Case report

A peculiar complication of suprapubic catheterization: Recurrent ureteral obstruction and hydronephrosis

Bamidele Adeyemo[1], Steven Makovitch[2], Dominic Foo[3]

[1]Harvard Medical School/Spaulding Rehabilitation Hospital, Boston, MA, USA, [2]Rehabilitation Institute of Chicago, Chicago, IL, USA, [3]Spinal Cord Injury Service, Veterans Affairs Boston Healthcare System, Boston, MA, USA

Context: Suprapubic cystostomy (SPC) catheterization is a common and important technique for the management of vesicular drainage, especially in patients with neurogenic bladder. Some serious complications include bowel perforation and obstruction.

Findings: A 55-year-old man with C6 American Spinal Injury Association B tetraplegia and a urethral stricture requiring a chronic SPC was admitted for recurrent urosepsis. Computed tomography (CT) of the abdomen revealed severe right hydronephrosis and hydroureter due to obstruction of the right distal ureter by the SPC tip. The SPC (30 French/10-mm silicone catheter with a 10-ml balloon) was removed and replaced with a similar suprapubic catheter (30 French/10-mm silicone catheter with an 8-ml balloon). Symptoms recurred 2 months later and he was readmitted for urosepsis. CT of the abdomen again revealed severe right hydronephrosis and hydroureter due to obstruction of the right distal ureter by the SPC tip. The SPC was removed, and the patient was given a 14 French/4.67-mm urethral silicone catheter with a 5-ml balloon. Follow-up CT of the abdomen 2 months later showed complete resolution of the hydronephrosis and hydroureter. Of note, urodynamic studies 2 years earlier revealed an extremely small bladder with a capacity less than 20 ml.

Conclusion: This case illustrates that obstruction of the ureter by the tip of an SPC can be a cause of recurrent hydronephrosis and urosepsis.

Keywords: Cystostomy, Hydronephrosis, Hydroureter, Spinal cord injuries, Tetraplegia, Ureteral obstruction, Urinary bladder, Neurogenic, Urosepsis

Introduction

Suprapubic cystostomy (SPC) catheterization is a common and important technique for the management of vesicular drainage.[1–5] It is a widely accepted practice due the ease of execution, low infection rate, and high patient satisfaction.[1–8] Although complications may occur, it is proposed as a safe and benign option for bladder management.[6–8] We report a rare case of recurrent hydronephrosis due to ureteral mechanical obstruction by a suprapubic catheter despite replacement.

Correspondence to: Bamidele Adeyemo, Department of Physical Medicine & Rehabilitation, Harvard Medical School/Spaulding Rehabilitation Hospital, 125 Nashua Street, Boston, MA 02114, USA.
Email: boadeyemo@partners.org

Case report

A 55-year-old man with C6 American Spinal Injury Association (ASIA) Classification B tetraplegia and chronic SPC for neurogenic bladder presented on multiple occasions from a nursing home with altered mental status secondary to recurrent urinary tract infections (UTIs). The patient had a complex genitourinary history including sphincterotomy with subsequent urethral stricture, bladder wall injection of dextranomer/hyaluronic acid copolymer (DEFLUX®, Oceana Therapeutics Inc., Edison, NJ, USA), bilateral hydronephrosis with vesicoureteral reflux at low bladder pressures of 10–20 Torr, and recurrent symptomatic UTIs. The patient's urethral stricture indicated the placement of an SPC for bladder management.

The patient was admitted with urosepsis, secondary to ciprofloxacin-resistant pseudomonas and ESBL

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Escherichia coli. He demonstrated urinary retention with poor drainage of his SPC (30 French/10-mm silicone catheter with a 10-ml balloon) and residual urine in the bladder despite manual irrigation of the catheter. A renal ultrasound revealed new right-sided hydronephrosis. Abdominal computed tomography (CT) demonstrated right hydronephrosis and hydroureter due to obstruction of the right distal ureter by the SPC tip. The SPC (30 French/10-mm silicone catheter with a 10-ml balloon) was removed and replaced with a similar suprapubic catheter (30 French/10-mm silicone catheter with an 8-ml balloon). This resulted in improved urinary drainage and resolution of the urinary retention. Mild improvement of hydronephrosis was confirmed by renal ultrasound 3 days later.

Two months later, the patient was readmitted for another case of sepsis secondary to UTI. An abdominal ultrasound showed right-sided hydronephrosis. Abdominal CT again revealed severe right hydronephrosis and hydroureter due to obstruction of the right distal ureter by the SPC tip (Fig. 1). The SPC was removed, an indwelling urethral catheter (14 French/4.67-mm silicone tube with a 5-ml balloon) was placed for primary drainage, and a urostomy bag was placed over the suprapubic stoma. This allowed for collection of urine while the suprapubic tract closed over several days.

Two months later, the patient was re-evaluated while using his urethral Foley catheter for bladder management. Repeat abdominal CT at this time revealed complete resolution of the hydronephrosis and hydroureter. Given the repeated presentations of hydroureter and hydronephrosis with an indwelling catheter in the suprapubic position, we advised to change the indwelling catheter to the urethral position. However, we acknowledged that it did not guarantee against a possibility of urethral obstruction from the catheter tip in the urethral position.

