Urology Case Reports 33 (2020) 101330

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: http://www.elsevier.com/locate/eucr

Endourology

Case report: Treatment of urinary calculi using percutaneous nephrolithotomy in patient with ileal conduit and history of bladder transitional cell carcinoma

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ARTICLE INFO

Keywords:
Bilateral calculus kidneys
Percutaneous nephrolithotomy
Ileal conduit
Radical cystectomy

ABSTRACT

Urinary calculi are a frequent complication of urinary diversion following radical cystectomy, including in ileal conduit systems. We report the case of a 38-year-old man with ileal conduit urinary diversion, following radical cystectomy for transitional cell cancer, who presented with symptomatic bilateral kidney stones. By reporting the medical record and management procedure for this patient, we aim to demonstrate the successful management of kidney stones via supine percutaneous nephrolithotomy, using an Alken telescopic metal dilator, under spinal anesthesia. Consistent with most literature, percutaneous nephrolithotomy was the best management procedure in this case.

Introduction

An ileal conduit as a means of urinary diversion after radical cystectomy is associated with several complications, including urinary calculi. Herein, we present the case of a 38-year-old male patient with bilateral kidney stones 5 years after undergoing radical cystectomy with an ileal conduit due to transitional cell cancer of the bladder.

Case presentation

A 38-year-old male patient with a history of bladder transitional cell cancer pT3aN0M0 underwent radical cystectomy with an ileal conduit in 2014, followed by six complete-response postoperative chemotherapy cycles. In May 2019, he presented with bilateral continuous non-radiating flank pain, greater on the left side and unaffected by activity, which he had experienced for the previous 2 months. He had a history of hematuria and passing stones prior to 2014, although no history of nausea, vomiting, or fever. The patient consumed 3–4 L of water daily. The patient had neither any history of hypertension, diabetes mellitus, cardiovascular disease, asthma, or allergy, nor any family history of urinary tract calculi or cancer.

Physical examination showed the vital signs to be within normal limits. A stoma on the right hemiabdomen was identified, which produced 2.5–3 L of clear yellowish urine daily. Neither bulge nor mass was palpated on either flank, but right costovertebral angle tenderness was identified. Laboratory work-up revealed elevated levels of leukocytes (12,090/L), blood urea (32 mg/dL), and creatinine (17 mg/dL), and a low phosphate level (1.2 mg/dL). Urinalysis revealed elevated levels of leukocytes (40–45/LPF) and erythrocytes (50–55/LPF), a pH of 8.5, and the presence of gram-negative bacteria, nitrite, and leukocyte esterase. Other laboratory results were within normal limits. Urine culture was positive for *Proteus vulgaris* and *Klebsiella pneumoniae*, which are bacteria resistant to most antibiotics. Multiple inferior calyx and pelvic stones in the left kidney, and an inferior calyx stone in the right kidney, were visible upon abdominal CT (Fig. 1).

To treat the urinary tract infection, 1 g meropenem was administered three times daily. PCNL was performed for both kidneys using spinal anesthesia, with the patient in supine position. A schematic of the complete procedure is provided in Fig. 2A. A successful 17.5 G ultrasound-guided needle puncture was performed following contrast instillation (Fig. 2B). Following wire insertion, a fascial dilator (No. 6) was inserted followed by the insertion of an ATMD (No. 30 inner sheath

Abbreviations: AMTD, Alken Telescopic Metal Dilator; BD, Balloon dilator; CT, Computed tomography; ESWL, Extracorporeal Shock Wave Lithotripsy; LPF, Low-power field; PCNL, Percutaneous Nephro Lithotomy; URS, Ureteroscopy.

