

Left Emphysematous Pyelonephritis with Contralateral Hydroureteronephrosis: A Case Report

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Case Report

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Abstract

Emphysematous pyelonephritis (EPN) is a rare yet potentially fatal gas-forming necrotizing infection of the renal parenchyma that requires immediate imaging diagnosis for appropriate urgent management. Herein, we report a case of a 56-year-old female patient with left-sided EPN diagnosed on computed tomography, which is a particularly rare case due to the presence of concurrent hydroureteronephrosis on the contralateral side of unknown aetiology, which is rarely reported in the medical literature. Ultrasonography revealed multiple echogenic foci with reverberation artefacts and dirty acoustic shadowing within the left renal parenchyma, along with adjacent perinephric fat stranding without any perinephric fluid collection, while the right kidney was enlarged in size up to grade II hydroureteronephrosis. CT KUB scan showed marked enlargement of the left kidney up to approximately 12.8 x 9.5 cm with architectural distortion, widespread intraparenchymal gas with an intrarenal fluid collection, which is compatible with Huang and Tseng Class 2 EPN [4]. The right kidney was of approximately 8.3 x 4.1 cm in size with marked dilatation of the pelvicalyceal system and ureter without any obstructive calculus or mass lesion as a cause. The urinary bladder was of normal outline and thickness while associated hepatomegaly was also noted.

Introduction

Emphysematous pyelonephritis (EPN) is an uncommon but life-threatening necrotizing infection characterized by gas within the renal parenchyma, collecting system, or perinephric tissues [1,8]. It most often affects patients with diabetes mellitus, urinary tract obstruction, impaired host immunity, or a combination of these factors [5,8]. Because the condition can progress rapidly to sepsis and renal functional compromise, early recognition on imaging is essential [1].

Imaging has a central role in diagnosis and management. Ultrasonography may demonstrate echogenic foci with reverberation artefacts and dirty posterior acoustic shadowing related to gas; however, the extent of disease and the presence of collections or extrarenal spread are better assessed on CT [2]. The CT-based classification proposed by Huang and Tseng remains widely used because it correlates imaging extent with management and prognosis [4]. In this case, CT-KUB confirmed left-sided EPN with contralateral right hydroureteronephrosis and no obvious obstructive calculus or mass lesion identified in the provided report.

Case Presentation

Patient Information

A 56-year-old female patient was evaluated in the nephrology/medicine clinical setting and underwent ultrasound examination of the abdomen and pelvis followed by CT-KUB. Patient identifiers have been removed for confidentiality. The clinical indication and detailed presenting symptoms were not documented in the supplied imaging reports.

Ultrasonography Findings

- The left kidney showed a reniform structure with reverberation artefact and multiple echogenic foci within the renal parenchyma producing dirty posterior acoustic shadowing, suggestive of intrarenal gas.
- Adjacent perinephric fat stranding was noted around the left kidney, without a definite perinephric fluid collection on the supplied USG report.
- The right kidney showed grade II hydroureteronephrosis with dilatation of the pelvicalyceal system and proximal ureter; a tiny echogenic concretion was noted at the mid pole on the handwritten USG report.
- Minimal bilateral pleural effusion was noted and described as non-tappable.
- Borderline hepatomegaly was present on ultrasound, with the liver measuring approximately 15.8 cm. The intrahepatic biliary radicles were not dilated.
- A few well-defined round-to-oval soft-tissue echogenic lesions near the splenic hilum with tiny calcific foci were described as likely accessory spleens (splenunculi).

Computed Tomography Findings

- CT kidney-ureter-bladder examination demonstrated enlargement of the left kidney, measuring approximately 12.8 x 9.5 cm.
- There was severe architectural distortion of the left kidney with extensive air foci within the renal parenchyma and an associated intrarenal fluid collection.
- Surrounding perinephric fat stranding was present around the left kidney.
- The overall CT appearance was consistent with left emphysematous pyelonephritis.
- The right kidney measured approximately 8.3 x 4.1 cm and showed dilatation of the pelvicalyceal system and ureter throughout its course, consistent with right hydroureteronephrosis.
- No obvious calculus was seen on either side on the CT report, and no definite obstructive calculus or mass lesion was identified as the cause of right hydroureteronephrosis.
- The urinary bladder was normal in outline and wall thickness.
- The liver measured approximately 16.5 cm in craniocaudal span, consistent with hepatomegaly.

