

# Acute Abdominal Pain Due to Spontaneous Rupture of the Renal Calyx: Clinical Presentation, Diagnosis and Management

## *Spontan Renal Kaliks Rüptürüne Bağlı Akut Karın Ağrısı: Klinik Görünüm, Tanı ve Tedavi*

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### ABSTRACT

**Background:** Rupture of renal calyces with urinoma, mimicking acute abdomen, is an unusual condition that is mostly caused by distal ureteral stone.

**Case Presentation:** Ultrasonographic evaluation showed right hydronephrosis in a woman who was admitted to our emergency department with persistent severe abdominal pain. A delayed contrast-enhanced computerized tomography (CT) was required to confirm the diagnosis of rupture in symptomatically worsening patient. Among various treatment options conservative treatment was preferred, the patient was recovered, and urinoma was resolved without any complication. Diagnosis and treatment options are discussed.

**Conclusion:** A spontaneous rupture of the urinary system can mimic acute abdomen, and should always be considered in the differential diagnosis of a patient presenting complex symptoms after renal colic. If a definite diagnosis cannot be established by routine imaging modalities, delayed phase contrast-enhanced CT would be helpful in this regard. Conservative treatment with careful monitoring is an option with good results, thus it may obviate the need for surgical intervention in most of the patients.

**Keywords:** rupture, stone, computed tomography, abdominal pain

### ÖZ

**Giriş:** Renal kaliks rüptürü ve beraberinde oluşan ürinom çoğunlukla distal üreter taşından kaynaklanan ve akut karını taklit eden alışılmadık bir durumdur.

**Olgu Sunumu:** Acil servisimize inatçı ve şiddetli karın ağrısı ile başvuran bir kadın hastaya yapılan ultrasonografik incelemede sağ böbrekte hidronefroz saptandı. Semptomatik olarak kötüleşen hastada rüptür tanısını doğrulamak için gecikmiş faz kontrastlı bilgisayarlı tomografi (BT) gerekiyordu. Farklı tedavi seçenekleri arasında konservatif tedavi tercih edildi, sonrasında ürinom komplikasyonsuz düzeldi ve hasta iyileşti. Tanı ve tedavi seçenekleri tartışıldı.

**Sonuç:** Üriner sistemin spontan rüptürü akut karını taklit edebilir ve renal kolik sonrası kompleks semptomlar gösteren bir hastanın ayırıcı tanısında her zaman düşünülmelidir. Rutin görüntüleme modaliteleri ile kesin bir tanı konulamazsa, gecikmiş faz kontrastlı BT bu açıdan yardımcı olacaktır. Dikkatli izleme ile konservatif tedavi, iyi sonuçlara sahip bir seçenektir ve bu nedenle hastaların çoğunda cerrahi müdahale ihtiyacını ortadan kaldırabilir.

**Anahtar kelimeler:** rüptür, taş, bilgisayarlı tomografi, karın ağrısı

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## INTRODUCTION

Spontaneous rupture of the renal calyx and urine extravasation with symptoms of acute abdominal pain is a rare condition. The underlying pathophysiology of the rupture is the increased pressure in the renal pelvis exceeding the critical level of 20 to 77 mmHg<sup>1, 2</sup>. The frequent cause is a stone, mostly located at the distal part of the ureter followed by malignant extrinsic ureteric compression<sup>3</sup>. I herein report a case of spontaneous rupture of the renal calyx due to ureteral stone, and its etiology, diagnosis, and treatment options are discussed.

## CASE PRESENTATION

A 67-year old woman presented to the emergency department with severe abdominal pain.

Her symptoms started a day ago as of right flank pain and nausea that did not respond to various analgesic drugs adequately. She had no history of urolithiasis. On physical examination, she had pain at the right lower quadrant of the abdomen, and rebound tenderness was detected. An immediate ultrasonographic evaluation revealed right hydronephrosis associated with a 3 mm distal ureteral stone. Analgesics were administered appropriately, and complete laboratory evaluations were performed. Vital parameters, biochemical analysis, and urine test results of the patient were within normal limits (body temperature: 36.9°C, white blood cell count: 9,950/mm<sup>3</sup>, C reactive protein: 3.43, creatinine: 0.93). The patient had persistent acute abdominal pain; therefore, an abdominal contrast-enhanced computed tomography (CT) was mandatory. CT

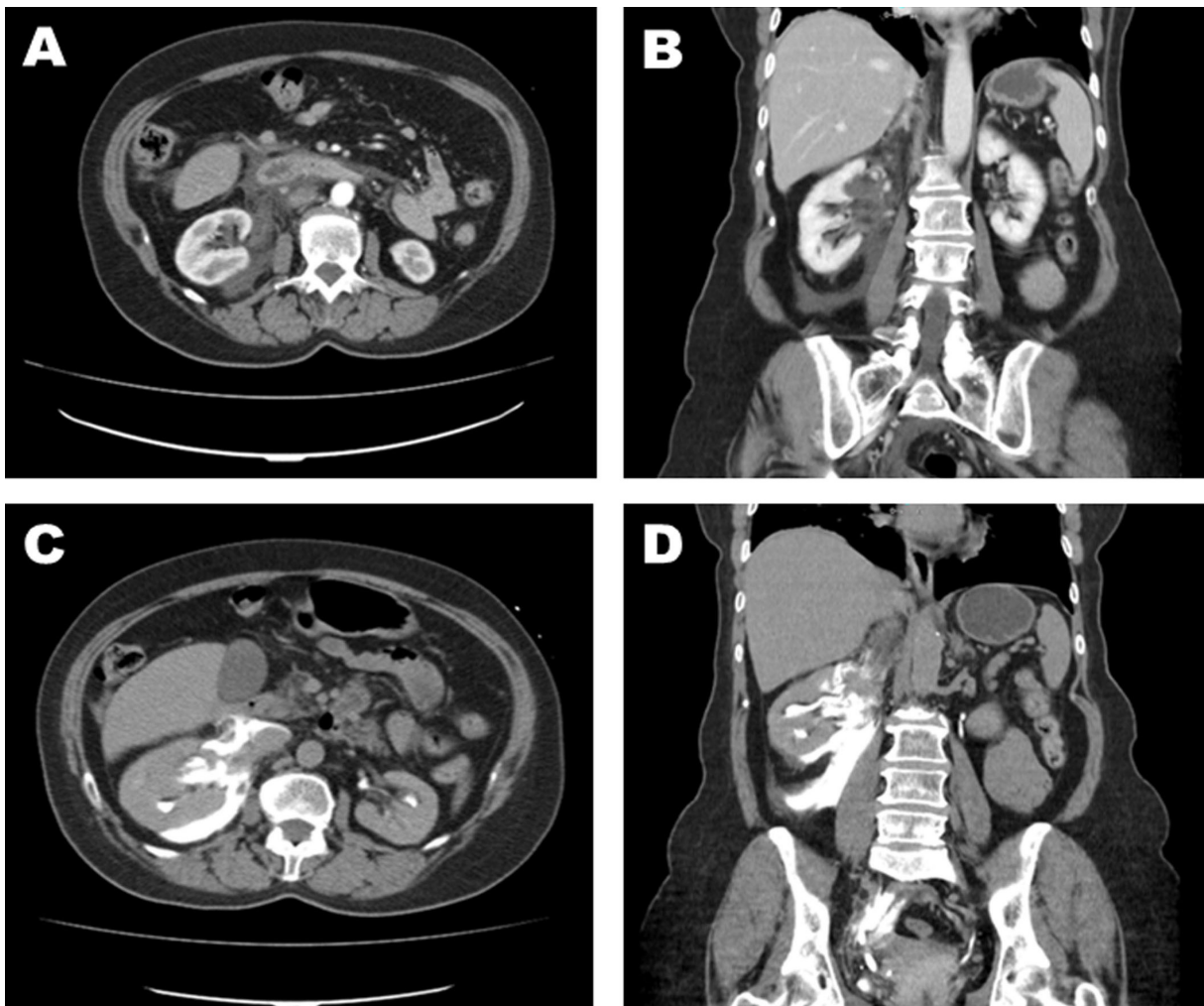


Figure 1. a-d Contrast- enhanced computed tomography showing right hydronephrosis, and suspicious extravasation 10 minutes after injection of the contrast material (A, B). Delayed phase images documenting contrast extravasation and urinoma (C, D).

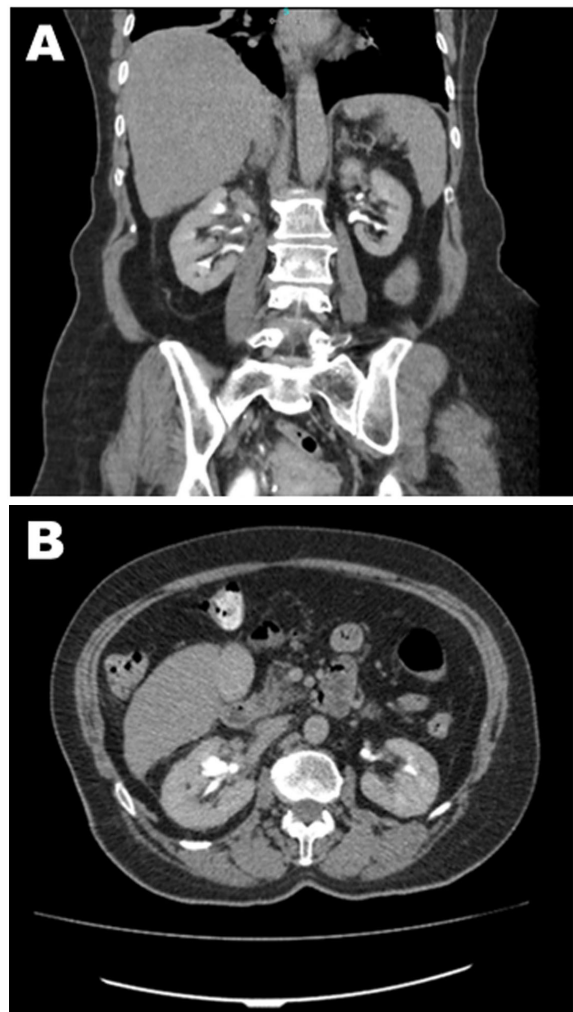
showed right hydronephrosis 10 minutes after the injection of contrast medium. However, delayed phase images demonstrated contrast extravasation from the upper calyx of the right kidney into the perirenal space associated with an urinoma. Ureteral dilatation was observed throughout the right ureter down to the ureterovesical junction without evidence of ureteral stone (Figure 1).

Percutaneous nephrostomy and/or ureteroscopic evaluation were scheduled. The next day, the general condition of the patient improved without abdominal pain. Before the intervention, ultrasonographic control did not show any dilatation at the right pelvicalyceal system. Thus, surgical intervention was postponed and conservative treatment was continued. On the third day of the patient's hospital stay, a contrast-enhanced CT was performed. The right renal hydronephrosis was minimal, and the calibration of the right ureter was normal. CT did not show any extravasation of the contrast out of the upper calyx (Figure 2). One week after the patient's discharge, ultrasonographic evaluation could not reveal any sign of urinoma.

## DISCUSSION

Spontaneous rupture of renal calyces or ureter has been reported with an incidence of 0.08–1% per urogram. It usually occurs with ureteral stone(s) in 50% of the cases, leading to ureteral obstruction and transmission of backpressure with resultant high hydrostatic intraluminal pressure<sup>4</sup>. Other reported causes are tumor, postirradiation stricture, congenital abnormality, retroperitoneal fibrosis, connective tissue disorder, pregnancy, renal transplant, vesicoureteral reflux, urinary tract infection, urinary retention, and chemotherapy<sup>1, 3-5</sup>. Fornix rupture of the right kidney is the most common site followed by the upper ureter. Urine extravasation may lead to urinoma formation; usually limited within the Gerota's fascia, but rarely it might exceed the midline<sup>1</sup>.

Precise diagnosis requires a careful physical examination and detailed clinical history. The



**Figure 2. a, b. No extravasation of contrast material from the upper calyx of the right kidney is shown at control computed tomograms obtained after treatment (A, B).**

symptoms are diverse, ranging from renouretal colic, nausea, and vomiting to unremitting severe abdominal pain or acute abdomen with peritoneal irritation. Sometimes, it is associated with fever or hematuria. Differential diagnosis includes pyelonephritis, appendicitis, diverticulitis, duodenal ulcer, biliary colic, and cholecystitis<sup>6</sup>. Therefore, a spontaneous urinary tract rupture should be considered in patients with acute abdomen, or sudden deterioration of the symptoms in patients with flank or abdominal pain.

Ultrasonography is usually performed as the first line of investigation method for renal colic. It can identify hydronephrosis, calculi, and perinephric urinoma. Enhanced and non-enhanced CT is the most accurate and efficient technique in patients

presenting complex symptoms after renal colic<sup>4</sup>. In this case, a contrast- enhanced CT was also obtained to exclude the other causes of persistent acute abdominal pain. Delayed phase CT scans are essential to demonstrate ureteral entity, and identify the attenuation increase of the urinoma, which can range from 0 to 20 HU before intravenous contrast administration and then enhance up to 200 HU after contrast administration<sup>1,4</sup>.

Since the first case was reported in 1856, spontaneous rupture of the urinary system has attracted less attention than it deserves through the years, despite occasional reports appeared in the literature including the one series consisted of 12 cases published in 1976<sup>2</sup>. The most common reason for spontaneous rupture was determined as ureteral stone (74.1%) among 108 patients in a retrospective study. Malignancy (8.3%), benign lesions (1.9%), ureteropelvic junction obstruction (1.9%), and vesicoureteric junction stenosis (0.9%) were other identified causes, and no reason was evident in 8.3% of the cases. In the same study, the level of obstruction was found significant, and the stones were located at the distal part of the ureter in 58.1 % of the cases<sup>3</sup>. A recent review showed similar results that the most common cause was an ureteral stone (56%) for spontaneous ureteral rupture, whilst no cause was identified in 22% of the patients<sup>7</sup>.

Treatment decision has to be made according to the underlying pathology and patients' symptoms. The options are double- J ureteral stent placement, ureteroscopic lithotripsy, percutaneous nephrostomy, and conservative treatment in the presence of small ruptures<sup>1, 2, 6, 8</sup>. Drainage of urinoma or open surgery is rarely indicated, and can only be an option in difficult cases associated with extensive rupture or in case of sudden clinical deterioration<sup>8, 9</sup>. Ureteral stenting can be appropriate management of the calyceal rupture with upper ureteral and ureteropelvic junction stones. Distal and middle ureteral obstructive stones can be treated by ureteroscopic lithotripsy combined with ureteral stenting<sup>4, 6</sup>. When percutaneous nephrostomy is preferred; the catheter should be left in situ to inject contrast

medium to confirm that the injury is completely healed<sup>1</sup>. In this case, the stone was at the distal ureter and extravasation was from the upper calyx. Since hydroureteronephrosis subsided in a short period, conservative treatment was the preferred method of choice in our case, contrary to the tendency for percutaneous nephrostomy at the beginning of the course. Lien et al.<sup>10</sup> reported good results and mostly an uneventful recovery with conservative treatment including antibiotics in the presence of a distal ureteric stone with calyceal rupture, as is the case with most of the relevant literature<sup>5, 7</sup>.

A spontaneous rupture of the urinary system can mimic an acute abdomen, and should always be considered in the differential diagnosis of a patient presenting complex symptoms after renal colic. If a definite diagnosis cannot be established by routine imaging modalities, such as plain abdominal films, ultrasonography, and non-enhanced CT scans, close follow-up is important. Delayed phase contrast- enhanced CT would be helpful in this regard. Spontaneous rupture of renal calyces should be evaluated and managed on an individual basis. Conservative treatment with careful monitoring is an option with good outcomes, thus it may obviate the need for surgical intervention in most of the patients.

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