

*Case Report*

## A Rare Complication: Misdirection of an Indwelling Urethral Catheter into the Ureter

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We report 3 patients with the rare complication of an indwelling urethral catheter misdirected into the ureter. This is the largest series to date. Patients were referred to us for a variety of reasons following exchange of their chronic indwelling urinary catheters. CT in all cases demonstrated the urinary catheters residing in the left ureter. The ages of the patients were 37, 67 and 81 years old. All patients suffered from neurogenic bladder. Two patients were female, one was male, and 2 of the 3 had a sensory disorder inhibiting their pain response. The catheters were replaced with open-end Foley catheters. Extensive follow-up CT scans were obtained in one case, demonstrating improvement of hydronephrosis and no evidence of ureteral stenosis. Cystoscopy in this patient demonstrated normally positioned and functioning ureteral orifices. Although the placement of an indwelling urethral catheter is a comparatively safe procedure, one must keep in mind that this complication can occur, particularly in female patients with neurogenic bladder. CT without contrast is a noninvasive, definitive diagnostic tool.

**Key words:** complication, indwelling urethral catheter, imaging, computed tomography, ureter

Indwelling urethral catheter insertion is a comparatively safe procedure; it is almost routine work in many hospitals. Minor complications such as infection, bleeding, urethral injury or catheter malfunction occur with some frequency [1], but serious complications rarely occur. However, bladder perforation and/or peritonitis [2] and rectovesical fistula [3] have been reported. To avoid such injury, we need to stick to the basic principles; if one cannot obtain return of urine, it is necessary to aspirate urine or irrigate the indwelling urethral catheter to confirm the location of the balloon before inflation.

We report 3 instances of the rare complication of an indwelling urinary catheter unintentionally placed into the ureter, which could have been avoided if this basic principle had been followed. We also describe how to manage this complication.

### Case Report

**Case 1.** An 81-year-old man with severe atrophic bladder had been undergoing chronic indwelling urethral catheter exchange for 7 years. He was referred to us 3 days after a routine catheter exchange for pyelonephritis, with a temperature of 39°C.

CT revealed that the inflated balloon of his catheter was situated in the left ureter, causing hydronephrosis. The catheter was removed and replaced

with an open-end Foley catheter. He was given IV antibiotics for 6 days and discharged after 10 days.

**Case 2.** A 67-year-old woman with neurogenic bladder had a 4-month history of chronic indwelling urinary catheter exchange. She was referred to us for pyelonephritis 18 days after a routine catheter exchange, with a temperature of 39.5°C.

CT revealed that the catheter was in the left ureter, with the inflated balloon causing hydronephrosis. The catheter was removed and replaced with an open-end Foley catheter.

IV antibiotics were administered for 7 days and the patient was discharged 13 days after admission.

**Case 3.** A 37-year-old paraplegic woman with neurogenic bladder was referred to us 2 days following her catheter exchange. She had had a chronic indwelling urinary catheter in place in the bladder for 10 years. Her history was also significant for a laminoplasty 10 years prior, performed for thoracic ossification of the posterior longitudinal ligament.

Her complaint was leakage of urine around the 16-Fr indwelling urethral catheter. No hematuria or pyuria was noted in the urinalysis. Catheter obstruction was suspected and the catheter was irrigated. She then complained of left lower quadrant abdominal pain. Abdominal ultrasonography (US) failed to identify a balloon in the urinary bladder, and CT revealed

that the catheter was residing in the left ureter, causing hydronephrosis (Fig. 1). Her catheter was removed and replaced under US guidance and follow-up CT was obtained three days later (Fig. 2). The CT demonstrated no ureteral injury or urinoma. Three months later, a second follow-up CT demonstrated no evidence of ureteral injury or hydronephrosis (Fig. 3).

Cystoscopy was also performed on this patient, demonstrating chronic inflammation of the bladder wall secondary to catheterization, but no dilation of the ureteral orifices.

