Inadvertent foley catheterization of the ureter

Parth K. Modi, MD,[1] Amirali Hassanzadeh Salmasi, MD,[1]
Mark A. Perlmutter, MD[2]

[1]Division of Urology, Rutgers Robert Wood Johnson Medical School, New Brunswick, New Jersey, USA
[2]Division of Urology, Jersey Shore University Medical Center, Neptune, New Jersey, USA

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We present a case of an 83-year-old woman with multiple sclerosis and chronic indwelling urethral catheter who was found to have a ureteral injury after inadvertent placement of a foley catheter into the proximal right ureter. Cystoscopy and retrograde ureteral stenting was attempted, but unsuccessful. The patient ultimately underwent successful antegrade ureteral stenting and nephrostomy placement. We review the limited literature on the topic of aberrant foley catheter placement into the ureter.

Key Words: iatrogenic ureteral injury, foley catheter

Introduction

Urethral catheterization is a common intervention for patients with a multitude of indications. While considered generally safe, placement of a foley catheter has known risks: urethral trauma and catheter retention are most common. A rare complication of urethral catheterization is inadvertent cannulation of the ureter and ureteral trauma secondary to inflation of the foley catheter balloon. We describe a case of inadvertent ureteral catheterization and ureteral disruption and review the literature related to this rare mechanism of ureteral injury.

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Address correspondence to Dr. Parth K. Modi, Division of Urology, 1 Robert Wood Johnson Place, MEB 584A, New Brunswick, NJ 08901 USA

Case report

The patient is an 83-year-old woman who presented from her long term care facility with weakness and shortness of breath. Her past medical history was significant for advanced multiple sclerosis with poor functional status, diabetes mellitus, chronic stage IV sacral decubitus ulcer, and urinary incontinence. She presented to the emergency department with a foley catheter that had been placed 2 months earlier at an outpatient wound clinic visit to encourage healing of her sacral ulcer. She continued to have leakage of urine despite placement of the catheter secondary to a patulous urethra. Recent outpatient urine cultures had demonstrated growth of methicillin-resistant staphylococcus aureus (MRSA) and proteus mirabilis, and she had been started on a course of trimethoprim-sulfamethoxazole.

On evaluation in the emergency department, she was found to have gross hematuria with red colored

urine and a "large" (> 182 RBC/HPF) amount of blood in the urine. Her initial lab results revealed a mild leukocytosis (WBC 12,100/µL, normal 4500-11000/µL), anemia (Hgb 7.2 g/dL, normal 12-16 g/dL), BUN 19 mg/dL (normal 5-25 mg/dL) and creatinine 0.32 mg/dL (normal 0.44-1 mg/dL). She denied any flank or abdominal pain, fevers, chills, nausea or vomiting. Her outpatient medications were resumed and she was admitted for evaluation of her symptomatic anemia and gross hematuria.

On hospital day 3, the patient's gross hematuria had resolved, creatinine had remained at baseline, and urine culture had been negative. She was noted to have persistent leakage of urine around the foley catheter. The catheter was irrigated easily and thought to be in position. Leakage of urine was attributed to a patulous urethra and poor coaptation around the catheter.

The following day the patient's creatinine was noted to have increased to 0.92 mg/dL, more than double the patient's baseline. Urine leakage continued and the foley catheter was exchanged to a 20F foley catheter with a 30 mL balloon. After placement of the new catheter, significant urine leakage continued and the catheter did not irrigate normally, with increased resistance to aspiration. A CT cystogram, Figure 1, was obtained to evaluate for the possibility of a urinary fistula. The CT cystogram demonstrated the foley catheter extending through the urinary bladder into the region of the right ureter. The balloon of the catheter was seen in the region of the proximal-mid right ureter with a small amount of free air. Contrast was noted in the posterior pararenal space and new mild-moderate right hydronephrosis was identified, consistent with a diagnosis of malpositioned foley catheter and right ureteral perforation. The patient did not complain of flank or abdominal pain.

