

CASE REPORT



Prolonged reversible bilateral balloon ureteric obstruction in iatrogenic ileal conduit injury – a weapon for the armamentarium

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Introduction

Urinary fistulas are a major problem, occurring iatrogenically through surgical interventions, radiotherapy, malignancy or trauma [1]. While small urinary fistulas may be managed more conservatively with the aid of urinary diversion, more significant fistulas have traditionally required operative intervention. However, both a conservative approach and operative intervention are often associated with poor outcomes and a high failure rate (up to 35%) [2], with intervention fraught with difficulties in these often unfit patients. Here we present a rare and unique solution, in the use of prolonged reversible bilateral balloon obstruction of the ureters to manage a serious iatrogenic ileal conduit injury.

Case report

A 72 year old-gentleman underwent a robotic-assisted radical cystoprostatectomy with ileal conduit formation for carcinoma-in-situ of the bladder at a specialist hospital, some distance away. The operation was complicated by a bowel perforation secondary to port-site hernia. The patient then underwent an emergency laparotomy, small bowel resection and primary anastomosis with a covering loop ileostomy and was later discharged home. The following month, he presented to our hospital with nutritional and electrolyte abnormalities due to a 'high output stoma' from the ileostomy and was managed by the general surgeons. Unfortunately, the problems failed to settle with conservative management including total parental nutrition. Two months later, a planned elective reversal of his loop ileostomy was then undertaken.

Vomiting and high nasogastric tube output started almost immediately postoperatively and after two weeks, he underwent a further laparotomy for presumed intestinal obstruction. The obstruction was corrected but a small perforation was noted in the ileal urinary conduit which was also repaired. The patient was intubated and ventilated on ITU postoperatively.

Postoperatively, a prolonged ileus and abdominal distention raised early concerns for a urine leak from the repaired conduit on CT scans. A conduitogram (contrast injected *via* the ileal conduit) confirmed a major contrast leak into the abdomen and pelvis (Figure 1). Unfortunately, dehiscence of the midline laparotomy wound and subsequent sepsis from the urine leak caused a brisk deterioration of the patient's condition on ITU. Bilateral nephrostomies were first inserted to reduce the urine leak and later, antegrade stent insertions attempted; both were unsuccessful. The urine leak gradually worsened, resulting in most of the urine output being *via* the abdominal drains and midline abdominal wound.

At this stage, with the size of the leak and failure of conventional methods, it seemed unlikely that the leak would heal without surgical repair (Figure 2). The patient's cachexia and septic condition however, rendered him too unfit to undergo another laparotomy. An alternative strategy was devised following discussions between the urological surgeons and interventional radiologists. The decision was made to completely occlude the lumen of both ureters based on the principle that calculi-obstructed ureters cause little in the way of long-term injury or strictures, even over sustained periods of time.

On the left side, the nephrostomy was removed over a wire, and through an 11 Fr sheath, the in-situ ureteric stent (with the distal end noted in the pelvic collection) was snared and removed. A Berenstein Occlusion Balloon Catheter 8.5/11.5 mm (Boston Scientific) was placed to the mid-ureter and inflated (Figure 3) to the point of occlusion, and a new covering nephrostomy was inserted. The same technique was used to deploy a balloon on the right through an 8 Fr sheath. The urinary leak ceased instantly.

Four days later, the patient's state had improved such that he was discharged from ITU. The right ureteric occlusion balloon fell out spontaneously through the conduit 12 days post-insertion and the left ureteric occlusion balloon was removed 22 days post-insertion. The patient convalesced enough to be discharged home with bilateral nephrostomies in-situ. Nephrostograms and CT-urography six weeks later revealed normal drainage through both ureters to the



Figure 1. Conduitogram showing major contrast leak into abdomen suggestive of ileal conduit injury.



Figure 2. Antegrade nephrostograms showing ongoing major abdominal leak.