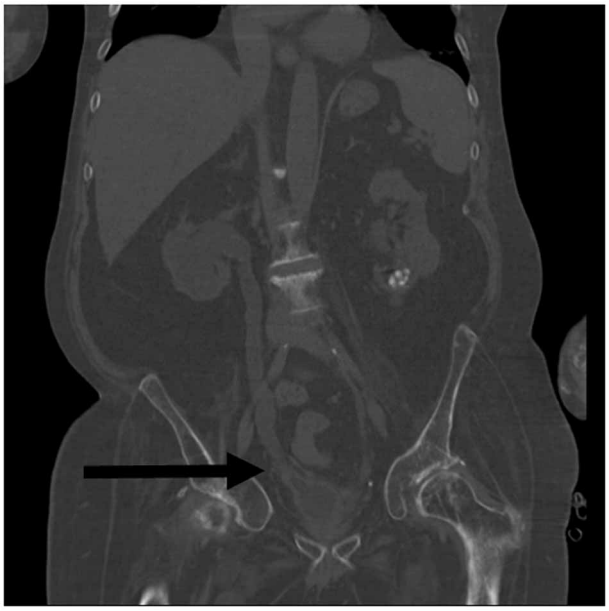

Figure 1 CT scan, coronal view of the abdomen demonstrating suprapubic catheter tip in the right ureter (arrow).

In consideration of the high morbidity of sepsis in the patient's repeated presentations of hydroureter and hydronephrosis, we believed that it was safer to remove the SPC rather than attempting to secure it from future migrations. Instead, we placed a urethral catheter in the bladder. Three months later, CT of the abdomen and pelvis showed no evidence of hydronephrosis. The patient remained asymptomatic at the 1-year follow-up visit.

Discussion

SPC catheterization is a common technique for bladder management.[1–5] Reported benefits of SPC catherization include decreased bacteriuria, increased comfort and higher acceptability, avoidance of urethral strictures, decreased level of nursing care, preserved sexual function, prevention of penile pressure necrosis, early postsurgical ambulation, lower infection rates, ease of bladder training, shorter hospitalization stays, and decreased postoperative infections.[1,2,5–8] Complications of SPC placement include infection, bleeding, and catheter blockage.[1,6] Major complications are rare and may include bowel perforation, entero-cutaneous fistula, bladder perforation, fracture with intra-cavity loss of catheter fragment, knotting of the catheter, catheter migration into the ureter, and an increased risk of bladder cancer.[1–15] Of note, a recent study by Katsumi *et al.*[8] compared SPC to urethral catherizations and reported equal incidences of UTI, bladder stones, renal calculi, and cancer. However, they reported a slightly decreased incidence for scrotal-urethral complications such as scrotal abscesses, epididymitis, and urethral fistulas and strictures.[8] This study also supports the initial placement of an SPC in our patient with a history of urethral stricture.[8]

Ureteral obstruction secondary to suprapubic catheter migration is an exceedingly rare occurrence according to current reports.[1–3] To our knowledge, this is the first known description of recurrent ureteral obstruction secondary to SPC migration.

In this case, the patient's episodes of obstruction of the right distal ureter resolved only after SPC removal. This suggested that the SPC was the cause of the recurrent ureteral obstruction and hydronephrosis.

Urodynamic studies 2 years earlier revealed an extremely small bladder with a capacity less than 20 ml. Therefore, we postulate that the etiology of the recurrent obstruction was likely the restricted bladder capacity. As his bladder capacity was markedly reduced, the tip of the SPC had a tendency to migrate into the right distal ureter, causing urosepsis from obstructive hydronephrosis and hydroureter. Migration of the tip of a urethral catheter is also a possibility, but seems less likely from anatomical considerations, and has not occurred so far in this patient.

In this patient, recurrent ureteral obstructions were treated by the placement of a urethral catheter. We acknowledge that a urethral catheter can migrate to the ureter; however, it is uncertain as to whether it has a similar migration risk to an SPC.[16] Urethral migrations may be less likely than SPC migrations, given most urethral-mediated urine bags hang inferior to the ureteral orifice, thereby reducing urethral migration risk via gravitational pull. This case highlights the importance of proper selection of a bladder management method. Given the morbidity and recurrent nature of the urinary problems in this patient, we explored whether these episodes could have been prevented. A review of the literature on SPC migration revealed the importance of properly securing the SPC to the outer abdominal wall. Various abdominal-anchoring methods include adhesive tape, CathGrip or BioDerm Tube Holder (BioDerm Inc., Largo, FL, USA), GRIP-LOK™ Universal Foley Catheter Securement (Zefon International, Inc., Ocala, FL, USA), and Statlock Catheter Stabilization device (Bard Medical Division, Covington, GA, USA.)[17,18] Vaidyanathan *et al.*[18] advocates for using the Cathgrip/Bioderm Tube Holder, because it anchors various types of SPCs, prevents migration and dislodgement, and maintains a skin-protecting contact surface.

Another preventative method is to mark the length of the catheter, especially during catheter changes. The team could have measured the length of the first suprapubic catheter and marked the corresponding length on the replacement catheter to ensure it was placed at the correct depth.[18] Another tactic to prevent catheter migration is to perform exchange of catheters over a 0.032 guide wire.[18,19] This technique uses a Folysil catheter (Coloplast Ltd, Peterborough, UK) with a terminal hole that facilitates insertion of a new catheter over the guide wire.[18,19] Perhaps if any of these three methods were implemented, one could have decreased the risk of this patient's repeated complications.

In selecting options for bladder management, clinicians should individualize patient catheter selection and balance benefits against potential complications.[20] Future clinicians should consider whether patients with restrictive bladder capacity might be at increased risk of catheter migration and potential complications.[21]

Conclusion

This case illustrates that obstruction of the ureter by the tip of an SPC can be a cause of recurrent hydronephrosis and urosepsis. For patients with suprapubic management of neurogenic bladder presenting with recurrent urosepsis, one should include migration of the catheter tip to the distal ureteral orifice as a potential cause of obstructive hydronephrosis.

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