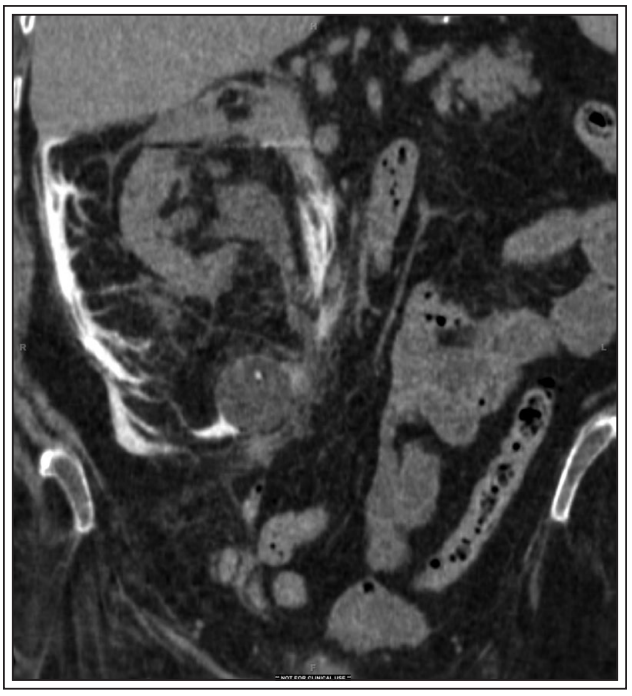

Figure 1. Coronal CT image demonstrates spherical foley catheter balloon in the region of the proximal right ureter, hydronephrosis, and contrast in the right pararenal space.

The foley catheter was left in place and the findings were discussed at length with the patient, who wished to avoid any surgery or incisions. She agreed to attempted retrograde ureteral stent placement and was taken to the operating room. Under sedation, cystoscopy was performed using an 8F semi-rigid ureteroscope, leaving the foley catheter in position. Cystoscopy revealed a contracted, empty bladder with a patulous urethra. Immediately upon traversing the bladder neck, the enlarged right ureteral orifice was identified, with the foley catheter passing into the right ureter. The right ureteral orifice was cannulated with a guidewire with hydrophilic tip, and the wire was passed retrograde under fluoroscopic guidance. At the level of the proximal ureter, the wire appeared to exit the ureter and curl in the retroperitoneum. The catheter balloon was emptied of 30 mL of water and further attempts were made, unsuccessfully. The catheter was gently removed, the ureteroscope was advanced into the right ureter and a retrograde pyelogram was obtained. This revealed a large area of extravasation at the level of the proximal ureter with a small amount of retrograde filling of the renal pelvis, Figure 2. With the ureteroscope in the distal right ureter, multiple attempts were made to traverse the disruption with a guidewire, however the proximal right ureter could not be accessed. The ureteroscope was withdrawn and a 5F open ended ureteral catheter was placed in the distal right ureter. A new foley catheter was placed, and the patient was transferred to the interventional radiology suite.

Using ultrasound guidance, the right kidney was accessed. Antegrade pyelogram, Figure 3, demonstrated a hydronephrotic kidney and lack of visualization beyond the proximal ureter. A 4F catheter was then used to negotiate a wire into the proximal right ureter. Multiple attempts were needed to traverse the ureteral injury. Eventually, a wire was passed into the bladder. The previously placed 5F open ended catheter was removed. Over the wire, a 22 cm 8F double-J stent was deployed in the ureter. A separate 8F nephrostomy tube was placed. The patient tolerated the procedure well and was sent to the floor postoperatively.

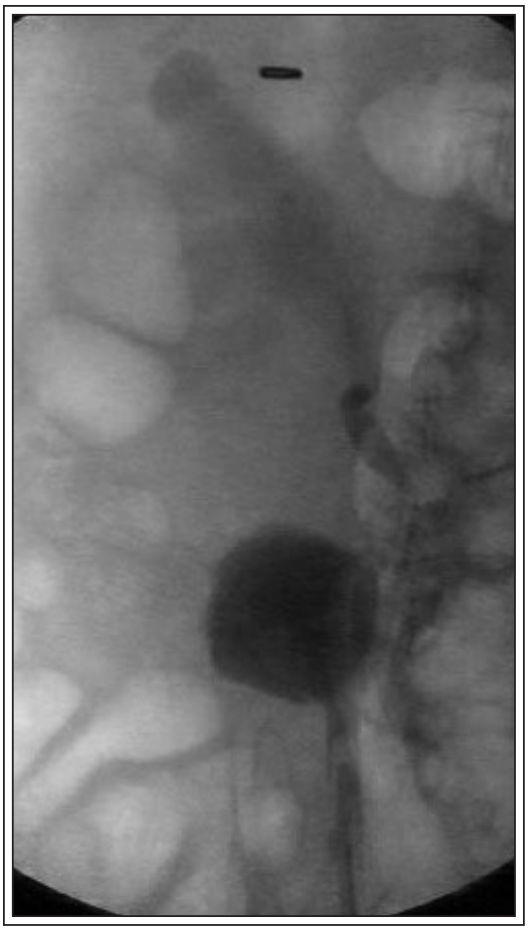

Figure 2. Retrograde pyelogram demonstrates extravasation of contrast at area of presumed ureteral injury.

By 2 days post-procedure, the patient's creatinine returned to near-baseline at 0.42 mg/dL. The patient was discharged with stent, which will be left in place for 2 months. She will undergo retrograde pyelogram and stent removal. Surveillance will include basic chemistry tests and renal ultrasound. Her foley catheter was not replaced. She will consider options for further management of her incontinence including observation, suprapubic catheterization and urethral bulking agents.

