Urology Case Reports 69 (2026) 103644

Contents lists available at ScienceDirect

Urology Case Reports

journal homepage: www.elsevier.com/locate/eucr

Endourology

# Spontaneous ureteral rupture secondary to distal ureteric stone presenting as perinephric urinoma: A case report of a rare urological emergency

Binyam Mohammedbirhan Berhe [a,*], Mohamedaman Mohamedsied Ibrahim [b], Mizan Kidanu Weldemariam [b], Tigabu Bezabh Hagos [c], Temesgen Gebremariam Weldeslassie [b]

[a] Mekelle University College of Health Sciences, Department of Pathology, Mekelle, Ethiopia
[b] Mekelle University College of Health Sciences, Department of Surgery, Mekelle, Ethiopia
[c] Mekelle University College of Health Sciences, Department of Radiology, Mekelle, Ethiopia

ARTICLE INFO

*Keywords:*
Spontaneous ureteral rupture
Ureteric stone
Ureterovesical junction
Urinoma
Perinephric collection
Obstructive uropathy
Hydronephrosis
Ureteroscopy
Case report

ABSTRACT

Spontaneous ureteral rupture is a rare complication of obstructive uropathy that may mimic infection and delay diagnosis. We report a 48-year-old man with persistent left flank pain initially treated as pyelonephritis. Imaging showed worsening hydronephrosis and perinephric fluid. Contrast-enhanced CT demonstrated a <3 mm distal ureteric stone at the ureterovesical junction with contrast extravasation, confirming ureteral rupture and urinoma. The patient underwent emergency ureteral stenting followed by delayed ureteroscopy and lithotripsy, with complete recovery. Early CT imaging and prompt decompression are essential for accurate diagnosis and optimal outcomes in such cases.

## 1. Introduction

Spontaneous ureteral rupture (SUR) is an uncommon yet clinically significant complication of acute urinary tract obstruction, most frequently attributable to ureteric calculi. It occurs due to an abrupt increase in intraluminal pressure, resulting in disruption of the ureteral wall and leakage of urine into the retroperitoneal or perinephric spaces. Clinically, the condition can resemble more common entities such as acute pyelonephritis, renal colic, or complicated urinary tract infection, often leading to delays in accurate diagnosis and appropriate management.[1]

Ureteric stones, including small calculi located distally near the ureterovesical junction (UVJ), are increasingly recognized as a leading cause of spontaneous ureteral or calyceal rupture. The diagnosis is frequently missed on initial ultrasound examination, whereas contrast-enhanced computed tomography is considered the gold standard for accurately identifying both the site of obstruction and the presence of urinary extravasation.[2]

Timely recognition is critical, as delayed diagnosis may result in serious complications such as urinoma formation, sepsis, abscess formation, and impaired renal function. Early urinary diversion through ureteral stenting or percutaneous drainage, followed by definitive management of the underlying stone, has been shown to yield excellent clinical outcomes, even in patients with significant urinary leakage.[3]

## 2. Case presentation

A 48-year-old previously healthy male presented with a 14-day history of progressive left flank pain. The pain was colicky, intermittently severe, and associated with nausea, but there was no history of fever, dysuria, or gross hematuria. He had no prior history of urolithiasis, urinary tract infection, trauma, or previous urological procedures. Two days prior to presentation at our institution, he sought care at a peripheral hospital due to worsening abdominal pain.

At the initial evaluation, he was afebrile but in moderate distress due to pain. Physical examination revealed left flank tenderness and a positive left costovertebral angle tenderness without guarding or rebound. His vital signs were largely stable, except for mild tachycardia. Laboratory investigations demonstrated a hemoglobin level of 14.2 g/dL, a mildly elevated white blood cell count of $11.8 \times 10^9$/L, and normal renal

* Corresponding author.
*E-mail addresses:* benjmoha17@gmail.com (B.M. Berhe), muhe20160@gmail.com (M.M. Ibrahim), mizankidanu@gmail.com (M.K. Weldemariam), tigabu.bezabh@mu.edu.et (T.B. Hagos), temesgengebrema3@gmail.com (T.G. Weldeslassie).

https://doi.org/10.1016/j.eucr.2026.103644
Received 3 September 2026; Received in revised form 4 October 2026; Accepted 11 October 2026
Available online 15 October 2026
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function with a serum creatinine of 1.1 mg/dL. Inflammatory markers included C-reactive protein (CRP) of 28 mg/L and erythrocyte sedimentation rate (ESR) of 32 mm/hr. Urinalysis showed microscopic hematuria with mild pyuria. Urine culture obtained at initial presentation showed no bacterial growth after 48 hours of incubation.

