

Spontaneous rupture of the renal calyx secondary to dysfunctional voiding

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ABSTRACT

Spontaneous pelvicalyceal/ureteral rupture due to abnormal bladder dynamics or urinary retention is rare with only a few cases reported. We report a case of spontaneous fornix rupture secondary to increased intravesical pressure caused by dysfunctional voiding in a young female with mental subnormality with paralytic ileus as a presenting symptom. The patient settled with double J stenting and catheterization. A literature review of the upper tract rupture due to bladder dysfunction/urinary retention is presented along with a discussion of management options and prevention.

Key words: Dysfunctional voiding, Forniceal rupture, Urinary retention

Spontaneous rupture of the urinary collecting system is defined as extravasation of urine from the collecting system which occurs without any trauma, iatrogenic manipulation, kidney disease, or previous surgery [1]. Abnormal bladder dynamics or urinary retention is a rare cause of spontaneous forniceal rupture, which should be considered while evaluation of such patients. We describe the case of calyceal rupture due to dysfunctional voiding in a young female with mental subnormality along with the literature review of the past 40 years on pelvicalyceal or ureter rupture due to abnormal bladder function.

CASE REPORT

A 22-year-old female with mental subnormality and seizure disorder since birth, on antiepileptic medications presented with complaints of abdominal distention and vomiting for 3 days. Vomiting was bilious, 3–4 episodes per day. She was passing urine well as per the history given by the parents but later on, detailed enquiry retrospectively revealed an erratic pattern of passing urine with not passing urine for hours followed by passing a good amount of urine or sometimes passing a small amount of urine frequently since many years.

On examination, the vitals were normal with a pulse rate of 88/min blood pressure of 110/70 mmHg, and oxygen saturation of 99% on room air. Local examination showed a distended abdomen with absent bowel sounds.

A computed tomography (CT) scan for workup for paralytic ileus showed the right perinephric collection with a leak of excreted

contrast of the right kidney for which, the patient was referred to the urology department. Furthermore, an overdistended bladder was seen on a CT scan (Fig. 1). Laboratory workup showed serum creatinine 0.59 mg/dl and mild leukocytosis (11,000/mm³) but urine examination did not show any evidence of urinary tract infection.


The patient was immediately catheterized and the next day, she underwent cystoscopy showing a non-trabeculated large capacity bladder and retrograde contrast study which showed a contrast leak from the right upper calyces (Fig. 2). A double J (DJ) ureter stent was placed in the right ureter. Ultrasound showed minimal perinephric collection, so the drain was not placed. The patient had an uneventful stay and was discharged with a catheter *in situ*.

On follow-up, the Foley catheter was removed after 2 weeks and the DJ stent was removed after 4 weeks. Parents were counseled for abnormal voiding pattern as a cause of problems and counseled for clean intermittent catheterization for prevention of further such episodes but opted to have an indwelling catheter *in situ* for future care.

DISCUSSION

In most cases, spontaneous rupture of the pelvicalyceal system or ureter is due to acute obstruction at the supraventricular level. The differential diagnosis includes ureteric calculi, strictures, extrinsic ureteral compression, and pelviureteric junction obstruction, most common being ureteral calculi [2].

Bladder outlet obstruction or abnormal bladder due to neurogenic element or dysfunctional element is a rare cause. A PubMed search using terms “urinary retention” and “ureteral

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Table 1: A literature review of the upper tract rupture due to bladder dysfunction/urinary retention

| Author and year of publication | Case details | Management |
|------------------------------------|--|---|
| Gershman <i>et al.</i> , 2011 [1] | Prostate hypertrophy | Urethral catheterization |
| Akpınar <i>et al.</i> , 2002 [2] | 89 year male, prostate carcinoma | Urethral catheterization |
| Linbecker <i>et al.</i> , 2005 [3] | 47 year male, maggots self-inserted into the urinary tract | Cystoscopy, foreign body removal |
| Searvance <i>et al.</i> , 2016 [4] | 40 year male, neurogenic bladder, Downs syndrome | DJ stenting, nephrostomy drain, and suprapubic catheterization |
| Allin <i>et al.</i> , 2012 [5] | 89 year male, transitional cell carcinoma of bladder | Urethral catheterization |
| Sarmah <i>et al.</i> , 2015 [6] | 77 year male, prostate hypertrophy | Urethral catheterization |
| Buckley and Smith, 1984 [7] | 72 year male, prostate hypertrophy | Transurethral resection of the prostate |
| Choi <i>et al.</i> , 2011 [8] | 75 year female, urine retention | DJ stenting, percutaneous nephrostomy drain, and urethral catheterization |