Discussion

Ureteral injury, whether iatrogenic or traumatic, is rare. Iatrogenic ureteral injury usually occurs during urologic, gynecologic or other pelvic surgery.[1] Here, we have presented a rare cause of iatrogenic ureteral injury. Occlusion of the ureteral orifice by urethral[2] and suprapubic[3] catheter tip has been reported. Aberrant inflation of a foley balloon in the ureter, however, has only been reported in seven other case reports in the literature.[4-10] Here, we will briefly review the existing literature on inadvertent foley balloon inflation in the ureter.

Of the eight cases reviewed, seven patients were female. Patients presented with poor urine output into the catheter and/or peri-catheter leakage with difficulty irrigating the catheter in four of the eight cases.[4-6] Two cases had a presenting complaint of flank or groin pain[7,8] and two cases were identified intraoperatively.[9,10] In six of the eight cases the patient had a chronic foley catheter and a poor compliance bladder.[4,6-8,10] Notably, both affected patients who did not have a poor compliance bladder and chronic catheterization did have inadvertent catheterization of a duplicated left ureter.[5,9] Of the eight patients, two had primary operative repair of the ureter,[9,10] three patients underwent ureteral stenting,[4,5] one patient had a nephrostomy only,[7] and two patients were treated with removal of the malpositioned catheter only.[6,8]

These data provide some information, though limited, as to which patients may be at risk for ureteral injury from inadvertent catheterization. The vast majority of the patients reported were women. This is intuitive, as the length of the male urethra may protect from having excess catheter length enter the ureter. The majority (75%) had a history of neurogenic bladder with chronic

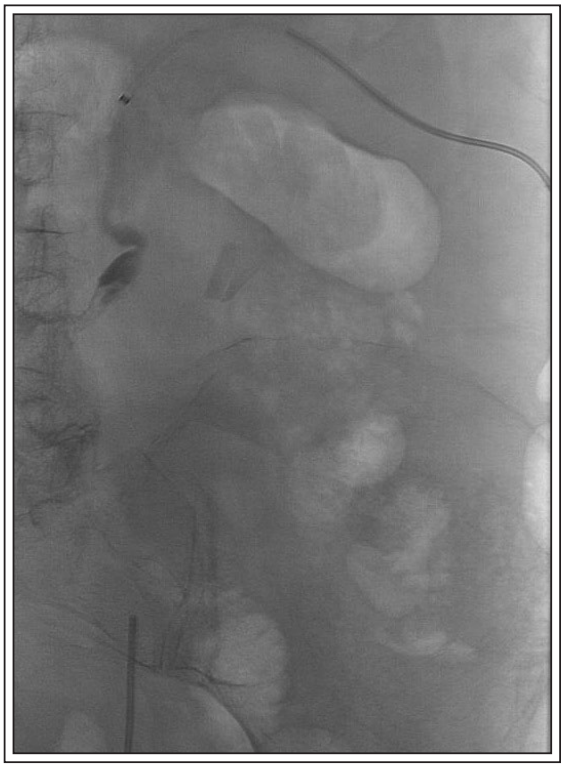

Figure 3. Antegrade nephrostogram demonstrates lack of opacification distal to the proximal ureter. Previously placed 5F open-ended catheter can be seen in distal ureter.

indwelling foley catheterization. This is significant as the presence of a widely patent or patulous ureter and urethra, though not described in every case, may predispose to inadvertent catheterization. The two patients who did not have a history of neurogenic bladder both had a duplicated left ureter which was the site of misplaced catheterization. It is not clear whether this is of any significance as one patient had a single ureteral orifice[5] and the other report did not specify if the injury was to the ureter with an orthotopic orifice or an aberrant one.[9]

Consistent with previously reported cases, our patient was female, had a history of neurogenic bladder and had a patulous urethra and ureteral orifice. While she had only had an indwelling urethral catheter for 2 months prior to this event, her anatomy would suggest that she may have had a chronic urethral catheter in the past leading to the development of a contracted bladder and patulous urethra, as well as contributing to her urine leakage. While she had some hematuria at the time of her presentation to the emergency department, her catheter was functioning properly until it was exchanged. We believe the catheterization of the ureter and ureteral injury occurred at the time of the catheter exchange. Prevention of this complication in the future will be accomplished by removing the catheter. Catheterization had failed for controlling her incontinence secondary to a patulous bladder neck and therefore will not be resumed.

Strategies to avoid inadvertent catheterization of the ureter have been suggested in several of these case reports. Confirmation of catheter position by urine aspiration[7,10] or pulling the catheter down to the bladder neck[9] have been suggested. While it is difficult to formulate any significant recommendations from this case series, awareness of this rare complication and adherence to the basic principles of urethral catheterization are, perhaps, our best tools. □

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