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https://doi.org/10.1016/j.eucr.2020.101330
Received 9 June 2020; Received in revised form 23 June 2020; Accepted 26 June 2020
Available online 26 June 2020

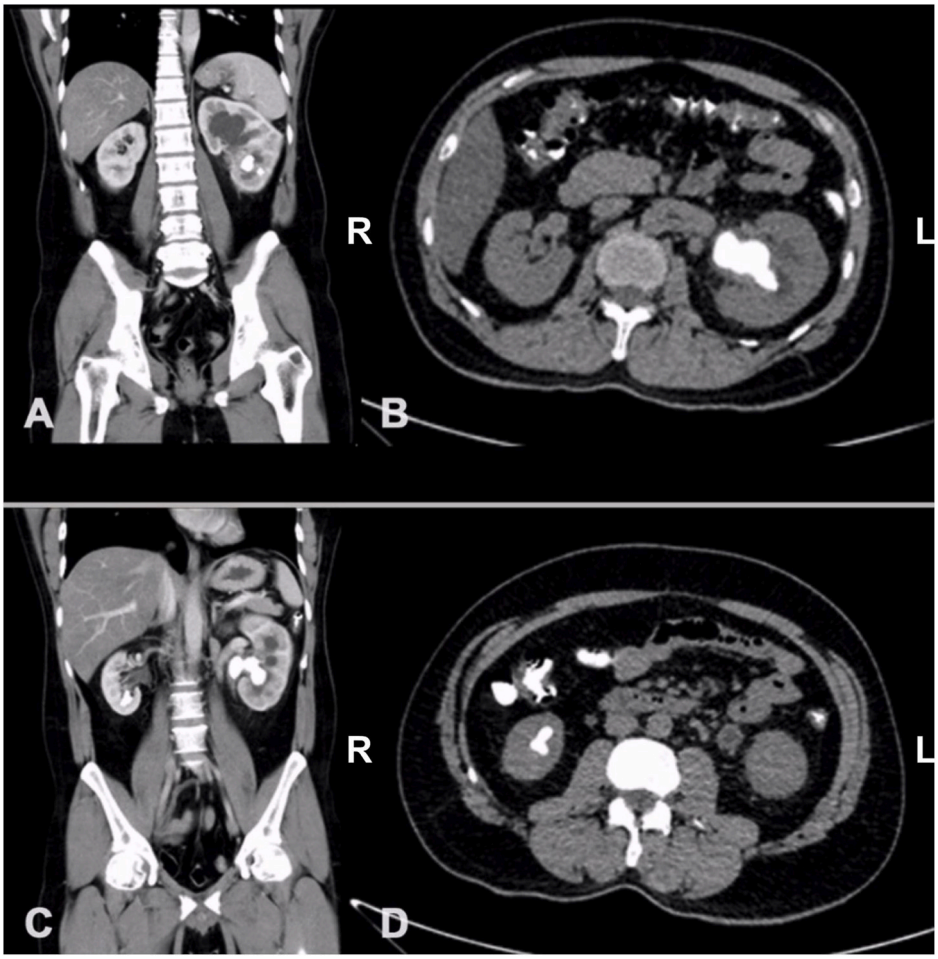

Fig. 1. Whole abdomen CT with contrast. **A:** Coronal view showing an enlarged left kidney (1210 × 703 mm) with multiple stones in the inferior calyx, the largest of which was 38 × 34 × 3 mm, and the smallest of which 10 × 8 × 4 mm (456–1026 Hounsfield unit), and grade III hydronephrosis. **B:** Transverse view, left pelvis projection, showing a stone sized 38 × 34 × 3 mm (621–1174 Hounsfield unit) and grade III hydronephrosis. **C:** Coronal view showing the right kidney with a stone in the inferior calyx sized 13 × 10 × 5 mm (360–1245 Hounsfield unit), and grade II hydronephrosis. **D:** Transverse view, inferior calyx projection of the right kidney with a stone sized 13 × 10 × 5 mm (360–1245 Hounsfield unit).

and No. 30 Amplatz® guidewire) allowing stone visualization using zero-degree nephroscopy (Fig. 2C). Stones were shattered using a combination of ultrasound - shockwave lithotripter and removed using forceps. Upon C-arm and nephroscopy evaluation, no remaining stones were found and no active bleeding was present. Stone analysis was not performed because the test was not covered by the National Social Security Program.

