Ureteral Calculus Presenting as Generalized Abdominal Cramps

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We describe a 58-year-old man with a left ureteral calculus who presented with normal-looking urine, generalized abdominal cramps and abdominal distension that was thought to be due to acute intestinal obstruction. The diagnosis of ureteral calculus was established with an abdominal radiograph and a nonenhanced helical computed tomography of the abdomen, and the symptoms were promptly relieved by extracorporeal shock wave lithotripsy. Physicians should be vigilant that ureteral calculus may, although very rarely, present with generalized abdominal cramps.

Key words: urology ■ abdomen

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Ureteral calculus is a common and the most painful urological disorder.[1] Approximately 8–12% of the population will develop a urinary calculus during their lifetime.[1,2] The lifetime recurrence rate is approximately 50%.[1] The typical clinical features of acute ureteral colic include a sudden onset of very intense agonizing flank pain that frequently makes the patient writhe. The pain often radiates across the abdomen to the groin and sometimes to the testicle in the male or to the labia majora in the female. Nausea and vomiting are commonly associated. Blood is often visible in the urine. Unusual or atypical presentations are possible. We describe a 58-year-old man with a left ureteral calculus who presented with generalized abdominal cramps and normal-looking urine. The occurrence of this atypical presentation is not well described.

CASE REPORT

A 58-year-old physician developed crampy abdominal pain 12 hours prior to his departure for China. The abdominal cramps got worse over the next 3–4 days such that he had to bend over or lie down during the attacks. The cramps were diffuse but more severe in the periumbilical area. He had 6–7 attacks per day, and each episode lasted 10–30 minutes. He did not experience any pain between the attacks. During this time, he did not have any bowel movements. He noticed that his abdomen was distended. There was no associated fever, vomiting or diarrhea. There was no change in his voiding pattern. Specifically, there was no dysuria, frequency, nocturia, urgency, daytime incontinence or bedwetting. He did not have any discomfort with voiding, suprapubic pain, groin pain, flank pain or low back pain. His urinary stream was normal. He did not need to wait or push to initiate voiding, and his urinary stream was strong, straight and continuous. His urine looked clear and had a normal color. There was no evidence of floating debris, and he did not pass any small solid particles in the urine.

The past history included a laparoscopic cholecystectomy at 48 years old for cholelithiasis. At 49 years old, multiple sialoliths were removed from his right submandibular duct. One of the sialoliths was large (14x9 mm), and the sialoliths were composed of microcrystalline hydroxyl and carbonate apatites, protein and cryptocrystalline tricalcium phosphate.[3] His past health was otherwise unremarkable. He was not on any medication, vitamin or mineral supplement. There was no family history of urolithiasis.

The presentation of abdominal cramps, abdominal distension, cessation of bowel movements and a past history of an abdominal operation suggested a diagnosis of intestinal obstruction. He was treated with a fluid diet, but the abdominal cramps persisted. Glycerine suppositories encouraged the evacuation of retained stools and offered some relief with a decrease in the abdominal distension.

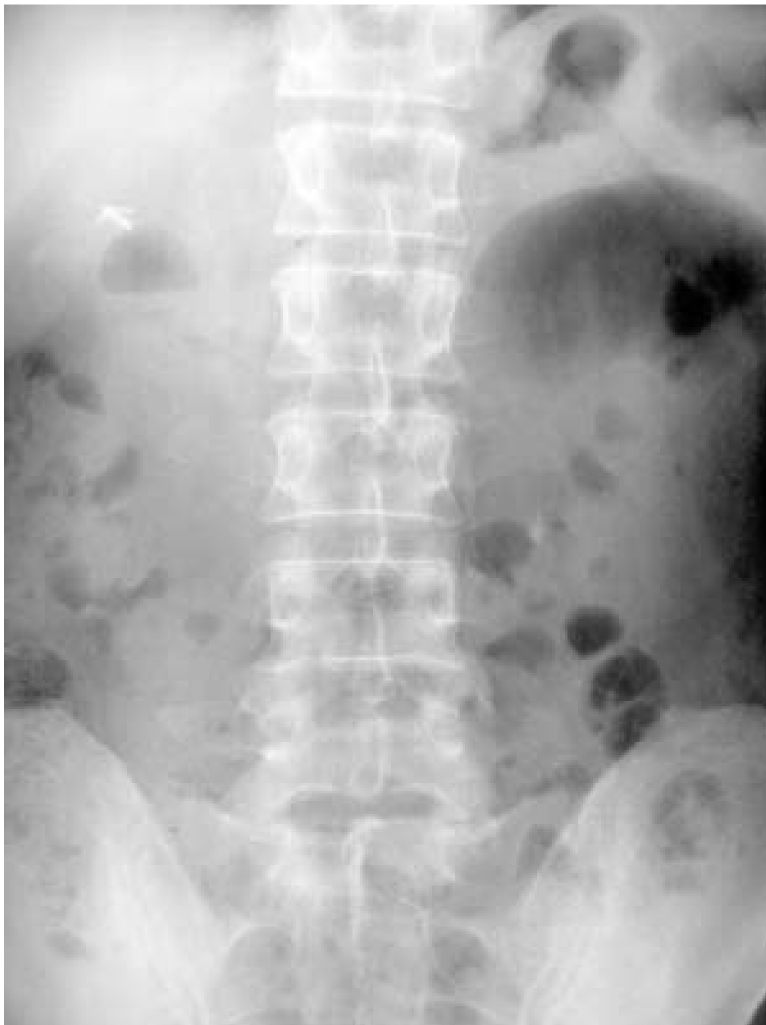
The patient did not choose to be treated for his problem in mainland China but returned to Hong Kong where he was assessed in the emergency department at the Prince of Wales Hospital. By that time, the episodes of abdominal cramping had increased in frequency to once every 1–2 hours during the day, and the pain was sufficient to awaken him once or twice at night. There was no change in the location of the pain. On exami-