Radiological Impression

- Left emphysematous pyelonephritis with left renal enlargement, severe architectural distortion, extensive intraparenchymal gas, intrarenal fluid collection, and perinephric fat stranding.
- Right-sided hydroureteronephrosis without obvious obstructive calculus or lesion on the provided CT report.
- Hepatomegaly.

- Provisional CT severity: Huang and Tseng class 2 EPN [4] based on gas limited to the renal parenchyma in the supplied report. If review of the CT images demonstrates gas or abscess extension into the perinephric space, the case should be reclassified as class 3A.

Treatment and Follow-Up

The patient was recommended to head to the urgent care urology and nephrology department due to emphysematous pyelonephritis, a serious kidney infection that needs prompt, coordinated care from multiple specialists.

The patient was discharged with significant improvement with advised regular follow-up with urology/nephrology for renal function assessment, urine culture if symptoms recur

Discussion

EPN is a radiological and clinical emergency because gas-forming infection may rapidly destroy renal parenchyma and extend into the perinephric or pararenal spaces [1,8]. The current case is notable for CT-confirmed extensive intraparenchymal gas and intrarenal fluid collection in the left kidney, along with contralateral right hydroureteronephrosis without an obvious obstructive calculus or mass lesion on CT.

Ultrasonography provided the first clue by showing echogenic foci with reverberation artefacts and dirty posterior acoustic shadowing in the left renal parenchyma. These findings are typical for gas but may be difficult to distinguish from calculi or bowel gas on ultrasound alone. CT clarified the diagnosis by directly demonstrating intraparenchymal air foci, renal enlargement with architectural distortion, and associated inflammatory stranding. The CT-based Huang and Tseng classification stratifies EPN according to the distribution of gas and abscess: class 1 denotes gas confined to the collecting system, class 2 denotes gas within the renal parenchyma without extrarenal extension, class 3A denotes extension into the perinephric space, class 3B denotes extension into the pararenal space, and class 4 denotes bilateral EPN or EPN in a solitary kidney [4]. On the basis of the supplied CT report, the present findings correspond most closely to class 2 disease; however, direct review of the CT images is required to exclude subtle perinephric gas or abscess extension that would upstage the classification.

The presence of contralateral hydroureteronephrosis is of additional clinical significance, as urinary tract obstruction is a recognized contributor to adverse outcomes in severe renal infection [6,7]. In the present case, hydroureteronephrosis involved the right ureter throughout its course, yet no obstructing calculus or discrete lesion was identified. This discordance warrants clinical correlation and, where indicated, further urological evaluation to distinguish among functional obstruction, inflammatory ureteric narrowing, a recently passed calculus, a distal ureteric lesion, or bladder outlet dysfunction.

Management decisions in EPN depend on hemodynamic status, renal function, extent of gas, presence of abscess or obstruction, culture results, and response to antibiotics [6,7]. Contemporary management

generally favors early broad-spectrum antibiotics and drainage or decompression when indicated, reserving nephrectomy for non-responders or extensive disease with poor prognostic features [3,5,6]. For this case, the final manuscript should include laboratory data, culture results, diabetic status, renal function, treatment performed, and clinical outcome to make the report complete and publication-ready.

Comparison with Previous Original Studies

Study, year	Study type / imaging basis	Relevant original finding	Relation to the present case
Michaeli et al., 1984 [1]	Original clinical series	Described EPN as a severe gas-forming renal infection requiring prompt recognition and treatment.	Supports the emergency nature of the current CT-confirmed left EPN.
Wan et al., 1996 [2]	Original imaging-outcome study	Correlated radiographic, CT, and ultrasound patterns with clinical outcome; type II disease included fluid collection with bubbly or loculated gas.	The present case shows intrarenal gas and fluid collection; actual CT images should be reviewed for Wan type assignment.
Chen et al., 1997 [3]	Original treatment series	Reported 10-year experience with percutaneous drainage as a renal-preserving approach in EPN.	Highlights why identification of intrarenal fluid collection and obstruction matters for management planning.
Huang and Tseng, 2000 [4]	Original CT-based classification study	Proposed the widely used CT classification and linked extent of gas/abscess and risk factors with outcome.	The supplied CT report most closely fits class 2, unless images show perinephric gas/abscess.
Tang et al., 2001 [5]	Original clinical series	Showed EPN usually presents in diabetic patients and may require drainage or nephrectomy in severe cases.	Clinical details such as diabetes status, cultures, and renal function should be added for final submission.
Kapoor et al., 2010 [6]	Original prognostic study	Identified factors predicting mortality and need for nephrectomy in EPN.	Laboratory and clinical severity data are needed to discuss prognosis in the present case.
Lu et al., 2014 [7]	Original retrospective study	Reported predictors of conservative treatment failure, including severe hypoalbuminemia and emergency hemodialysis need.	Supports adding albumin, renal function, shock status, and treatment response to the manuscript.
Present case, 2026	CT-based case report	Left renal enlargement, severe architectural distortion, extensive intraparenchymal gas, intrarenal fluid collection, and right hydroureteronephrosis without obvious obstructive calculus/lesion.	Adds a CT-documented case of unilateral left EPN with contralateral hydroureteronephrosis.