A ureteral catheter was inserted through a guiding zebra nitinol guidewire (3 cm angled-tip, sized 0.035 in × 150 cm) to guide ureteral catheter insertion. Then, a 22.5-French sheath and 70-degree lens were inserted through the ileal conduit. Methylene blue was instilled through the inserted ureteral catheter (Fig. 2D) providing guidance for sheath insertion with subsequent visualization of the zebra nitinol guidewire and ureteral catheter from left ureter meatus. Subsequently, the ureteral catheter and zebra nitinol guidewire were extracted from the neo-ureteric orifice. The successful antegrade insertion of a 6-French double-J stent was confirmed by C-arm and cystoscopy visualization. Following sheath removal, an 8-French nephrostomy tube was appropriately inserted into the left pelvicalyceal system and the guidewire was removed. The operative wound was sutured, and the pigtail was fixed. Post-operative plain abdominal radiography revealed complete stone removal (Fig. 3). The patient was discharge from the hospital three days after the operation.

Discussion

Radical cystectomy with urinary diversion, preferably with an ileal conduit, is a standard therapy for localized muscle-invasive bladder cancer. Urinary calculi are a common long-term complication in patients with an ileal conduit, with an incidence comparable to that of the general population.[1] Most urinary stones occur 76 months after urinary diversion and are located on the upper urinary tract,[1] consistent with location of the stone in this case.

Various treatment approaches have been developed but instrumentation and technique advancements mean that minimal and non-invasive approaches have lower morbidity. Ramachandra reported a success rate of 59–75% for URS on urinary diversions.[2] Factors that improve outcomes include the use of a flexible URS and stiff wire, an access sheath, radiopaque dye, fluoroscopy to delineate anatomy, and a low threshold for a combined antegrade and retrograde approach. Otherwise, the presence of anastomotic strictures, a tortuous tract, unclear anatomy, or difficulties identifying the ureteric orifice may complicate the treatment approach.

Different treatments have a similar complication rate (PCNL 29%, ESWL 30%, and URS 33%), although the stone-free rate is significantly higher in PCNL (83.3%) than in ESWL (33.3%) or ureteroscopy (30%).[3] Our approach in this case was therefore justified. In cases with unidentified neo-ureteric orifices, percutaneous renal access and instillation of contrast may not be possible. Alternatively, ultrasound can guide a small finder needle as it advances into the collecting system, allowing a nephrostogram to be taken. Ultrasound could also guide a percutaneous finder needle to determine the adjacent structure and prevent bowel puncture. Patients are commonly placed in a prone position during PCNL procedures. However, in uroenteric stenosis, supine and supine-modified positions (e.g., Galdakao-modified supine Valdivia) may facilitate maneuvers during kidney stone removal in patients with an ileal conduit.[4] The novelty of our case was that we successfully performed ultrasound-guided PCNL using an ATMD which is more cost

