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Case Report Open Access

# Emphysematous pyelitis: a case report

**Ali Moradi** [1], **Akram Sanagoo** [2], **Maryam Abolghazi** [3*], **Karim Aqerkakli** [4], **Fatemeh Mehravar** [5], **Leila Jouybari** [6]

[1] Nursing Student, Research Committee, Golestan University of Medical Sciences, Golestan, Iran
[2] Associate Professor, School of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran
[3] Nurse, Golestan University of Medical Sciences, Gorgan, Iran
[4] Radiologist, Golestan University of Medical Sciences, Gorgan, Iran
[5] Assistant Professor of Epidemiology, School of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran
[6] Professor, School of Nursing and Midwifery, Golestan University of Medical Sciences, Gorgan, Iran

[*] **Corresponding author:** Maryam Abolghazi, Amir al-Mominin (AS) Hospital, Kordkuy City, Golestan University of Medical Sciences, Gorgan, Iran. **E-mail:** maryamabolqazi2@gmail.com

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## Abstract

**Background:** Emphysematous pyelitis is a rare disease, and there is limited scientific literature documenting the same. Despite being a relatively benign condition, this disease is often unreported. In light of this, the purpose of this study is to present a rare case of emphysematous pyelitis, contributing vital information on this disease.

**Case presentation:** A 51-year-old female patient hailing from northern Iran presented at the hospital with symptoms of fever, chills, lethargy, and side pain. