An unusual case of spontaneous rupture of the renal pelvis
Theodore Weber *, Matthew DeSanto, Daniel Ricchiuti

NEOMED: Northeastern Ohio Medical University, USA

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ABSTRACT
Spontaneous rupture of the renal pelvis is a relatively rare urologic finding. It is associated with obstructing ureteral calculi and can occur with or without urinary instrumentation. Spontaneous rupture is typically diagnosed through imaging modalities such as computed tomography (CT) scans or retrograde pyelography. In this case report, we detail a case regarding spontaneous rupture of the renal pelvis (SRRP) of a 33-year-old male with idiopathic extravasation of contrast from the renal pelvis discovered on delayed phase CT scan of the abdomen and pelvis. This is a unique case of SRRP as the etiology remains idiopathic.

1. Introduction

Urinary extravasation is a urologic development with multiple underlying pathologies. Rupture of the renal pelvis is most commonly derivative of obstructive ureteral calculi. Other etiologies include traumatic injuries, malignant obstruction, ureteropelvic junction (UPJ) obstruction, pregnancy, and iatrogenic urinary tract manipulation. There has been a case of bilateral renal pelvis rupture during administration of IV contrast for CT scan. Forniceal rupture is similar in prevalence and etiology to renal pelvis rupture. Identification of renal pelvis or fornical rupture is typically discovered via CT scan of the abdomen and pelvis (AP) or retrograde pyelography.

Spontaneous extravasation from the urinary tract can be defined as extravasation of urine in the absence of recent ureteric instrumentation, recent surgery, external trauma, and renal neoplasm. The pathogenesis underlying nontraumatic rupture of the urinary tract may be related to increased intraluminal pressure. A study of 108 patients with spontaneous renal pelvis rupture found that 74.1% of cases were caused by ureteral stones, 8.3% by extrinsic malignant ureteral compression, 1.9% by UPJ obstruction, and 0.9% by bladder outlet obstruction.

In this case report, we document a rare case delineating a radiographic finding conveying renal pelvis contrast extravasation with no known inciting event.

2. Case report

This case details a 33-year-old previously healthy male, presenting to a local emergency department (ED) with cough, vomiting, and abdominal pain. Medical history was significant for recurrent ureteral stones, but he denied genitourinary symptoms at initial presentation. CT AP showed no renal or ureteral calculi, and there was no evidence of obstructive uropathy or extravasation (Fig. 1). The most significant finding reported was ground-glass infiltrates of the lung bases bilaterally, aiding in the diagnosis of COVID-19 pneumonia.

One week later, the patient returned to the ED, presenting with worsening COVID-19 symptoms as well as aching flank pain and inability to urinate. He proclaimed that these symptoms were similar to those he experienced with his prior ureteral stones. He denied dysuria and hematuria. His physical examination was unremarkable. Repeat CT AP displayed mild fullness of the left renal pelvis and left, proximal ureter, as well as faint periureteric fat stranding. Mild bladder distention was noted, and the right ureter was of normal appearance. These findings were suggestive of changes related to an underlying UTI, non-radiopaque stone, or a recently passed stone. At this point, urology was consulted for the workup of mild left hydronephrosis. After review of the CT scan, it was concluded that genitourinary findings were secondary to a recently passed nephrolith. Daily tamsulosin was initiated with intentions for outpatient follow up.

However, the patient returned to the ED with altered mental status five days after discharge. Family reported abnormal behavior and an episode of urinary incontinence. He received a CT head without contrast, which showed no acute intracranial abnormalities. Upon return from imaging, the patient began to complain of severe right-sided flank pain with costovertebral angle tenderness. He had an episode of urinary incontinence as well. This prompted a repeat CT AP. A column of contrast in the right renal pelvis and right proximal ureter with a...
Fig. 1. CT abdomen pelvis from initial ED visit in coronal (A) and axial (B) views without acute pathology.

Fig. 2. CT abdomen pelvis in coronal (A) and axial (B) views demonstrating urinary extravasation from the right renal pelvis.
A moderate amount of extraluminal contrast surrounding the right kidney was noted, suggestive of perforation (Fig. 2). No new obstructive calculi, masses, or bladder distention were noted on imaging. The extravasated fluid was deemed resorbable and did not appear detrimental to the patient’s health. The patient’s right flank pain resolved and was treated conservatively.

At a 1-month follow-up appointment, repeat imaging demonstrated complete resolution of urinary extravasation (Fig. 3).

3. Discussion

Reflecting upon this distinctive patient scenario, the exact etiology of the renal pelvis urinary extravasation is unknown. The patient denied several times any incidences of trauma or injury to the left flank area. It is possible, but unlikely, that the patient had a stone that was not visualized on CT AP that contributed to his mild flank pain and mild hydronephrosis. Iodinated contrast used in CT scans is a potent osmotic diuretic, increasing urine flow rate along with urine volume. Rare cases of SRRP have been attributed to small calculi causing transient acute obstruction without symptomatology. The combination of the diuretic effect from contrast and a small non-visualized stone in our patient could have increased intraluminal pressure causing rupture. It’s theorized that this is a renoprotective mechanism where extravasation depressurizes post-renal pressure to prevent acute kidney injury.

Lastly, it is unclear the etiology of the patient’s acute urinary retention. It’s possible the patient’s urothelial distention induced retrograde dilatation of the ureters. However, we would expect more significant right sided hydroureteronephrosis. Given the patient’s mild prostatomegaly on CT imaging, bladder outlet obstruction is possibly an etiology of urinary retention and SRRP. Although extremely rare, one case of unilateral fornical rupture was noted in the setting of prostatic hypertrophy due to unequal compliance between pyeloureteral systems. Ultimately, the patient’s clinical gestalt did not clearly fit into researched theorized mechanisms of injury. SRRP can occur in the setting of increased intraabdominal pressure. Our patient had developed COVID-19 pneumonia and significant coughing bouts, which were the only indices of repeated and elevated intraabdominal pressure. At this time, our most reasonable conclusion would be repeated intraabdominal pressure coupled with a previously passed stone, leading to renoprotective renal pelvis rupture.

It has been documented that urinary extravasation in the absence of vascular or abdominal trauma can be safely managed non-operatively with resolution greater than 90%.

4. Conclusion

This is a rare case of spontaneous rupture of the renal pelvis with idiopathic etiology. Common etiologies include obstructing ureteral calculi, renal masses, UPJ obstruction, however, no causality was definitively correlated to this patient’s presentation. Despite this, the patient was managed conservatively. Repeat imaging demonstrated resolution of renal pelvis extravasation without placement of ureteral stent or nephrostomy tube (Fig. 3). The patient did not develop a discernible urinoma or hematoma at the time of repeat imaging.

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