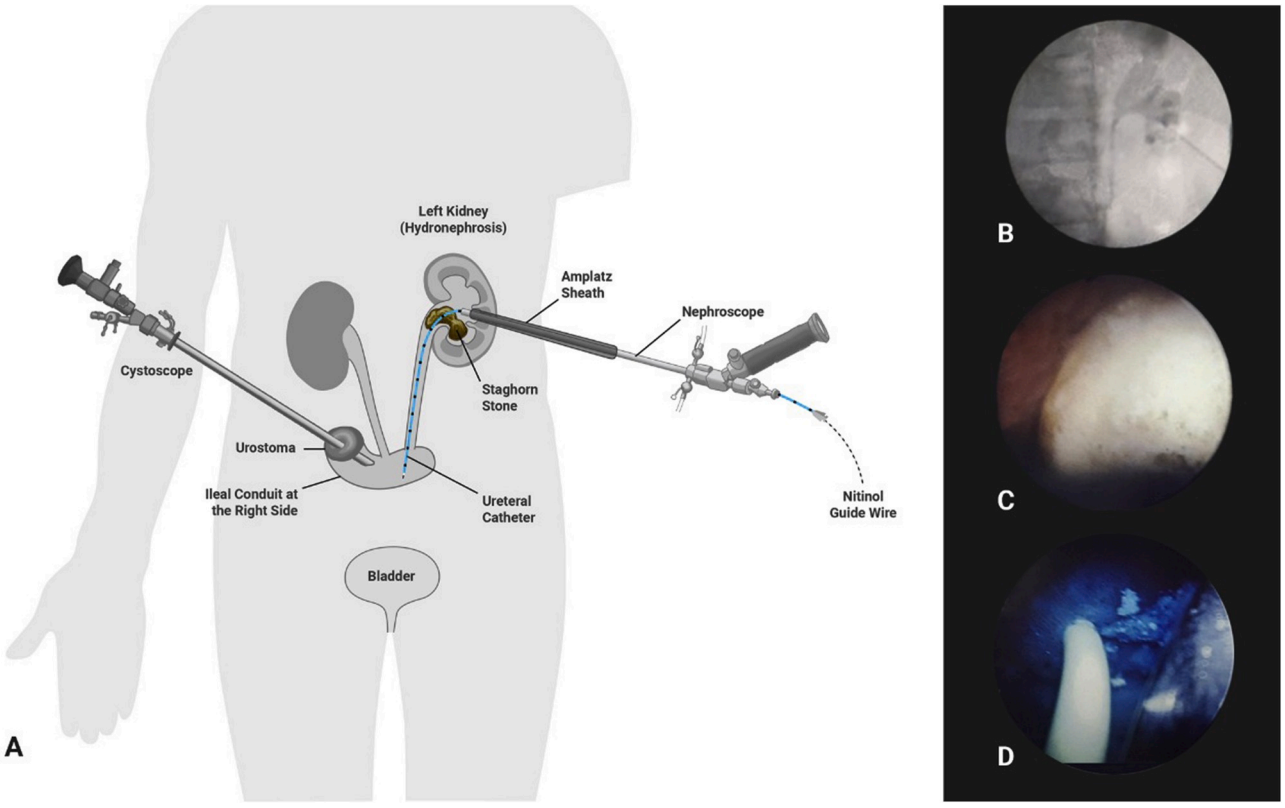

Fig. 2. **A:** Schematic view of the PCNL procedure and ileal conduit visualization using cystoscope (22.5 French sheath and 70-degree lens), **B:** A successful 17.5 G ultrasound-guided needle puncture followed by contrast instillation to pelvicalyceal system, **C:** Nephroscopic view with visualized stone in the pyelum, **D:** Methylene blue instillation through the inserted ureteral catheter. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Fig. 3. Radiographic Kidney-Ureter-Bladder (KUB) Imaging showing no stone remaining on the left kidney, Double J stent in situ, and properly placed nephrostomy tube.

effective, instead of the commonly used BD, on bilateral kidney stones while the patient was positioned in a supine manner under spinal anesthesia. **In our country, ATMD costs around USD 2800/unit, while BD costs USD 700/set. ATMD is more expensive, but reusable for more than 500 times. Meanwhile, BD is non-reusable.**

Conclusion

Urinary calculi are a common complication of urinary diversion following radical cystectomy. Urinary stones in patients with an ileal conduit can be managed using similar procedures to those for patients without an ileal conduit. Percutaneous nephrolithotomy was suitable for the management of this case.

Ethical approval

This study has been approved by the Ethics Committee of Cipto Mangunkusumo Hospital–Faculty of Medicine, University of Indonesia (No. KET-1373/UN2.F1/ETIK/PPM.00.02/2019) under protocol number 19-12-1446. Patient consent regarding the writing and publication of this article were properly obtained according to ethical guidelines.

Funding sources

This study was supported and financed by International Publication Research Grant Universitas Indonesia. Grant number: NKB-1902/UN2.RST/HKP.05.00/2020.

Declaration of competing interest

None to declare.

Acknowledgement

The authors are grateful to Indra Wicaksono MD., for creating illustrations and images.

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