nation, his temperature was 36.8ºC, pulse 75/min and blood pressure 125/80 mmHg. The abdomen was soft, not distended and nontender. The bowel sounds were normal. There was no tenderness with palpation over the kidney. The rest of the physical examination was otherwise unremarkable.

His hemoglobin was 158 g/L, white blood cell count $5.7x10^9$/L with a normal differential count, and platelet count $183x10^9$/L. His serum sodium was 146 mmol/L, potassium 3.7 mmol/L, urea 5.4 mmol/L, creatinine 105 µmol/L, urea/creatinine ratio 0.05 mmol/µmol, glucose 6.1 mmol/L, total protein 73 g/L, albumin 43 g/L, alanine aminotransferase 27 IU/L, calcium 2.3 mmol/L, phosphate 1.07 mmol/L, alkaline phosphatase 71 IU/L, urate 346 µmol/L and amylase 73 U/L. The prothrombin time was 11.8 sec, and the activated partial thromboplastin time was 30.9 sec. Urinalysis showed a pH of 6 and a specific gravity of 1.010. There were 0–5 white blood cells and 20–30 red blood cells per high-power field. Urine culture was normal. X-ray of the abdomen showed a radiopaque opacity in the left side of the abdomen at the level of the third and fourth lumbar vertebrae (L3/4) and in a position compatible with a ureteral stone (Figure 1). A nonenhanced helical computed tomography (CT) of the abdomen showed a 6x8-mm high-density calculus in the left ureter at the level of L3/4 with mild proximal hydroureteronephrosis and perinephric stranding (Figure 2).

The patient developed mild left-side loin pain and tenderness to palpation over the left kidney in the evening following the x-ray and CT of the abdomen. Extracorporeal shockwave lithotripsy was performed the following day. Preoperative medications included 50 mg pethidine intramuscularly and 0.5 mg alfentanil and 750 mg cefuroxime intravenously. A total of 3,000 shockwaves were administered. The abdominal cramps disappeared promptly after the procedure. Mild left-side loin pain and tenderness persisted for two more days. The patient passed minute pieces of stone fragments in the urine after the procedure (Figure 3). The patient was treated with prednisone 25 mg daily, nifedipine 30 mg daily, and ibuprofen 400 mg three times a day to facilitate expulsion of residual stone fragments and to reduce ureteral inflammation and edema. The patient was instructed to drink sufficient fluids to maintain a urine output of ≥2 liters a day so as to minimize the recurrence of urinary tract calculi.

Figure 1. X-ray of the abdomen with an opacity in the left side of the abdomen at L3/4 level



Analysis of the stone fragments revealed 56% calcium oxalate, 42% calcium phosphate-carbonate, and 2% matrix protein and lipid. A 24-hour urine collection had a volume of 2,359 ml and contained 13.8 mmol of creatinine, 6.53 mmol of calcium, 31 mmol of phosphate, 42 mmol of urate, 1.6 mmol of citrate and 242 mmol of oxalate.

DISCUSSION

In acute ureteral colic, the pain is produced by physical stretching of nerve endings, provoked by increased endoluminal pressure of the urinary tract and by increased tension in the wall of the ureter as a result of ureteral obstruction.[2] In response to the ureteral obstruction, the smooth muscles in the wall of the ureter contract so as to propel the calculus down the ureter.[4] These smooth muscles develop spasm if the calculus becomes lodged and fails to move.[4] The muscle spasm leads to ischemia and increased production of lactic acid, which irritates

both slow type-A (myelinated) and fast type-C (unmyelinated) fibers with aggravation of the pain.[2,4] Mucosal irritation and chemoreceptor activation have only a minor role to play.[5]

Referred pain or radiation of pain can occur in any organ that shares the innervation of the urinary tract. Referred pain is felt in the area supplied by the same dermatome as a result of shared central pathways for the afferent neurons from the different sites.[6] Distension of the renal capsule can lead to nausea and vomiting because of shared connections between the renal plexus and the celiac and mesenteric plexuses that reach the spinal cord at the same level.[1,2] A calculus lodged in the right ureteropelvic junction can mimic acute cholecystitis.[7] A calculus lodged in the right and left lower ureter can mimic acute appendicitis and acute diverticulitis, respectively.[7,8] A calculus lodged in the vesicoureteral junction can mimic acute cystitis. Typically, the pain occurs on the same side as the underlying pathology. Rarely, the pain can occur on the contralateral side, a phenomenon known as "mirror pain."[4] Clark et al. evaluated 631 patients with unilateral, symptomatic, radiologically identifiable calculi in the upper urinary tract, and identified three patients with contralateral or "mirror" pain.[4]

Gross or microscopic hematuria occurs in approximately 90% of patients with ureteral calculus.[9] As such, the absence of hematuria does not exclude the presence of ureteral calculi.[9]

Our patient presented with generalized abdominal cramps, no specific urinary symptoms and with normal-looking urine. The pain was periumbilical and did not localize to either side. The presentation with cessation of bowel movements, abdominal distension and a past history of abdominal surgery suggested the possibility of intestinal obstruction. The diagnosis of ureteral calculus was established when an abdominal radiograph did not show signs of intestinal obstruction but did show an opacity in the left side of the abdomen at the level of L3/4. This was confirmed by a nonenhanced CT, which showed the calculus in the left ureter with proximal hydroureteronephrosis and perinephric stranding. A kidneys, ureter, bladder (KUB) radiograph will show 90% of renal and ureteral calculi.[10] Calcium oxalate and phosphate calculi are radiopaque and are easily visible. Pure uric acid, xanthine and triamterene calculi are radiolucent and might not be visible on plain radiographs.[10] Helical unenhanced CT is the modality of choice for the evaluation of acute renal colic. Helical unenhanced CT has a sensitivity of 96–100% and a specificity of 92–100%; it also provides detailed anatomic information.[10]

Our patient developed left-side loin pain and tenderness on the evening of the day when radiographs and CT of the abdomen were performed. Prior to that, the symptoms were atypical for ureteral colic. Physicians should thus be vigilant of this unusual clinical presentation. Ureteral calculus should be considered in the differential diagnosis of patients who present with generalized abdominal cramps.

Figure 2. A nonenhanced CT scan with a high density proximal ureteral calculus surrounded by soft tissue (rim sign)

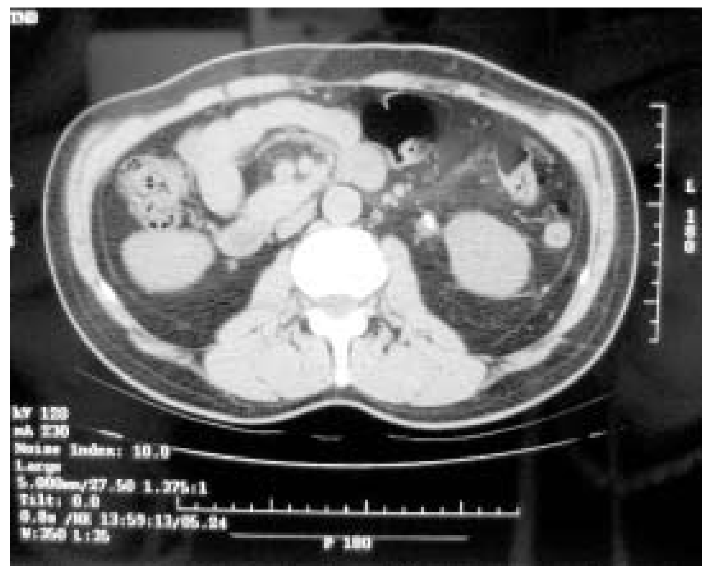
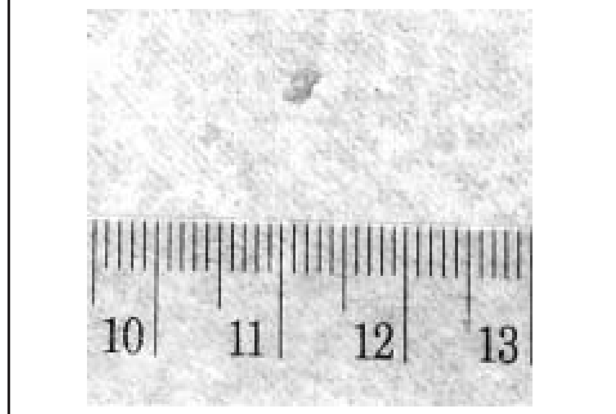


Figure 3. Ureteral stone fragments passed after extracorporeal shock wave lithotripsy



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