urothelium (17). Stone fragmentation is caused by chemical decomposition as a result of a dominant photothermal mechanism (18). Elbah-nasy et al., on the other hand, used a 12-mm self-retaining laparoscopic probe to gain bladder access in order to achieve both rapid fragmentation and stone extraction (19).

As a potential possibility of being a migrant stone from the upper urinary tract, the extracted vesical stone should be properly inspected, moreover, should be analyzed to make sure that whether it is a migrant gunshot or pure vesical stone. Unfortunately, in our case study, we don't have a stone analysis for the retrieved vesical stone. Based on the rational that the retrieved vesical stone is not bullet in gross appearance.

To wrap up, the entire case scenario emphasizes that Retained renal bullet post gunshot injury is unusual presentation. In such scenario, asymptomatic renal bullet look alike renal stone doesn't necessitate treatment.

#### 4. Conclusion

Retained renal bullet post gunshot injury to the back is unusual presentation. A characteristic star-like pattern produced by lead shots and not by “stone,” consisting of plastic detonating cap will aid the

urologist to differentiate retained renal bullet from renal stone. In such scenario, asymptomatic renal bullet look alike renal stone doesn't necessitate treatment.

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#### Ethical approval

Approval of the Institutional Review Board according to publish this case report was obtained. This case report manuscript follows the surgical case report (SCARE) Guidelines (10).

#### 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.

#### CRediT authorship contribution statement

- Diaa-Eldin Taha: manuscript writing
- Ali Abdel Raheem: manuscript revision
- Abdulkam Aljarbou: collecting data
- Salem Bahdilh: collecting data
- Abdelkarim Alrubat: collecting data
- Ibrahim Alowidah: manuscript revision

#### Research registration

None.

#### Guarantor

Diaa-Eldin Taha

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**Declaration of competing interest**

None.

**References**

- [1] N.M. Cinman, McAninch JW, S.P. Porten, J.B. Myers, S.D. Blaschko, H.S. Bagga, et al., Gunshot wounds to the lower urinary tract: a single-institution experience, *J. Trauma Acute Care Surg.* 74 (3) (2013) 725–730, discussion 30–1.
- [2] H.U. Eickenberg, M. Amin, R. Lich Jr., Traveling bullets in genitourinary tract, *Urology* 6 (2) (1975) 224–226.
- [3] H. Gutman, M. Rothberg, K.E. Johanson, Ureteral obstruction by shotgun pellet seven years after injury, *Urology* 23 (2) (1984) 170–172.
- [4] J. Marantidis, G. Biggs, Migrated bullet in the bladder presenting 18 years after a gunshot wound, *Urol. Case Rep.* 28 (2020), 101016.
- [5] C. Mehta, M. Loecher, A. Sih, A.C. Reese, A report of a retained bullet in the bladder which migrated from an extraperitoneal injury, *Urol. Case Rep.* 34 (2021), 101463.
- [6] A. Cicione, C. Den, S. Manno, R. Damiano, A. Posti, E. Lima, et al., Bladder stone management: an update, *Minerva Urol. Nefrol.* 70 (1) (2018) 53–65.
- [7] I. Naeem, J. Masood, N. Buchholz, Percutaneous nephrolithotomy for removal of a calcified intra-renal artillery shell fragment, *J. R. Army Med. Corps* 155 (1) (2009) 30–31.
- [8] A. Bissas, A. Dellis, N. Bafaloukas, O. Sopilidis, K. Livadas, A. Skolarikos, Percutaneous nephrolithotomy to remove a cartridge detonating cap mimicking a renal pelvic stone 12 years after renal trauma, *J. Endourol.* 19 (6) (2005) 719–721.
- [9] M. Maruschke, O.W. Hakenberg, Gunshot wound to the kidney: case report and therapeutic management, *Der Urologe Ausg. A.* 47 (4) (2008) 482–485.
- [10] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, A. Kerwan, The SCARE 2020 guideline: updating consensus surgical CAse REport (SCARE) guidelines, *Int. J. Surg. (London, England)*. 84 (2020) 226–230.
- [11] A.F. Morey, J.A. Broghammer, C.M.P. Hollowell, M.J. McKibben, L. Souter, Urotrauma guideline 2020: AUA guideline, *J. Urol.* 205 (1) (2021) 30–35.
- [12] Y. Chen, M.J. DeVivo, L.K. Lloyd, Bladder stone incidence in persons with spinal cord injury: determinants and trends, 1973–1996, *Urology* 58 (5) (2001) 665–670.
- [13] J. Ord, D. Lunn, J. Reynard, Bladder management and risk of bladder stone formation in spinal cord injured patients, *J. Urol.* 170 (5) (2003) 1734–1737.
- [14] R.B. Hansen, F. Biering-Sørensen, J.K. Kristensen, Urinary calculi following traumatic spinal cord injury, *Scand. J. Urol. Nephrol.* 41 (2) (2007) 115–119.
- [15] M. Aron, R. Goel, G. Gautam, A. Seth, N.P. Gupta, Percutaneous versus transurethral cystolithotripsy and TURP for large prostates and large vesical calculi: refinement of technique and updated data, *Int. Urol. Nephrol.* 39 (1) (2007) 173–177.
- [16] V. Tugcu, H. Polat, B. Ozbay, N. Gurbuz, G.A. Eren, A.I. Tasci, Percutaneous versus transurethral cystolithotripsy, *J. Endourol.* 23 (2) (2009) 237–241.
- [17] T.A. Wollin, R.K. Singal, T. Whelan, R. Dicecco, H.A. Razvi, J.D. Denstedt, Percutaneous suprapubic cystolithotripsy for treatment of large bladder calculi, *J. Endourol.* 13 (10) (1999) 739–744.
- [18] K.F. Chan, G.J. Vassar, T.J. Pfefer, J.M. Teichman, R.D. Glickman, S.T. Weintraub, et al., Holmium:YAG laser lithotripsy: a dominant photothermal ablative mechanism with chemical decomposition of urinary calculi, *Lasers Surg. Med.* 25 (1) (1999) 22–37.
- [19] A.M. Elbahnasy, Y.A. Farhat, A.R. Aboramadan, M.R. Taha, Percutaneous cystolithotripsy using self-retaining laparoscopic trocar for management of large bladder stones, *J. Endourol.* 24 (12) (2010) 2037–2041.