Differential Diagnosis

- Emphysematous pyelitis: gas limited to the collecting system without renal parenchymal destruction; less likely because CT reported extensive intraparenchymal air foci and renal architectural distortion.
- Renal or perinephric abscess: may produce fluid collections and inflammatory stranding but does not by itself explain extensive intraparenchymal gas unless gas-forming infection is present.
- Xanthogranulomatous pyelonephritis: may cause renal enlargement and inflammatory change, usually associated with chronic obstruction or staghorn calculus; no calculus was reported on CT.
- Gas introduced by instrumentation or fistula: should be considered if there is recent intervention, trauma, or bowel communication; such history was not provided in the reports.

Conclusion

This particular case shows emphysematous pyelonephritis proven by CT imaging with features of renal enlargement, severe distortion of architecture, abundant gas in the parenchyma, fluid collection within the kidney, and fat stranding around the kidney. The right hydroureteronephrosis without an identifiable obstructing stone or lesion further increases the clinical significance and warrants correlation with urology.

Key Learning Points

- EPN is a severe gas-forming renal infection that requires urgent diagnosis and management.
- Ultrasound may suggest intrarenal gas through echogenic foci, reverberation artefacts, and dirty posterior acoustic shadowing, but CT is superior for disease mapping.
- CT findings in this case included left renal enlargement, severe architectural distortion, extensive parenchymal gas, intrarenal fluid collection, and perinephric fat stranding.
- Contralateral hydroureteronephrosis without visible calculus should be evaluated carefully because obstruction can influence management and prognosis.
- Actual CT images are necessary for final classification, figure preparation, and publication-quality radiological documentation.

Abbreviations

Abbreviation

Full form

CT

Computed tomography

EPN

Emphysematous pyelonephritis

KUB
Kidney-ureter-bladder
PCD
Percutaneous catheter drainage
USG
Ultrasonography

Declarations

Ethics approval and consent to participate

Not applicable. This case report does not involve any interventional study requiring ethics committee approval. This case report complies with the CARE (Case Report) guidelines.

Consent for publication

Written informed consent for publication of this case report and the accompanying images was obtained from the patient.

Clinical trial number

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Author Contribution

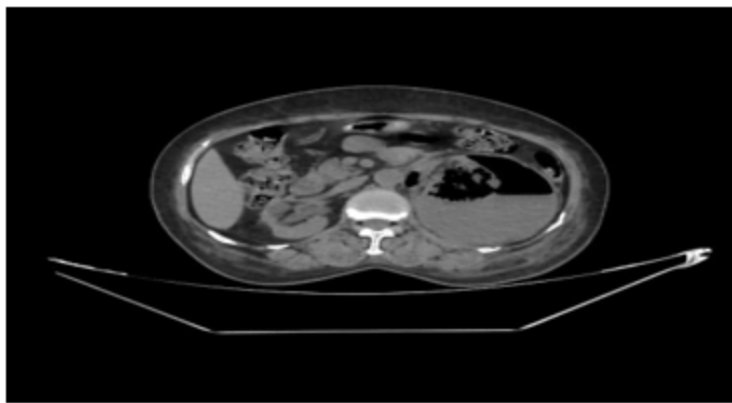
The authorss helped in finding of data and helped in preparing of tables.All authors reviewed the manuscript.

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Figures

1.

