

## Spontaneous rupture of the renal pelvis due to an obstructing ureteral calculus diagnosed by point-of-care ultrasound

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Received: 13 November 2009 / Accepted: 15 December 2009 / Published online: 12 January 2010  
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**Abstract** A 37-year-old man presented to the emergency department with left flank pain and vomiting. Bedside ultrasound performed by the treating emergency physician revealed left-sided hydronephrosis and perinephric fluid, suggesting a rupture of the renal pelvis. Urinary sonography revealed an absent left ureteral jet, suggesting left ureteral obstruction. Treatment was initiated and a non-contrast computed tomography scan confirmed the initial ultrasound findings.

**Keywords** Emergency ultrasound · Critical ultrasound · Calyceal rupture · Urinoma · Hydronephrosis

### Case report

A 37-year-old man with no prior medical history presented to the emergency department (ED) 4 h after the onset of acute left flank pain and vomiting. He denied fever, diarrhea, dysuria, or trauma. His temperature was 98.2°F, pulse 104/min, respirations 18/min, blood pressure 142/78 mm Hg, and his room air oxygen saturation was 98%. His physical examination was remarkable for left costovertebral angle tenderness. His abdomen was soft and non-tender without rebound or guarding. A mid-stream urinalysis showed 0–2 red blood cells/high powered field.

**Electronic supplementary material** The online version of this article (doi:10.1007/s13089-009-0019-2) contains supplementary material, which is available to authorized users.

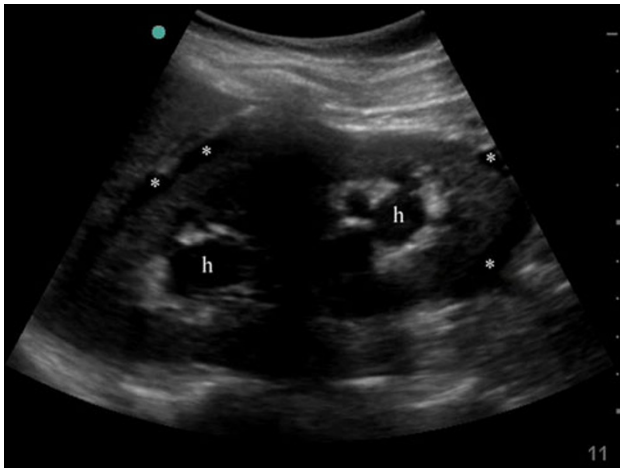
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The treating emergency physician performed a bedside ultrasound using a 5–2 MHz curvilinear transducer (Sonosite M-Turbo, Bothell WA). Examination of the left kidney demonstrated moderate hydronephrosis and an anechoic fluid collection surrounding the left kidney consistent with a calyceal rupture and pyelosinus extravasation (Fig. 1; h = hydronephrosis, asterisks = fluid collection, and Video Clip S1, available as supporting information in the online version of this paper). Although power Doppler examination of the bladder demonstrated a ureteral jet from the right ureteral orifice (Fig. 2), no ureteral jet was visible on the patient's left, indicating a left ureteral obstruction.

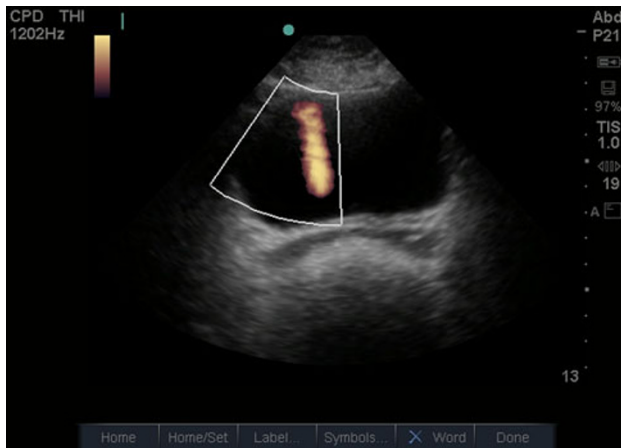
### Results and discussion

Non-contrast computed tomography (CT) scan of the abdomen and pelvis confirmed a 5 mm obstructing left ureterovesical junction (UVJ) stone (Fig. 3; b = bladder, asterisk = stone) with left-sided hydronephrosis and perinephric fluid (Fig. 4; h = hydronephrosis, asterisk = perinephric fluid). The patient was evaluated by a urologist after his symptoms were controlled with antiemetics, analgesics, and intravenous crystalloid. He was discharged home with oral antibiotics and opiate analgesics, an alpha 2-antagonist, and a follow-up appointment in the urology clinic 48 h later. Chart review revealed that the patient recovered uneventfully without any surgical intervention.

Rupture of the renal pelvis with extravasation of urine into the perinephric and/or retroperitoneal space is a rare condition most often resulting from trauma [1], but also associated with obstructing ureteral calculi, or compression of the ureter by pregnancy [2], tumor or retroperitoneal fibrosis [3]. Flank and abdominal pain are the most common presenting symptoms, and ultrasonography and



**Fig. 1** Longitudinal view of left kidney demonstrates moderate hydronephrosis (*h*) with anechoic fluid collection (*asterisks*) surrounding the kidney



**Fig. 2** Transverse view of the urinary bladder demonstrates power Doppler flow from the right ureteral orifice



**Fig. 3** Non-contrast computed tomography (CT) demonstrates a 5 mm calculus (*asterisk*) at the left ureterovesical junction (*b*, bladder)



**Fig. 4** Non-contrast computed tomography (CT) demonstrates left hydronephrosis (*h*) and perinephric fluid (*asterisk*)

computed tomography (CT) are the initial diagnostic modalities of choice. Serial ultrasound exams may demonstrate enlargement of the perinephric fluid collection [4] that may prompt urologic intervention. Symptoms can also be relatively mild, however, and as in our case, resolve without the need for urgent urologic intervention.

Patients with flank and upper abdominal pain have a broad differential diagnosis, including many life-threatening entities, such as acute cholecystitis, pancreatitis, intestinal obstruction, mesenteric ischemia, aortic dissection, and aortic aneurysm. The ability to rapidly diagnose a rupture of the renal collecting system using point-of-care sonography can be of great assistance in the evaluation of these patients, and can affect the choice of subsequent diagnostic and therapeutic strategies.

**Conflict of interest** None.

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