DJ: Double J

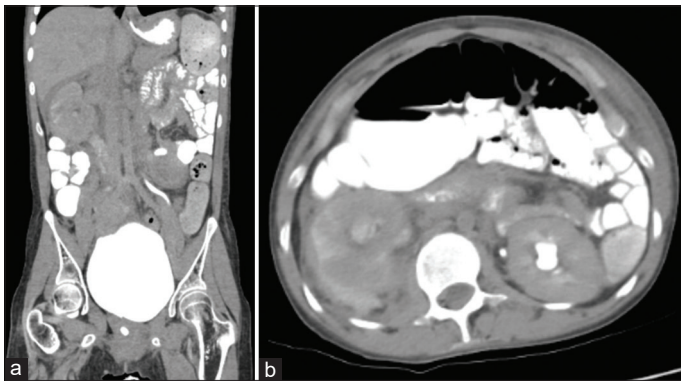


Figure 1: Contrast-enhanced (a) coronal computed tomography (CT) image showing overdistended bladder and contrast extravasation at the level of the right renal pelvis and upper ureter; (b) axial CT image showing contrast extravasation around the right perinephric renal space

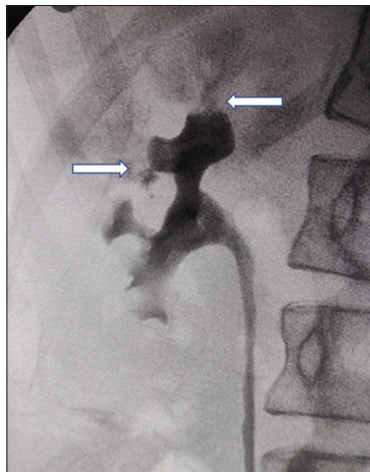


Figure 2: Fluoroscopy-A right retrograde pyelogram showing contrast leak from the right upper calyx (arrows)

rupture /fornix rupture/pelvicalyceal rupture/calyceal rupture” showed nine cases of adults related to the upper tract rupture due to retention or abnormal bladder dynamics in the past 40 years [1-8] (Table 1). We did not include postpartum five cases with ureteral rupture [9] and cases detected post-intravenous urography as they cannot be strictly called spontaneous and an element of primary ureteral compression cannot be ruled out entirely (e.g., gravid uterus).

The cause of pelvicalyceal rupture is due to increased pressure in one of the ureters that exceed the pressure of 25–75 mmHg causing ureteral and pelvic backflow [10]. Furthermore, it is possible for the ureter to kink secondarily due to the extremely distended bladder [10]. In addition, the proximal ureter can get obstructed due to proximal secondary kinks [10]. This will be more likely if the obstruction is chronic allowing the ureter to develop kinks more proximally. In our case, though there was no kinking of the ureter and the degree of hydronephrosis was minimal suggesting a relatively shorter course.

The site of rupture was fornix, pelviureteric junction, or upper ureter [2-5,9]. Increased bladder pressure was due to retention (due to benign prostatic hyperplasia, prostate cancer, clot retention with bladder irrigation, and self-inserted foreign body), neurogenic bladder with retention, and only one case of dysfunctional voiding associated with Down’s syndrome (low compliant bladder with acontractile detrusor) [1-8]. The last case had apparently no urinary symptoms despite abnormal bladder [4]. Presentation with severe paralytic ileus and overall poor general condition prompted us to do DJ stenting, but conservative management has been successfully used in such cases [2,5,6]. Nephrostomy has also been commonly used for diversion in such cases [4,10].

To summarize, this is only the second case of dysfunctional voiding causing forniceal rupture. Especially with mental subnormality, it should be considered in the cases with paralytic ileus as presentation. A brief trial of conservative management may be tried (instead of DJ stenting or nephrostomy) with bladder diversion provided that the patient condition is stable. Later, an urodynamic study (UDS) can be done if mental subnormality is up to a lesser degree to allow a meaningful UDS and if caretakers are willing for intermittent catheterization.

CONCLUSION

Severe urinary retention due to dysfunctional voiding may cause pelvicalyceal rupture in rare cases. Urologists should be aware of the possibility of pelvicalyceal rupture in the differential diagnosis of an acute abdomen, particularly in patients with urinary retention. Management of these patients should

include minimally invasive techniques accompanied by active management of urinary retention.

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