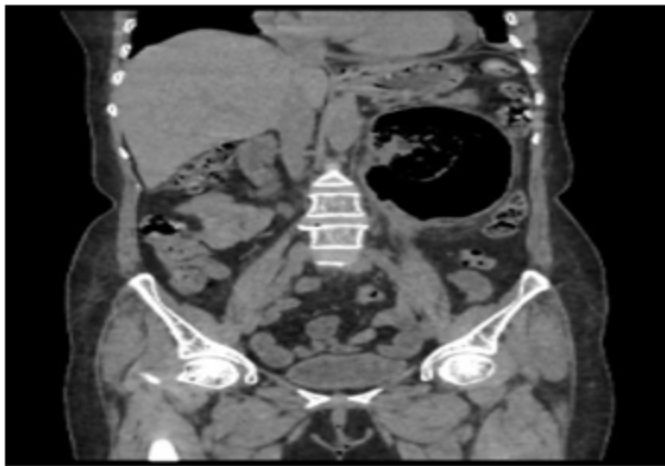


Axial CT-KUB image showing enlarged left kidney with severe architectural distortion and multiple intraparenchymal air foci, consistent with emphysematous pyelonephritis.

Figure 1

Axial CT-KUB image showing enlarged left kidney with severe architectural distortion and multiple intraparenchymal air foci, consistent with emphysematous pyelonephritis.

2.

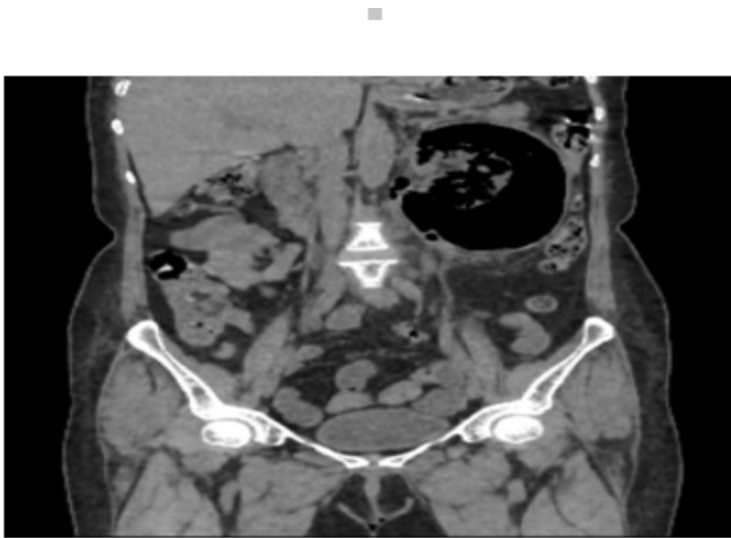


Coronal CT-KUB image demonstrating left renal enlargement with intrarenal fluid collection and surrounding perinephric fat stranding.

Figure 2

Coronal CT-KUB image demonstrating left renal enlargement with intrarenal fluid collection and surrounding perinephric fat stranding.

3.

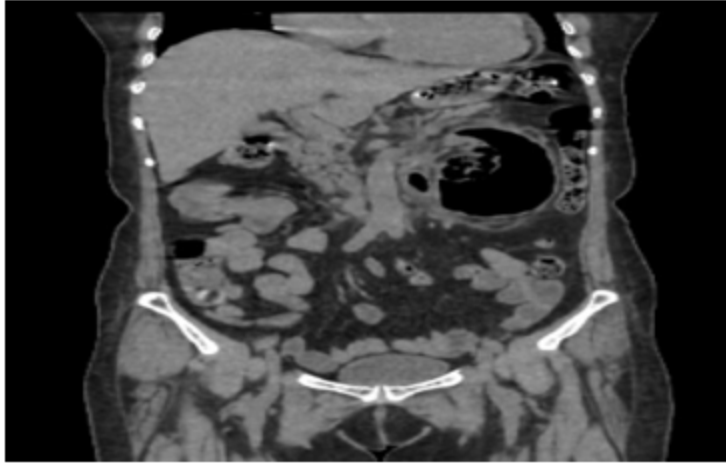


Axial or coronal CT-KUB image showing right-sided hydroureteronephrosis with dilatation of the pelvicalyceal system and ureter, without an obvious obstructive calculus or mass lesion.

Figure 3

Axial or coronal CT-KUB image showing right-sided hydroureteronephrosis with dilatation of the pelvicalyceal system and ureter, without an obvious obstructive calculus or mass lesion.

4.



Coronal CT abdomen image showing hepatomegaly, if relevant to the final radiological figure set.

Figure 4

Coronal CT abdomen image showing hepatomegaly, if relevant to the final radiological figure set.

Supplementary Files

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