Case Report

Complete Upper Urinary Tract Obstruction Caused by Penetrating Pellet Injury of the Ureter

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Abstract

Ureteral injuries due to gunshots are tend to be misdiagnosed because of concomitant vascular and intraabdominal organ wounds. Our case is a 23-year-old man who was admitted to the hospital with multiple abdominal gunshot wounds. Laboratory findings showed worsening anemia, and the computed tomography (CT) scan showed multiple lead bullets inside the abdomen and retroperitoneum. Patient was then taken to the operation room for laparatomy. There were many intestinal injuries and also a stable retroperitoneal hematoma. There was no ureteral injury mentioned in the operation note or the initial CT report. Two weeks after this operation, the patient developed significant urine leakage from the abdominal wounds. Ureteral J stent placement was our first choice of treatment. This was complicated with a late ureteral obstruction. The final treatment was an ureteroureterostomy. Diagnosing ureteral injuries due to traumatic causes can be hard in most of the cases. Physicians should consider early evaluation of the patient for ureteral leakage if there is suspicion about ureteral injury.

Keywords: *Gunshot, ureteral obstruction, wound*

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Introduction

Abdominal gunshot wounds are an infrequent cause of ureteral injuries. Also, pure ureteral injury after penetrating injury is a very rare condition and the gastrointestinal tract is frequently associated. Most patients undergo urgent laparotomy without further investigations. Suspicion is essential to diagnosis of ureteral injuries because of the morbidity related to late diagnosis.

Case Report

A 23-year-old man was admitted to emergency medical services after a gunshot injury to the left lateral abdomen from close range with a single shotgun blast (spherical pellets, approximately 3 mm in diameter, more than 120 pellets) [Figure 1]. The patient was hypotensive, lethargic with a Glasgow Coma Scale core of 9. Physical examination revealed left-side abdominal tenderness and multiple entrance wounds. There was no evidence of gross hematuria. Urine analysis revealed 140 red blood cells per high power field. Colloid infusion and blood transfusion had begun. Anteroposterior film and a noncontrast computed tomography (CT) scan revealed multiple pellets in the retroperitoneum, thorax, and one in the pelvis [Figure 1]. In light of physical examination, radiological findings, and the persistence of hypotension after four units red blood cell transfusion, he underwent exploratory laparotomy. Operative findings included numerous pellets within the mesentery of the small bowel and colon, injury of the descending colon, no significant major vessel injuries, and nonexpanding left retroperitoneal hematoma. The general surgeon performed a left hemicolectomy. As the retroperitoneal hematoma remained stable during the whole operation, which lasted approximately 3 h, we decided not to explore the retroperitoneum to avoid longer exposure of the patient to anesthesia, and more bleeding. MR urography, blood sample, and kidney function tests performed on the 5th

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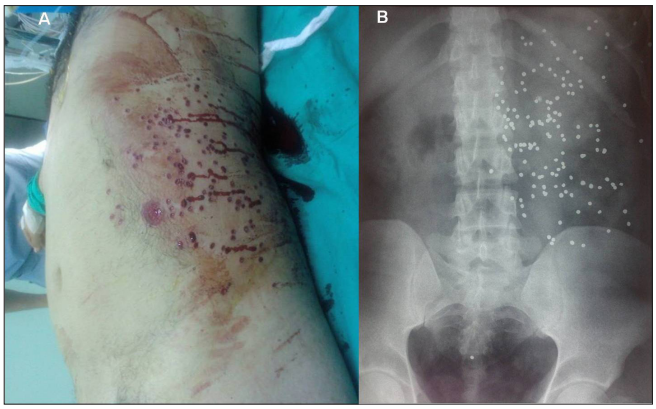

Figure 1: (A) Multiple pellet entrance wounds involving entire left flank; (B) abdominal plain radiography demonstrating multiple pellets in retroperitoneum, abdomen, and one in the pelvis

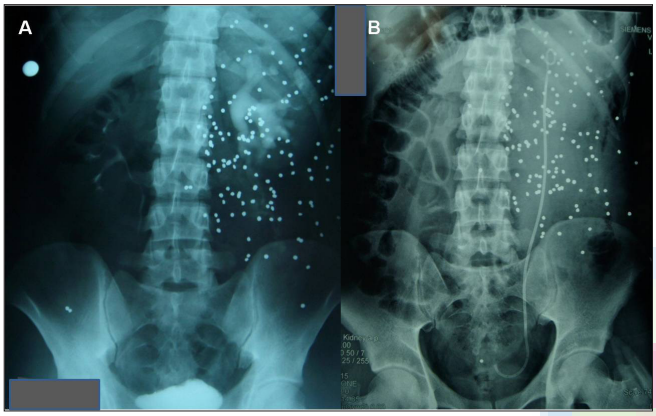

Figure 2: (A) Intravenous pyelogram demonstrates calyectasis, dilatation of proximal ureter; (B) after insertion of double-j stent

