Unintentional ipsilateral ureteral cannulation causing bilateral obstructive uropathy and azotemia in multiple sclerosis

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ABSTRACT

Lower ureteral obstruction secondary to a misplaced or migratory suprapubic or transurethral Foley catheter is a rare event. We recently encountered recurrent lower right ureteral transurethral Foley catheter misplacement causing abdominal pain, worsening azotemia and sequential bilateral obstructive uropathy. Notably, on both occasions, in May 2016 and again in October 2016, initial interpretations of the CT scan of the abdomen missed the diagnosis. We submit that in patients with shrunken neurogenic bladders together with dilated lower ureters (hydronephrosis), such as in patients with multiple sclerosis and spinal cord injury, there is a need for a more cautious approach in the placement of both transurethral and suprapubic Foley catheters.

Implication for health policy/practice/research/medical education:
In patients with shrunken neurogenic bladders together with dilated lower ureters (hydronephrosis), such as in patients with multiple sclerosis and spinal cord injury, there is a need for a more cautious approach in the placement of both transurethral and suprapubic Foley catheters.


Introduction
Lower ureteral obstruction with misplaced or migratory suprapubic or transurethral Foley catheters is a rare event (1-3). By 2014, Anderson and Greenlund had acknowledged that only eight such cases of unintentional ureteral cannulation had been described in the literature (2). We recently encountered a patient who had experienced recurrent lower right ureteral transurethral Foley catheter misplacement causing abdominal pain, worsening azotemia due to sequential bilateral obstructive uropathy. The implications of the safety of “blind” transurethral Foley catheter placements in such clinical scenarios in patients with accompanying shrunken urinary bladder and hydronephrosis as in patients with long standing progressive multiple sclerosis and spinal cord injury is reviewed.

Case Presentation
For several years now, we have followed a 41-year-old Caucasian female with complications of secondary progressive multiple sclerosis diagnosed since 1995. She is legally blind, and has a neurogenic bladder with overflow incontinence requiring chronic indwelling transurethral Foley catheter drainage that is changed once every month. She has experienced recurrent pyelonephritis, and in the last few years has stable chronic kidney disease (CKD) stage III/IV with baseline serum creatinine of 1.7 mg/dL – 2.3 mg/dL, estimated glomerular filtration rate (eGFR)
of 27-35 mL/min/1.73 m² BSA. In October 2016, she was 
evaluated for new onset acute excruciating right flank/
quadrant pain (10/10). Her chronic indwelling urinary 
Foley catheter had been replaced with a new one just 
3 days earlier. She presented on admission with right 
flank/lower quadrant pain, decreased appetite, chills, 
and dizziness. Urinalysis suggested pyelonephritis and 
intravenous levofloxacin was started. Acute kidney injury 
on CKD was evident with rising serum creatinine (Figure 
1). Initial CT scan of the abdomen was interpreted as 
otherwise stable bilateral hydroureters with worse right-
sided hydroureter (Figure 2). The interpreting radiologist 
read the scan as showing a distal right ureteral stent. 
Despite intravenous fluids and intravenous antibiotics, 
the abdominal pain persisted and urology was therefore 
consulted. The urologist, who was very familiar with the 
patient, again reviewed the CT scan images and quickly 
recognized that the Foley catheter inflated balloon was 
indeed in the lower right ureter (Figure 2) – this had been 
misdiagnosed by the radiologist as a lower ureteral stent. 
Previous retrograde pyelogram had demonstrated gross 
 bilateral hydroureters and a shrunken urinary bladder 
(Figure 3).

Initial attempts by the urologist to remove the Foley catheter 
failed and the next day at cystoscopy and subsequent 
ureteroscopy, the Foley catheter balloon was reached, 
penetrated and deflated using a sharp guided instrument. 
The balloon was inspected once the Foley catheter was 
removed and there was no evidence of a missing piece to 
the balloon. Urine cultures from three days prior to the 
admission grew *Escherichia coli* >100,000 col/mL and 
the levofloxacin course was completed. The right flank/
lower quadrant pain immediately resolved following the 
successful removal of the misplaced transurethral Foley 
catheter. Her kidney function slowly improved and the 
patient was soon discharged.

**Discussion**

Unintentional ureteral cannulation with transurethral or 
suprapubic Foley catheterization is very rare (1-3). As at 
2014, only eight such cases had been cited in the literature 
(3). Furthermore, ureteral obstruction secondary to 
suprapubic catheter migration is an exceedingly rare 
occurrence. Adeyemo et al reported the first known 
description of recurrent ureteral obstruction secondary to 
suprapubic catheter migration in 2013 (2). To our 
knowledge, our patient is the first report of recurrent 
ureteral obstruction secondary to transurethral Foley 
catheter unintentional cannulation of the distal ureter 
(Figure 2). Moreover, the transurethral Foley catheter 
inflated balloon in the distal right ureter had produced 
direct ipsilateral right ureteral obstruction while 
simultaneously producing indirect contralateral left 
ureteral obstruction because of the small urinary bladder 
capacity of our patient (Figure 3). As a result, acute 
albeit reversible exacerbation of renal failure was evident 
following relief of the obstructive uropathy (Figure 1). 
Due to a small urinary bladder capacity and dilated ureters 
(Figures 2 and 3), our patient had in the last ten months 
twice experienced the unintentional misplacement of an 
dwelling transurethral Foley catheter with the inflated 
balloon resting in the distal right ureter. Such presentation 
could easily be missed and misdiagnosed as catheter-
related urinary tract infection (UTI). Arguably, such 
scenario, if untreated over a long period of time could
Unintentional ureteral cannulation by Foley catheter

potentially lead to irreversible renal failure and the need for renal replacement therapy.

**Conclusion**

Recently, some research has gone into assessing and confirming the appropriate bladder management strategy for the spinal cord injury patient with neurogenic bladder (4). By common consensus, suprapubic catheterization is an effective and safe alternative form of bladder management in select patients with spinal cord injury (1,5). Besides, intermittent self-catheterization remains a common therapeutic option among tetraplegics with spinal cord injury (6). Anderson and Greenlund posit that among quadriplegics from spinal cord injury, the spastic, insensate bladder and altered pelvic sensorium found in upper motor neuron syndromes were major risk factors for unintentional ureteral cannulation with a urinary catheter (3). We submit that in patients with shrunken small-sized neurogenic bladders together with dilated lower ureters (hydroureters), such as in patients with progressive multiple sclerosis and spinal cord injury, there is a need for a more cautious approach in the placement of both transurethral and suprapubic Foley catheters. We posit that the safe placement of these catheters in such circumstances may warrant the use of ultrasound imaging guidance.

**Authors’ contribution**

MACO; Conception, design, acquisition of data, data analysis, interpretation of data, literature review, drafting the article and final approval of manuscript. NA; Critical revising for important intellectual content, design, final approval of manuscript. WM; Acquisition of data and final approval of manuscript. MR; Acquisition of data and final approval of manuscript.

**Conflicts of interest**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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