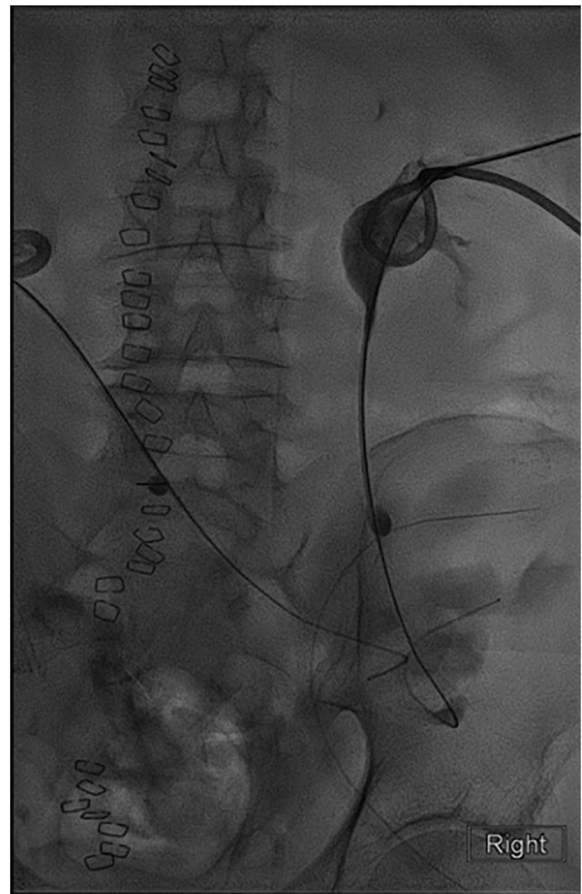


Figure 3. Antegrade bilateral deployment of Berenstein occlusion balloons to the mid-ureters.



Figure 4. CT-urogram at 6 weeks showing normal contrast excretion from the kidneys.

conduit with no leak, and the nephrostomies were removed (Figures 4 and 5).

Renal function which was normal prior to initial admission after the cystectomy remained stable on the day of discharge (creatinine 56 $\mu\text{mol/L}$, $\text{eGFR} >60 \text{ ml/min/1.73m}^2$) and

remains normal presently at over two years follow up. Follow-up ultrasonography and CT showed no evidence of hydronephrosis, and a CT with urographic phase 20 months later, for a separate presentation with acute abdominal pain

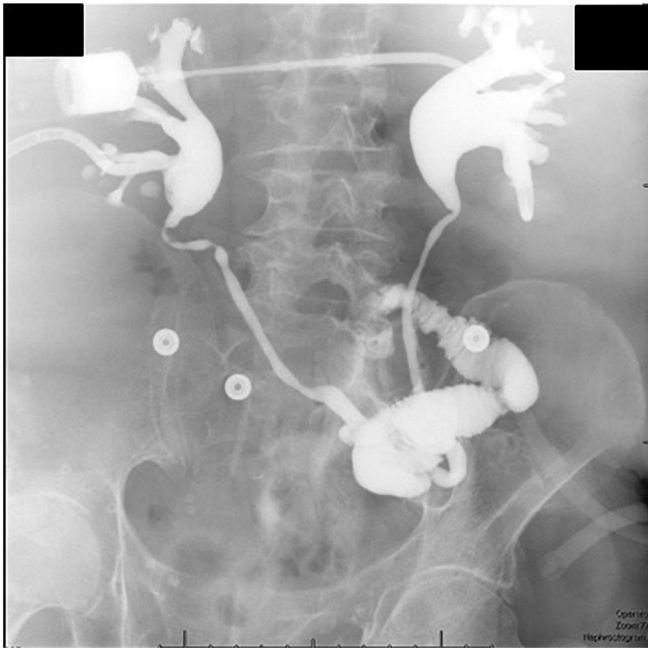


Figure 5. Bilateral antegrade nephrostogram at 6 weeks showing complete resolution of ileal leak, with normal contrast flow down both ureters, with no evidence of ureteric stricture or obstruction.

(cholecystitis), revealed normal kidneys, ureters and uretero-ileal anastomoses.

Discussion

This case describes a rare and interesting method of using reversible ureteric occlusion balloons to assist urinary diversion and allow iatrogenic urine leaks from ileal conduits to heal. Such urinary fistulas can be a major problem after redo surgery in patients who have previously undergone operations such as radical cystectomy [3]. Small leaks can be managed solely by bilateral nephrostomies, but more major ones could be managed in this way with little long-term risk to the ureters and avoidance of potentially complex surgery in an already ill patient [4].

Irreversible ureteric occlusion has been described since the late 1970s, often in the context of malignancy, with tissue adhesives such as butyl-2-cyanoacrylate [5] and N-hexyl-cyanoacrylate [6] being successfully used. However, techniques such as ours, for reversible ureteric obstruction have been much less commonly reported. Gunther et al. in 1982 published a series of seven cancer patients with ureters occluded using a silicone-filled balloon, in conjunction with percutaneous nephrostomy tubes [7], then subsequently

twenty patients in 1984 [8]. More recently, Horenblas et al. reported on seven pelvic cancer patients with pelvic with ureters occluded with Foley or angioplasty catheters, for a mean duration of 94 days (range 45–169) without evidence of pressure necrosis [9]. Franke et al. also showed the promising scope of reversible balloon occlusion in eighteen ureters, with a mean duration of 74 days (range 5–250 days), again without pressure necrosis [10].

Our case offers an example of the safety and efficacy of reversible ureteric occlusion with balloon catheters for urinary diversion in iatrogenic surgical injury. Our findings have mirrored those of the few cases reported in the literature, with no evidence of pressure necrosis on follow up imaging, and normal antegrade urination clinically for our patient on long-term follow up. This technique offers a very practical temporising method in patients unsuitable or unfit for surgical repair, and is an invaluable weapon in the armamentarium of urologists and urologists in such difficult cases.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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