



A rare complication of urinary catheter insertion: Proximal ureteric rupture and sepsis

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ABSTRACT

Catheter-related injuries to the distal urinary tract are well described however injury to the ureters are very rare.

A 76-year-old Caucasian female presented with proximal ureteric rupture and sepsis caused by cannulation of the ureter with a catheter and inflation of the balloon within the lumen. The patient was managed with intravenous antibiotics, nephrostomy and ureteric stenting.

Patients with neurogenic bladder may have vesico-ureteric reflux with patulous ureteric orifice. Long-term catheters may result in a contacted bladder, thereby altering the anatomical relationship of the bladder neck and ureteric orifice. Both of which may increase the risk of this complication.

1. Introduction

It is estimated that 100 million catheters are sold worldwide each year.¹ Complications of catheter insertion are well described and include: catheter associated urinary tract infection, urethral trauma including creation of a false passage at the level of the prostate gland or bladder neck and urethral stricture.²

Whilst injuries to the urethra are well described, injury to the ureters is an extremely rare event. Literature review identified 14 published case reports where ureteric injury had been encountered secondary to catheter insertion. All of the reported cases involved the distal ureter.

More common mechanisms for injury to the ureter are encountered following ureteroscopy or during gynaecological or colorectal procedures and result from inadvertent ligation, kinking, crushing, thermal injury or devascularisation of the ureter.³

Computed tomography urography (CTU) is the examination of choice when assessing for ureteric injuries.⁴ Extravasation of contrast medium in the delayed phase is the hallmark sign of ureteric rupture.

If detected at the time of injury, immediate surgical repair is the gold standard of treatment. In cases of delayed-diagnosis (as was the case reported here), endo-urological management by internal stenting is the first step in most cases but has a variable success rate of 14–19% according to case series.⁵

2. Case presentation

A 76-year-old female presented to the emergency department with 24hr history of right-sided abdominal pain, fever and persistent vomiting. She attributed the onset of her symptoms to a routine change of her

long-term Foley catheter by a district nurse 24 hours before.

Her past medical history included rheumatoid arthritis, ischaemic heart disease and overactive bladder (OAB) syndrome. Urodynamics confirmed the presence of detrusor overactivity which was refractory to medical management, and she underwent bladder botox treatment. This however had rendered her urinary catheter dependent.

She was a care home resident and had a limited exercise tolerance. She would not regularly leave the house and was reliant on carers to assist with activities of daily living.

On examination there was tenderness along the right side of her abdomen and right renal angle with features of peritonism.

On arrival to the emergency department, She displayed the clinical features of sepsis, (pyrexia 39.1, BP 88/67, HR 102). Biochemical inflammatory markers were elevated; WCC 19.2 CRP 323 and there was an acute kidney injury eGFR 15 (baseline 48). Urine dip was positive for leucocytes and blood, nitrites negative.

The patient was resuscitated as per national sepsis guidelines. An urgent CT abdomen/pelvis was arranged to assess for an intra-abdominal source of sepsis. As seen in Fig. 1, the scan revealed that the indwelling Foley catheter had cannulated the right ureter with its tip reaching the proximal one third. There are radiological features to suggest perforation of the ureter and subsequent obstruction of the right kidney.

Referral to the Urology team was made, the Foley catheter was deflated and removed and a new catheter placed into the bladder to allow for close monitoring of urine output. Surgical re-implantation of the ureter was considered but felt not to be suitable in this particular case due the patient's co-morbidities and frailty. The ureteric injury was therefore managed non-operatively with diversion of urine via

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Fig. 1. Coronal plane CT abdomen pelvis enhanced with IV contrast. “The urinary catheter tip is 13 cm superior to the bladder. It appears to follow the path of the right ureter and the tip is located near the proximal right ureter. Foci of free air is shown medial to the tip and the ureter has probably ruptured due to inflation of the balloon. There is haziness within the fat surrounding the ureter and right paracolic gutter, and also within the pelvis surrounding the uterus and this probably represents extravasation of urine. Moderate right-sided hydronephrosis is shown, the likely cause being blockage at the balloon”. [The orange arrow indicates the tip of the catheter]. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

nephrostomy drain and continued antimicrobial treatment.

One week into admission, the Interventional radiology team converted the nephrostomy to an antegrade ureteric stent. During this procedure a nephrostogram was performed. As seen in Fig. 2 there is active contrast extravasation at the site of the ureteric injury confirming the presence of ureteric rupture. The radiologist was successful in placing a ureteric stent across the injured ureter.

The patient responded well to initial treatment, renal function returned to baseline levels, abdominal pain resolved and there was no clinical or biochemical evidence of ongoing infection. She was discharged with the ureteric stent in place for a minimum of 6–8 weeks. Following this period, a retrograde ureteropyelogram was planned to assess for resolution of the ureteric injury.

3. Discussion

Whilst this is an exceptionally rare complication of a medical procedure performed on every ward in the NHS, there are several similar case reports. 8/14 of the case reports in which there was cannulation of the ureter by bladder catheter were patients with neurogenic bladder dysfunction. 11/14 (78%) were female and the mean age was 76 (range 64–86). The patient in this case report had previously undergone bladder botox treatment mimicking a neurogenic bladder and therefore fitting the demographic.

Patients with neurogenic bladder may also have vesico-ureteric reflux with patulous ureteric orifice which may also increase the risk of catheterization of the ureter. Furthermore, for patients on long-term catheter, their bladders tend to become contracted and thus altering the anatomical relationship between the bladder neck and ureteric orifices.

The need for frequent change of catheter increases the odds of this complication happening. Finally, patients with neurogenic bladder may lack sensation, limiting the patient’s ability to feel pain should the complication occur.



Fig. 2. Right Nephrostogram (Prone) Nephrostogram demonstrated transection of the proximal right ureter with contrast extravasation. [The orange arrow indicates the area of contrast extravasation at the site of ureteric rupture.]. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

4. Conclusion

- Careful consideration must always be made by the clinician when deciding to insert urinary catheters, particularly long-term indwelling catheters.
- Recommendations from the European Association of Urology Nurses suggest that during insertion of the catheter, inflation of the balloon should not be met with resistance or pain and once inflated the catheter should be gently retracted until the balloon rests on the bladder neck. Once the catheter is placed, the practitioner can aspirate the catheter with a syringe to assess for urine efflux. Failure to be able to do either of these steps should prompt the practitioner to deflate the balloon and remove the catheter.²
- Use of a short-tip catheter is recommended for patients with neurogenic bladders.
- In patients with neurogenic bladder, use a bedside ultrasound should be considered to confirm the intra-vesical location of the tip of the catheter post insertion.
- The clinician should aim to remove the catheter as soon as its use is no longer indicated to reduce the risk of developing complications including urinary tract infection.

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Contributorship

Author JS is the sole author for this case report and responsible for planning, conduct, reporting, conception and design, acquisition of data or analysis and interpretation of data.

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Consent

Written consent was obtained from the patient involved in this case.

Declaration of competing interest

The author did not declare any conflicts of interest.

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