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Case

Double-J Stent Fracture After Shock-Wave Lithotripsy: A Rare Adverse Event

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Abstract

Extracorporeal Shock-Wave Lithotripsy (ESWL) is a widely used, non-invasive treatment modality for urinary stone disease with a favorable safety profile. Common complications include hematuria, pain, and infection, whereas rare but serious adverse events such as renal hematomas, arrhythmias, and injuries to adjacent organs have also been reported. Ureteral stent-related complications following ESWL are uncommon. Herein, we report a rare case of proximal double-J ureteral stent fracture detected after ESWL in a patient treated for a renal pelvic stone. The case underscores the importance of considering stent-related structural complications in patients undergoing ESWL with indwelling ureteral stents, particularly when higher shock frequencies are used.

Keywords: Lithotripsy, Kidney Calculi, Ureteral Diseases, Equipment Failure

INTRODUCTION

Since its introduction in the early 1980s, extracorporeal shock wave lithotripsy (ESWL) has played a pivotal role in the management of urinary stone disease (1). ESWL relies on high-energy acoustic shock waves transmitted through a fluid medium and focused on urinary calculi, leading to stone fragmentation via compressive and tensile forces (2). Its non-invasive nature, relative ease of application, and satisfactory success rates (particularly for renal and proximal ureteral stones smaller than 2 cm) have contributed to its widespread adoption (3-5).

Despite its overall safety, ESWL is associated with a spectrum of complications ranging from transient hematuria and flank pain to more severe but infrequent events such as renal hematoma, infection, and injury to adjacent organs (6) Device-related complications, including ureteral stent damage or fracture, are exceedingly rare and sparsely reported in the literature. In this report, we present a case of double-J ureteral stent fracture following ESWL, with emphasis on clinical presentation, stent dwell time, and detailed ESWL parameters to better elucidate potential contributing mechanisms..

CASE

A 51-year-old female patient presented to the outpatient urology clinic with right-sided flank pain of two weeks' duration. She denied fever, dysuria, gross hematuria, or lower urinary tract symptoms at presentation. Laboratory evaluation revealed normal renal function, with a serum creatinine level of 0.82 mg/dL and blood urea nitrogen of 14 mg/dL; complete blood count and inflammatory markers were within normal limits. Urinalysis demonstrated microscopic hematuria (8–10 erythrocytes per high-power field) without evidence of pyuria or bacteriuria. Abdominal computed tomography showed a 16-mm calculus located in the right renal pelvis, accompanied by grade 1 hydronephrosis (**Figure 1**). The patient had no known comorbidities or significant past medical history. Ureterorenoscopy was initially planned; however, intraoperative assessment revealed inadequate ureteral dilation preventing safe advancement of the ureteroscope. Therefore, a 6 Fr double-J ureteral stent was placed to allow passive ureteral dilation and facilitate subsequent intervention (**Figure 2**).

Following shared decision-making with the patient, extracorporeal shock wave lithotripsy (ESWL) was selected as the definitive treatment modality. The first ESWL session was performed using a third-generation electromagnetic lithotripter, delivering a total of 2,800 shock waves at an energy level of 14–16 kV with a shock frequency of 86 shocks per minute. The procedure was completed without early complications, and the patient remained asymptomatic, with no post-procedural pain exacerbation, gross hematuria, or infectious symptoms. The indwelling stent duration at that time was 18 days.

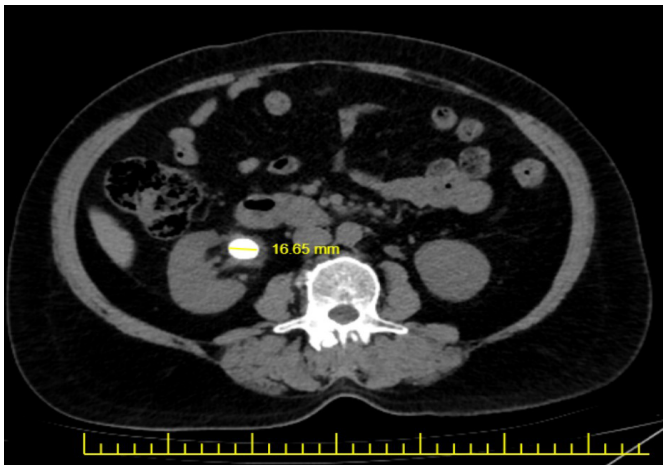

Figure 1. 16 mm stone in the right renal pelvis on non-contrast abdominal computed tomography.

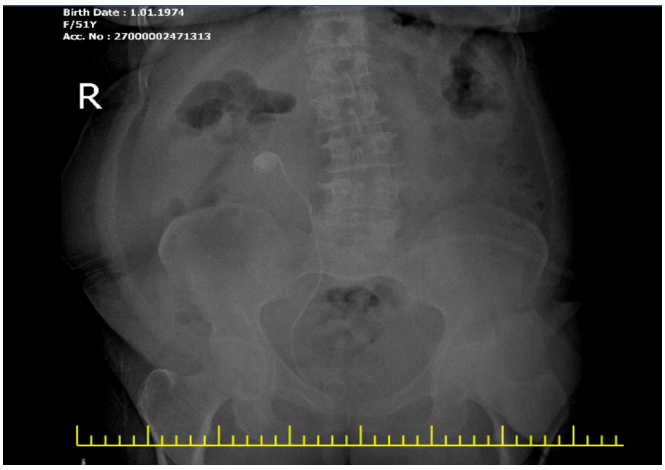

Figure 2. Direct urinary tract radiograph after insertion of a double j ureteral catheter, appearance of the stone and catheter in the right kidney.