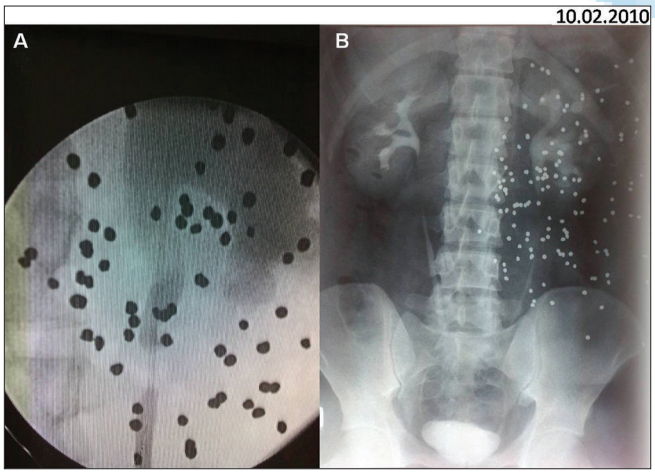

Figure 3: (A) Retrograde pyelogram demonstrating 1.5 cm long stricture; (B) intravenous pyelogram (25 min) revealing normal function bilaterally after treatment of ureteral stricture

day postoperatively were normal. He was discharged because of these normal findings. After 2 weeks of the operation, he complained of left flank pain and drainage of serous fluid from pellet entrance wounds. Biochemical analysis of serous fluid revealed that this fluid was urine. A ureteral double J (DJ) stent was inserted; drainage from wounds stopped immediately, and the stent was removed 1 month later. A day later, the patient was admitted to our outpatient clinic with serious renal colic. Ultrasound of the urinary system showed there was grade-2 hydronephrosis of the left kidney. We performed intravenous pyelogram (IVP), and there was minimal extravasation from the proximal ureter [Figure 2]. Radiologists reported that there may be a fistula between the ureter and the bowels. We decided to perform diagnostic ureterorenoscopy. During the operation the ureter was easily seen from the orifice to the pelviureteric junction (PUJ), no fistula or any other pathology was observed, and we inserted a DJ stent again. The patient's renal colic stopped and 2 days after the hydronephrosis resolved. Renal scintigraphy showed 29% function, multiple parenchymal scars, and delayed excretion in the left kidney. We then performed a selective renal vascular angiography. This angiography showed minimally increased parenchymal pressure, but no major vascular abnormality or injury. We removed the DJ stent and performed a retrograde pyelography. There was stricture in the proximal ureter [Figure 3]. The stricture did not allow the ureterorenoscope to pass, so we inserted a DJ stent and decided on open surgical exploration. After 9 months of the first operation, the patient was explored via a flank incision. There were no pellets anywhere near the ureter but the surrounding tissue was very fibrotic, and we could not separate the ureter from this tissue. So we excised the fibrotic area and we did an end-to-end anastomosis over a 7 fr DJ stent by spatulation only. At 6th month's postoperative, the patient was well, and IVP revealed normal ureteral passage.

Discussion

The ureter is protected by anatomically adjacent structures such as psoas muscle, vertebrae, and pelvic bones. Its small size and flexible structure contribute to its protection.[1] Thus, ureteral injuries are infrequent and the most common etiology is iatrogenic.[2] Abdominal gunshot wounds account for 2–5% of ureteral injuries. Additionally, less than 1% of all ureteral injuries are violent genitourinary injuries.[3] Pure isolated ureteral injury after penetrating injury is a very rare condition and the gastrointestinal tract is frequently associated with penetrating injury.[4] Diagnosis of traumatic ureteral injuries at presentation can be troublesome because of the obscure initial symptoms. Except hematuria, there may be no signal to indicate the presence of such injury.[5] A high index of suspicion is essential for diagnosis. CT is not only useful for diagnosis of ureteral injuries but also contributes to the diagnosis of other organ injuries. IVP and especially one-shot intravenous urography are unreliable modalities for ureteral

injuries.[6] Clinically stable patients may be examined by retrograde ureterorenography or ureteroscopy. The diagnosis of injury may be delayed because of the associated simultaneous injuries. When ureteral injuries are missed following abdominal gunshot trauma, injury may present with fever, abscess, urinoma, sepsis, ileus, urinary fistula, and evidence of upper tract obstruction.[7] The bullet can damage the ureter via direct transection or the blast injury may damage the intramural blood supply, resulting in segmental ureteral necrosis.[8] Missed ureteral injuries occur more frequently in the proximal portion of the ureter because of the location of retroperitoneal hematoma and difficulties involved in visual inspection.[7,9] Partial circumferential lacerations of the ureter can be repaired immediately with percutaneous nephrostomy or DJ stent placement. Endourological intervention is an option in late-diagnosis small fistulas and strictures. In late-diagnosis ureteral disruption and large strictures, open surgical ureteral repair is frequently necessary. Debridement of unviable tissues and ureteral parts, ureteral end spatulation, end-to-end anastomosis, and internal stenting are the main principles of repair.

Owing to hemodynamic instability, our case was operated urgently. We suggest that the stable hematoma in the retroperitoneum which remained stable during the whole operation concealed the upper ureteral injury. In addition, ureteropelvic junction obstruction, due to late ureteral wall necrosis from the blast effect, compromised the clinical presentation. Despite DJ stenting failure and late diagnosis, we were able to perform a resection of fibrotic segment of ureter and end to end anastomosis of the ureter according to published ureteral trauma guideline criteria.

Most patients undergo urgent laparotomy without further investigation; therefore, these injuries must be considered primarily in all cases of penetrating abdominal injury.[10] Suspicion is essential to diagnosis of ureteral injuries because of the morbidity associated with late diagnosis.[11]

Conclusions

Diagnosis of traumatic ureteral injuries at presentation can be troublesome because of the obscure initial symptoms. A high index of suspicion is essential for correct diagnosis.

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Conflicts of interest

There are no conflicts of interest.

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