An abdominal ultrasound performed at that time revealed mild left hydronephrosis and minimal perinephric fluid collection, without visualization of a ureteric calculus. Based on these findings, a provisional diagnosis of acute pyelonephritis was made, and the patient was treated with intravenous antibiotics, fluids, and analgesics. However, his symptoms failed to improve over the next 48 hours and instead progressed in severity.

A repeat ultrasound demonstrated worsening hydronephrosis, now moderate in degree, along with a significant increase in perinephric fluid collection. In view of clinical deterioration and inconclusive imaging, the patient was referred to our tertiary care center for further evaluation.

On presentation to our institution, he continued to have severe left flank pain but remained hemodynamically stable and afebrile. A non-contrast computed tomography scan of the kidneys, ureters, and bladder (Fig. 1) identified a small hyperdense calculus measuring less than 3 mm at the distal left ureter near the ureterovesical junction (UVJ), with a density of approximately 506 Hounsfield units (**Video 1**). There was associated mild to moderate hydroureteronephrosis with perinephric fluid collection (**Video 2**). Given the disproportionate fluid accumulation, a contrast-enhanced CT scan was subsequently performed, which demonstrated contrast extravasation from the proximal ureteric segment into the perinephric space, consistent with spontaneous ureteral rupture and urinoma formation. The scan also revealed mild enlargement of the left kidney and an incidental finding of left lower lobe consolidation with minimal pleural effusion. During retrograde ureteral stent placement, retrograde pyelography demonstrated contrast leakage at the proximal ureter near the PUJ, confirming ureteral wall disruption rather than isolated forniceal rupture.

Supplementary data related to this article can be found online at https://doi.org/10.1016/j.eucr.2026.103644

A final diagnosis of acute obstructive uropathy due to a distal ureteric stone complicated by spontaneous ureteral rupture and perinephric urinoma was established.

The patient underwent emergency retrograde ureteral stent placement for decompression of the obstructed system. The procedure was uneventful, and immediate urinary drainage was achieved. Postoperatively, he received intravenous antibiotics (ceftriaxone 1 g twice daily for 3 days), analgesics, and supportive care, along with treatment for the associated pulmonary infection. Serial laboratory follow-up showed normalization of WBC (from 11.8 $\times$ $10^9$/L to 7.6 $\times$ $10^9$/L) and CRP reduction from 28 mg/L to 6 mg/L within 72 hours. His clinical condition improved rapidly within 48 hours, with significant relief of pain.

He was discharged on the second day in stable condition and scheduled for definitive management. Four weeks later, he underwent elective ureteroscopy with laser lithotripsy, during which the distal ureteric stone was successfully fragmented and cleared. The previously

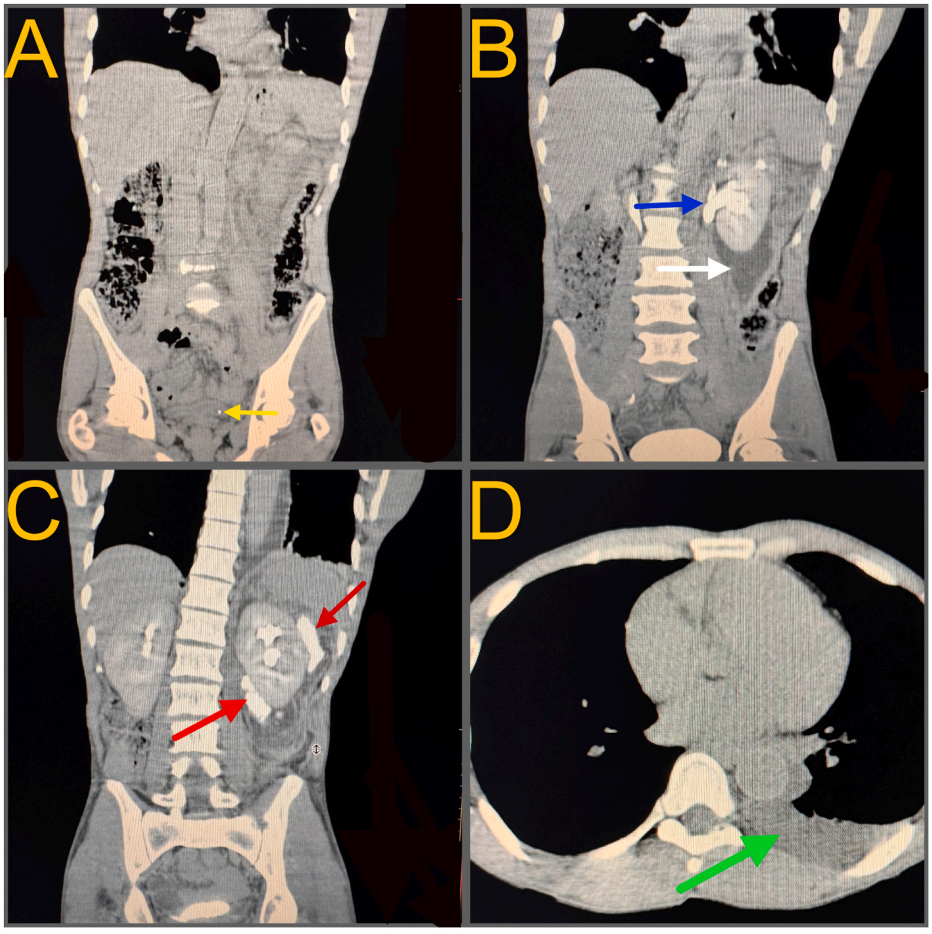



**Fig. 1. CT findings of spontaneous ureteral rupture secondary to distal ureteric stone.**
(A) Pre-contrast coronal CT image demonstrating a small hyperdense calculus at the left ureterovesical junction (yellow arrow).
(B) Post-contrast CT image showing the site of ureteral rupture in the proximal left ureter (blue arrow), with associated perinephric fluid collection (white arrow).
(C) Delayed phase image illustrating contrast extravasation into the perinephric space, consistent with urinoma formation (red arrow).
(D) Additional axial image demonstrating incidental left-sided pleural effusion (green arrow).

placed stent was removed without complication.

During follow-up at one and three months, the patient remained asymptomatic. Imaging showed complete resolution of hydronephrosis and perinephric collection, and renal function remained within normal limits. The patient reported satisfaction with the care received, particularly noting the rapid improvement after intervention and the minimally invasive nature of the treatment. No adverse events or recurrence were observed during the follow-up period. The chronological sequence of clinical events, diagnostic workup, and management is summarized as shown in Table 1.

## 3. Discussion

Spontaneous ureteral rupture (SUR) is an infrequent yet clinically important complication of urinary tract obstruction, increasingly recognized with the broader use of computed tomography. Recent studies indicate that spontaneous rupture of the upper urinary tract most commonly arises in the context of acute ureteric obstruction, particularly from calculi, and may present across a spectrum ranging from minimal perirenal fluid accumulation to extensive urinoma formation.[4] Radiologic classification systems have further demonstrated that the extent of urinary extravasation correlates with disease severity, with larger collections such as urinomas and free fluid being associated with more advanced presentations and a higher likelihood of complications.[4]

The pathophysiology involves a sudden elevation in intraluminal pressure proximal to an obstructing lesion, resulting in disruption of the forniceal region or ureteral wall. In our case, retrograde pyelography confirmed distal ureteral wall rupture, supporting true spontaneous ureteral rupture rather than isolated forniceal rupture. Notably, even small distal ureteric stones can trigger rupture, especially when located at the ureterovesical junction (UVJ) where resistance to urine flow is greatest.[5] This mechanism accounts for the finding in our case, where a calculus measuring less than 3 mm led to significant urinary leakage. Similar reports in the literature emphasize that stone size alone is not a reliable predictor of rupture risk, and that factors such as delayed presentation or sustained obstruction may be more critical determinants.[1]

From a clinical perspective, SUR remains challenging to diagnose because its presentation often overlaps with more common conditions such as renal colic and acute pyelonephritis. Patients frequently present with nonspecific flank or abdominal pain, and initial ultrasound imaging may fail to detect the underlying cause, particularly when the obstructing calculus is small or not visualized.[6] The initial misdiagnosis as pyelonephritis in our case exemplifies this common diagnostic pitfall. Worsening symptoms or increasing perinephric fluid on serial imaging should raise suspicion for urinary extravasation and prompt further investigation.

Contrast-enhanced computed tomography is the diagnostic modality of choice, as it enables both identification of the obstructing lesion and direct visualization of contrast leakage from the collecting system.[1] Delayed phase imaging is especially valuable for confirming extravasation and defining the extent of urinoma formation. In addition, CT plays an essential role in excluding other potentially life-threatening conditions, such as vascular or intra-abdominal emergencies, that may present with similar clinical features.[6]

If not promptly treated, SUR can result in significant morbidity, including infected urinoma, retroperitoneal abscess, sepsis, and long-term impairment of renal function. The clinical course is influenced by the volume of extravasated urine and the patient's baseline condition, with larger leaks conferring a greater risk of adverse outcomes.[6] Therefore, early diagnosis and timely management are crucial.

Current management strategies favor minimally invasive approaches, with urinary diversion serving as the cornerstone of therapy. Ureteral stenting is the most commonly used method, allowing rapid decompression of the obstructed system and promoting spontaneous healing of the rupture site.[1] When retrograde access is not feasible, percutaneous nephrostomy provides an effective alternative. Definitive treatment of the underlying cause, typically through ureteroscopy and lithotripsy, is usually deferred until stabilization, as performed in our patient. This staged approach has consistently demonstrated excellent outcomes with low complication rates in recent studies.[1,7]

This case underscores several important clinical insights. Spontaneous ureteral rupture should be considered in patients presenting with persistent flank pain and atypical imaging findings, even when an infectious etiology is initially suspected. Additionally, small distal ureteric stones can lead to significant complications, highlighting the need for a high index of suspicion. Finally, early utilization of CT imaging combined with prompt endoscopic management can result in rapid clinical recovery and complete resolution without long-term sequelae.

**Table 1**
Timeline of clinical presentation, diagnostic evaluation, and management.

| Time Point | Clinical Events and Findings |
|---|---|
| Day −14 | Onset of left flank pain, colicky in nature, progressive intensity |
| Day −2 | Presentation to local hospital; ultrasound shows mild hydronephrosis and minimal perinephric collection; treated as acute pyelonephritis with antibiotics |
| Day 0 (Re-presentation) | Worsening pain; repeat ultrasound shows moderate hydronephrosis and increased perinephric fluid; referred to urology center |
| Day 0 (Urology center) | Non-contrast CT identifies a distal left ureteric stone measuring <3 mm with hydroureteronephrosis and perinephric collection |
| Day 0 (Same day) | Contrast-enhanced CT demonstrates contrast extravasation into perinephric space, confirming ureteral rupture |
| Day 0–1 | Emergency retrograde ureteral stent placement for decompression |
| Day 2 | Clinical improvement; patient discharged in stable condition |
| Week 4 | Elective ureteroscopy and laser lithotripsy performed; stone cleared and stent removed |
| Month 1–3 follow-up | Complete clinical and radiological resolution; no complications |

## 4. Conclusion

Spontaneous ureteral rupture is a rare but important complication of obstructive uropathy that may mimic more common conditions such as acute pyelonephritis, leading to delayed diagnosis. This case highlights that even small distal ureteric stones can result in significant urinary extravasation and urinoma formation. Early use of contrast-enhanced CT is crucial for accurate diagnosis, while prompt urinary diversion followed by definitive stone management ensures excellent clinical outcomes.

## CRediT authorship contribution statement

**Binyam Mohammedbirhan Berhe:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Mohamedaman Mohamedsied Ibrahim:** Writing – review & editing, Validation, Investigation, Data curation. **Mizan Kidanu Weldemariam:** Writing – review & editing, Investigation, Data curation. **Tigabu Bezabh Hagos:** Writing – review & editing, Writing – original draft, Visualization, Project administration. **Temesgen Gebremariam Weldeslassie:** Writing – review & editing, Methodology, Investigation, Data curation.

## Patient consent statement

Written informed consent for publication of this case report and the accompanying clinical information.

## Ethics statement

This case report was conducted in accordance with institutional and local ethical guidelines. All procedures involving human participants were performed in accordance with the ethical standards of the World Medical Association Declaration of Helsinki. Ethical approval was waived according to institutional policy for single case reports.

## Patient perspective

A patient perspective was not obtained.

## Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

## Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this manuscript.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.eucr.2026.103644.

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