## Discussion

Misdirection of an indwelling urethral catheter into the ureter is a rare complication. Only fourteen cases have been reported to date (Table 1) [4-14]; all were single case reports. Ours is the largest series to date, comprising 3 cases, for a total of 14 reported patients. Table 1 suggests that female gender (11/14), neurogenic bladder (8/14), and sensory disorder (6/14) are major risk factors. The female urethra is shorter than the male, and the direction at which the catheter enters the bladder may make it vulnerable to misdirection. Neurogenic bladder may be associated with catheter misdirection only to the extent that the condition necessitates a chronic indwelling urinary

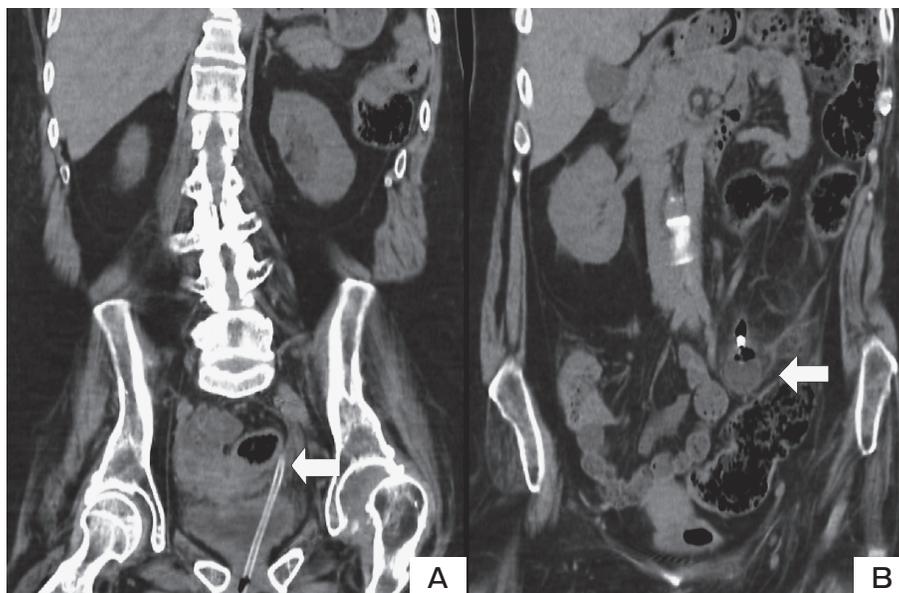


Fig. 1 A, Indwelling urethral catheter is located in the left ureter (arrow), causing left hydronephrosis; B, Inflated balloon in the left ureter (arrow) (Case 3).

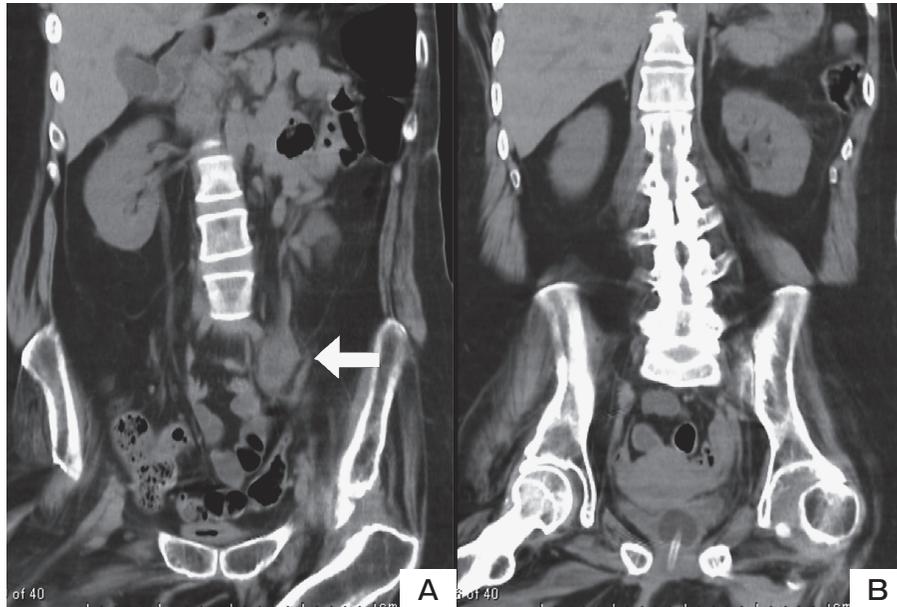


Fig. 2 A, Left ureteral dilation (arrow); B, Improved left hydronephrosis, no evidence of urinoma (Case 3).