Prior to the planned second ESWL session, a routine plain radiograph of the urinary system was obtained, which unexpectedly demonstrated a fracture involving the proximal one-third of the double-J stent (**Figure 3**). Despite this finding, the patient remained clinically stable and asymptomatic.

Given the potential risks of stent migration, urinary obstruction, and infection, endoscopic retrieval of the fractured stent segment was promptly planned. Under general anesthesia, ureterorenoscopy was performed, revealing the fractured proximal portion of the stent within the renal pelvis. The fragment was successfully retrieved using grasping forceps (**Figure 4**), and a new double-J ureteral stent was inserted at the end of the procedure to ensure adequate urinary drainage. The patient tolerated the intervention well, with no intraoperative or postoperative complications, and was discharged on the first postoperative day. During follow-up, she remained asymptomatic, and the replacement stent was removed uneventfully three weeks later.

DISCUSSION

ESWL remains a cornerstone in the management of renal stone disease; however, its safety is influenced by multiple procedural and patient-related factors. Among these, shock wave frequency has been shown to significantly affect tissue injury and mechanical stress. Experimental and clinical studies suggest that shock rates exceeding 60 shocks per minute may increase renal parenchymal injury and other complications (7). In the present case, a relatively high shock frequency of 86 shocks per minute may have contributed to repetitive mechanical stress on the indwelling stent.

Although prolonged stent dwell time is a recognized risk factor for stent degradation and fracture, the relatively short dwell time in our patient suggests that direct exposure of the stent to high-frequency shock waves may have played a more prominent role (8). Shock wave-induced vibration, microcrack formation, and material fatigue are plausible mechanisms.

Furthermore, precise targeting and real-time imaging are critical during ESWL, particularly in patients with indwelling foreign bodies. While fluoroscopic guidance was used, the presence of a stent within the focal zone may still predispose to unexpected device-related complications.

This case adds to the limited literature on ESWL-

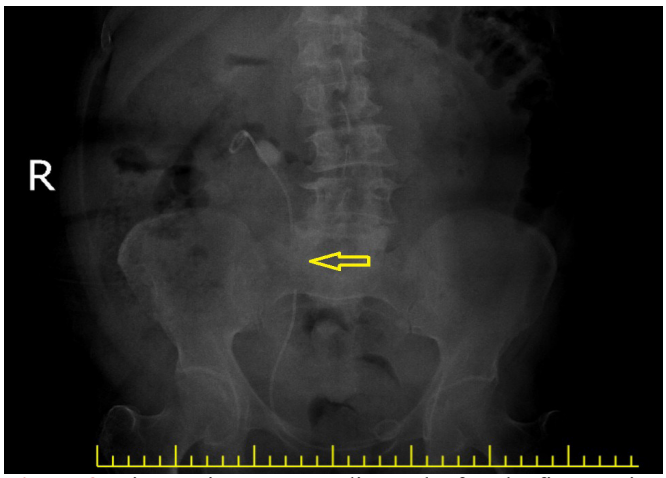

Figure 3. Direct urinary tract radiograph after the first session of ESWL, the fractured ureteral catheter is seen in the area indicated by the arrow.

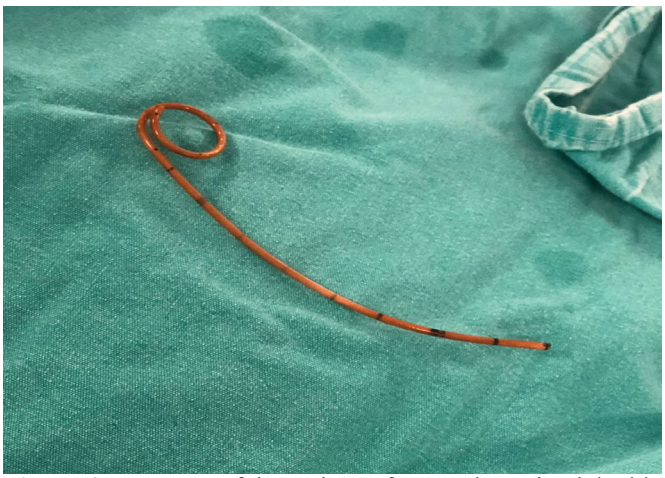

Figure 4. Fragment of the patient's fractured proximal double j ureteral catheter

associated ureteral stent fracture and highlights the importance of considering stent integrity when planning ESWL, especially when higher shock rates or energy levels are employed.

CONCLUSION

Although ESWL is a safe and effective modality for renal stone treatment, rare complications such as double-J stent fracture may occur, even with short-term stent placement. Clinicians should remain vigilant in patients undergoing ESWL with indwelling ureteral stents, particularly when higher shock frequencies are used. Early radiographic evaluation and prompt endoscopic management are essential to prevent further morbidity.

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Consent Statement: Patient consent was obtained.

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