



CASE REPORT

Distal ureteral calculi in a patient with ileal conduit and urinary diversion treated via antegrade ureteroscopic lithotripsy: A case report

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Abstract

Ureteral calculi management in patients with urinary diversion is challenging for most urologists. The surgeon should consider the patient's diversion type, BMI, stone size and location, and his/her experience with the procedure. We report an 85-year-old ileal conduit diversion man presented with ureteral calculi and treated via antegrade ureteroscopic lithotripsy.

KEYWORDS

antegrade, case report, percutaneous, ureteral calculus, ureteroscopy, urinary diversion

1 | INTRODUCTION

Radical cystectomy and urinary diversion is the gold-standard treatment option for patients with muscle-invasive bladder cancer.¹ Patients with urinary diversion are more likely to develop strictures at the site of uretero-intestinal anastomosis and urolithiasis, as urine reflux and pouch stasis enhance the chance of stone development.² The risk of stone development in these patients depends upon the type of diversion used. The stone incidence in colonic conduits, ileal conduits, the Kock pouch, ileal ureter, continent cecal reservoirs, the Mitrofanoff procedure, and vesicostomies has been reported 3–4, 10–12, 16.7, 17, 20, 10–12, and 33%, respectively.²

Adhesion following bladder reconstruction, stricture at the site of anastomosis, and urinary diversion complications are the urologists' primary technical dilemmas

in these patients.^{3,4} Percutaneous nephrolithotomy (PCNL), Extracorporeal shock wave lithotripsy (SWL), antegrade–retrograde combination ureteroscopy (URS), percutaneous antegrade URS, and open surgeries are all possible options for treating urinary tract stones in patients with urinary diversion.^{4,5}

Many parameters, including stone location and diameter, patient condition and diversion type, and surgeon's experience should be considered when selecting a therapeutic approach.⁵ Few reported cases of distal ureteral stones in radical cystectomy patients with an ileal conduit that have undergone antegrade URS lithotripsy exist in the literature.^{3,4,6} Here, we report our experience in treating distal ureteral stone via antegrade ureteroscopic lithotripsy in an 85-year-old man who had previously undergone radical cystectomy and ileal conduit.

2 | CASE REPORT

An 85-year-old male patient visited our emergency ward with a complaint of abdominal and right flank pain in the last 2 weeks. The patient had a history of radical cystectomy and an ileal conduit procedure 8 years ago due to muscle-invasive bladder cancer. He had no other significant medical or family history. The patient's exam revealed mild tenderness in the right lower quadrant of the abdomen.

The urine culture result was negative, but urine analysis report showed microscopic hematuria (red blood cells 15–20/ high power field). Investigation of the blood sample revealed hemoglobin level (9.7 g/dL), white blood cells (7×10^3 /mL), blood urea nitrogen (11 mg/dL), and serum creatinine level (0.8 mg/dL). Other lab results were normal.

Initial ultrasonography (US) revealed grade 2 right-side hydronephrosis, multiple lower pole right renal stones, and impacted distal ureteral stone. Noncontrast Abdominal pelvic computed tomography (CT) scan showed a 12×10 mm impacted stone detected in the right distal ureter 1.5 cm away from the ileal conduit orifice (Figure 1). Right kidney moderate hydronephrosis with two stones in the lower pole measuring 10×13 mm and 11×9 mm and fat stranding around the right kidney indicated nephritis. A nephrostomy was placed in the right kidney a week before the operation to maintain temporary urinary drainage, and appropriate antibiotics were administered (Figure 2). Then, the expulsive medical therapy with potassium citrate and allopurinol was tried for the



FIGURE 1 Fluoroscopy photo showing the nephrostomy in the proper position.

patient without improvement. Surgical options were discussed in detail with the patient, and the advantages and disadvantages of different methods were explained.

The patient was admitted to the hospital 6 h before the procedure and received prophylactic intravenous antibiotic (Ceftriaxone 1 g) and hydration. While supine, the patient was draped in sterile covering. Under general anesthesia, the pelvicalyceal system (PCS) was then seen, utilizing a 3.5 MHz probe and a color Doppler US guide (BK medical). An 18G access needle was advanced into the appropriate calyx using a one-shot dilatation approach. After the removal of the stylet, a 0.035-inch J-tipped guidewire was placed into the calyx. The skin was incised, and the nephrostomy tract was dilated using an 8 Fr polyurethane dilator. After changing the Alken guide and dilation with a single 18 Fr Amplatz dilator, an Amplatz sheath was inserted into the PCS. After checking the proper position of the Amplatz, we removed the Alken guide complex and the Amplatz dilator, and the Amplatz sheath and working guidewire were left in place. After that, 15 Fr rigid nephroscopy was performed. The whole renal access process was monitored by the US. Lithotripsy was done with a pneumatic lithoclast, and its particles were removed by forceps. The 7.2 F semirigid ureteroscope was then pushed to the distal ureter via safety guidewire using an antegrade technique. Laser lithotripsy (200 laser fiber, holmium laser set at a rate of 15 Hz and an energy of 1 J) was used to identify and fracture the stone. Irrigation was used to transport the shattered stones to the ileal pouch, and ureteral orifice ureteroscopy was done to ensure complete stone removal (Figure 3). Warm saline irrigation was used in the procedure to prevent hypothermia and hyponatremia. At the end, the US confirmed that the stone-free goal was achieved. After the procedure, the previous nephrostomy tube was replaced with a new one at the access site. The entire procedure took roughly 76 min.

The patient's postoperative period was uneventful. The following day of the procedure, US and KUB X-ray was used to rule out any remaining stone. The patient was discharged 3 days later with oral antibiotics (levofloxacin 500 mg daily). The nephrostomy tube was removed the following week. Stone analysis revealed a calcium oxalate stone. After a 7-month follow-up, the patient was fine and had no signs of recurrence.

3 | DISCUSSION

With the rising prevalence of bladder cancer, multiple types of urinary diversions have been introduced in the literature. Patients who have undergone urinary diversion have a life-long risk of complications such as tumor recurrence and urolithiasis.⁷ The possible explanation

FIGURE 2 Abdominal computed tomography scan showing distal ureteral stone: (A); coronal view. (B); lateral view (arrow).

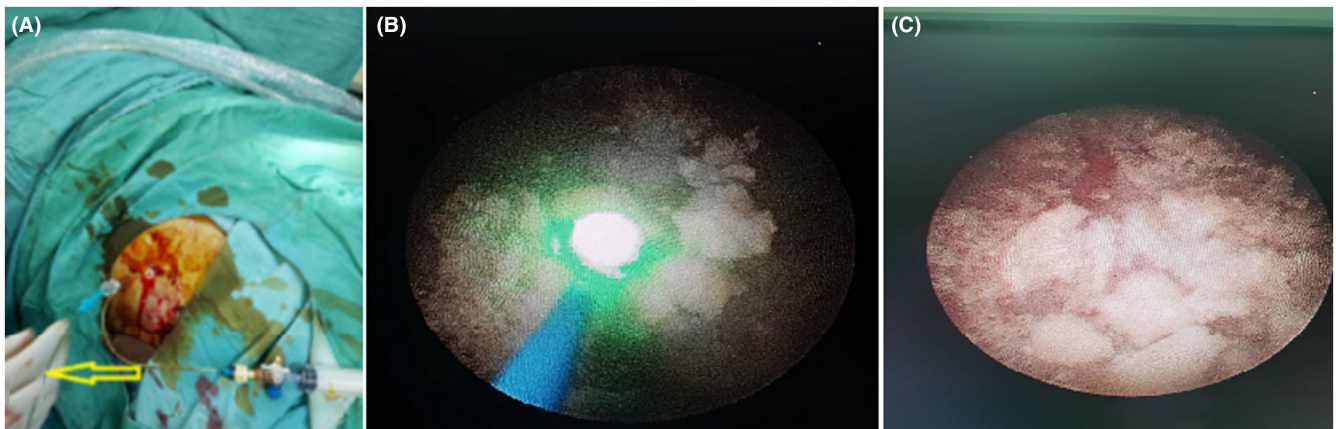
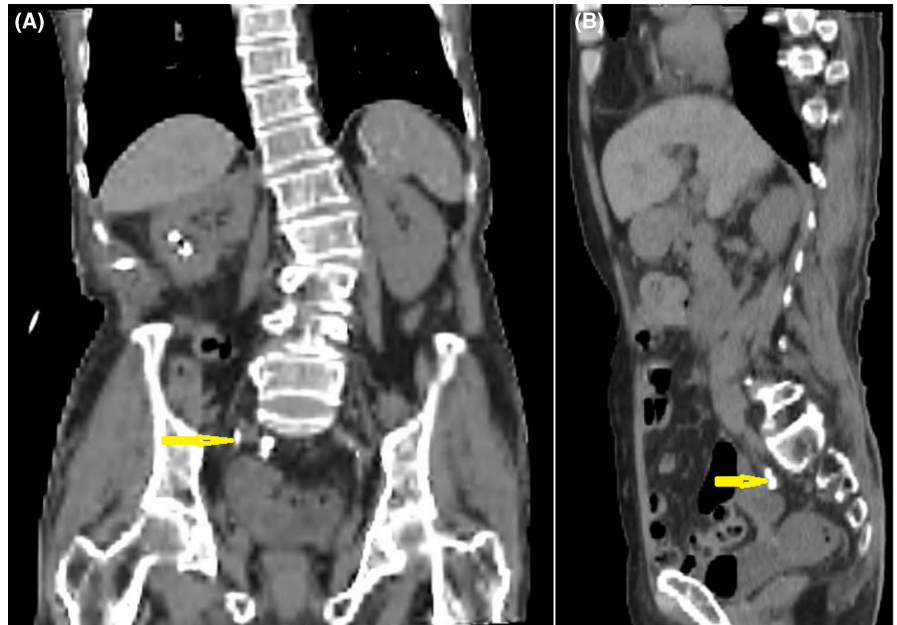


FIGURE 3 Operative photos showing: (A), Percutaneous nephrolithotomy procedure; (B), Antegrade ureteroscopy procedure; (C), After stone removal.

for the increased risk of urolithiasis might be diversion-associated metabolic disorders and postoperative anatomical changes that increase urinary stasis and mucus reflux in the ureters.⁸

Conservative management or expulsive medical therapy is the best option in asymptomatic patients with small-size stones in ileal conduit patients. On the contrary, in symptomatic cases, options suggested include SWL, URS lithotripsy, PCNL, and open surgeries.^{7,9} In the past decades, endoscopic technology and techniques have significantly improved. Despite these advances, in urinary diversion cases, recognizing the neoureteral orifice and passing through the anastomosis site may be extremely difficult. This makes distal ureteral stone management too challenging in urinary diversion cases.^{4,7} In this report, we suggested a minimally invasive and promising approach

for managing urolithiasis in an ileal conduit patient with distal ureteral as well as renal stones. This study is not the first of its kind since Chang et al. reported the same case.⁴ However, in that case, Chang used a flexible URS, while we used a semirigid URS in our study.

In the literature, in urinary diversion patients with upper tract stones, several studies supported the use of SWL. One report by El-Assmy et al. showed an 81.5% (22 of 27) overall SWL monotherapy success rate in these patients.¹⁰ At the same time, retreatment rates of SWL are considerably high.¹¹ Seth et al. reported higher complication rates of SWL in comparison to other endourologic procedures.¹²

In our case, the remnant of the absorbable suture in the ureter anastomosis may serve as a core for calculi formation.^{13,14} We successfully removed the remnant suture

and the attached stone using a rigid ureteroscope combined with holmium laser lithotripsy. A similar procedure was also reported by Wang et al.¹⁴

When neoureteric orifices cannot be located, injection of contrast via percutaneous renal access may not be possible. Thus, by using ultrasound to be aware of the adjacent structure, a small finder needle is advanced into the collecting system, allowing a nephrostogram to be taken safely.⁶ The prone position is the most common patient position in PCNL procedures. However, in cases with uroenteric stenosis, supine, and supine-modified positions can help to do the maneuvers during the stone removal.^{4,6}

In our case, we used the US for guidance and the mini PCNL equipment set (15 Fr rigid nephroscope) to reduce the parenchymal damage. This approach may contribute to reduced complications during and after the procedure.^{15,16}

We learned several key points from our experience with the case. It is ideal to choose the thinnest holmium laser fiber with sufficient energy to perform the cutting. This allows the fiber to pass through the space between the ureteroscopic operation channel and the basket extractor. We recommend that the surgeons should conduct an analytic in-vitro test before the surgery to choose the best energy setting for the cutting while preventing damage to the ureter.

Intraoperative perfusion pressure must be precisely maintained and controlled. Unrestricted pressure can increase the risk of postoperative infection and also cause dilation in the reconstructed ureteral lumen. When the lumen diameter of the reconstructed ileal ureter is large, both rigid and flexible ureteroscopes can be used for successful antegrade ureteroscopy. Finally, we recommend using a basket extractor in cases where the calculi diameters are smaller than the diameter of the ureteral lumen.

4 | CONCLUSION

With the rising number of patients undergoing radical cystectomy and ileal conduit, urologists are facing more urolithiasis cases as late complications. Treatment for these disorders is complex, and decision-making on each patient's treatment should be tailored to the patient's unique features, the location and size of their calculi, and the surgeon's experience with the procedure. This study aimed to show that antegrade URS may be a reproducible, less invasive option for treating distal ureteral stones in patients with ileal conduit urinary diversion.

AUTHOR CONTRIBUTIONS

Ali Eslahi: Conceptualization; formal analysis; funding acquisition; investigation; project administration.

Faisal Ahmed: Conceptualization; data curation; formal analysis; supervision; writing – original draft. **Mehdi Salehipour:** Conceptualization; data curation; formal analysis; funding acquisition; project administration. **Mohammad Reza Askarpour:** Data curation; investigation; project administration. **Sajad Kiani:** Software; visualization; writing – original draft. **Firoozeh Akrami:** Investigation; supervision; visualization; writing – original draft.

ACKNOWLEDGMENTS

The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran, and also Center for Development of Clinical Research of Nemazee Hospital and Dr. Nasrin Shokrpour for editorial assistance.

FUNDING INFORMATION

None.

CONFLICT OF INTEREST STATEMENT

None.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

INFORMED CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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How to cite this article: Eslahi A, Salehipour M, Ahmed F, Askarpour MR, Kiani S, Akrami F. Distal ureteral calculi in a patient with ileal conduit and urinary diversion treated via antegrade ureteroscopic lithotripsy: A case report. *Clin Case Rep*. 2023;11:e6987. doi:10.1002/ccr3.6987