Fig. 3 Three-month follow-up CT. The left hydronephrosis and dilation of the left ureter have improved (Case 3).

catheter. The presence of a sensory disorder delays presentation because of the patient's lack of pain, or ability to communicate discomfort. Dilation of the ureteral orifice may be another risk factor. Only 1 case report mentioned a dilated ureteral orifice [5], though cystoscopy was not performed in all cases.

An inflated catheter balloon in the ureter causes hydronephrosis and may lead to ureteral injury. Singh

[4] reports the intraoperative findings of urinary catheter misplacement and a 5-cm ureteral laceration during ileal conduit conversion performed for chronic urinary tract infection and repeated catheter displacement. CT is a noninvasive, useful tool for definitive diagnosis. Surprisingly, CT scans were not obtained in many cases until recently [4, 5, 9, 10]. Cystograms were the only imaging studies performed,

**Table 1** Patient characteristics from literature review and our case series

Author	Reported Year	Age	Sex	R/L	Cormobidity	Sensory disorder
Singh NP	1996	26	F	R	Neurogenic bladder	+
Kato H	1997	74	F	L	Bilateral VUR, Rheumatoid arthritis	-
Ogan K	2001	47	F	R	Atherosclerosis, Chronic renal insufficiency	-
Muneer A.	2002	77	M	R	Neurogenic bladder, chronic renal failure, bilateral hydronephrosis	-
George J.	2005	14	M	R	Neurogenic bladder, T6 paraplegia	+
Hara N	2005	51	F	L	Mild bladder prolapse, Stress urinary incontinence, Incomplete duplication of the left ureter	-
Kim M.	2008	38	F	R	Neurogenic bladder, 10th thoracic spinal cord injury, gynecological cancer	+
Papacharalabous E.	2011	68	F	L		-
Hale N.	2012	80	F	L	unknown	unknown
Baker KS	2013	59	F	R	Neurogenic bladder, Multiple sclerosis	+
Viswanatha RK.	2013	28	F	R	(Pregnant)	-
Ishikawa T.	2013	81	M	L	Neurogenic bladder	-
		67	F	L	Neurogenic bladder, SLE, Cerebral infarction,	+
		37	F	L	Neurogenic bladder, Ossification of posterior longitudinal ligament	+
Mean		53.4	F (11/14)	L (7/14)	Neurogenic bladder (8/14)	+ (6/14)

done in 3 of the cases [5, 9, 10]. A cystogram is a useful tool but it cannot be used in patients with allergies to contrast media, given the possibility of ureteral injury and subsequent extravasation of dye. CT was obtained in this series. Extensive CT follow-up was performed in the third case, demonstrating the natural course of this complication and providing valuable imaging studies.

What can be done to avoid ureteral injury secondary to misdirection of indwelling urethral catheters? If it occurs, what should be done? The following are suggestions from the authors:

1. Keep in mind that an indwelling urinary catheter may be inadvertently placed into the ureter.
2. Female patients are at higher risk for this complication.
3. Carefully watch the patient during balloon inflation. The balloon may cause pain if not properly placed, although this may not be evident in patients with sensory disorders.
4. Urine leakage around an indwelling catheter can be a sign of misdirection. The first step is to irrigate the catheter. If this fails to resolve the problem, use bedside US to find the balloon in the urinary bladder.
5. CT without contrast is a noninvasive study, useful

for definitive diagnosis, especially in those who are allergic to contrast media. Removal and replacement of a catheter is performed safely under US guidance. An open-end Foley catheter may be preferable, as the tip of the catheter is blunter than its closed-end counterpart.

6. Follow-up CT may be required when ureteral injury is suspected.

In conclusion, we report three instances of the rare complication of misdirection of an indwelling urethral catheter into the ureter. Although urinary catheter insertion is a comparatively safe procedure, one should keep in mind that this complication can occur, particularly in female patients with neurogenic bladder. Non-contrast CT is useful as a noninvasive, definitive diagnostic tool.

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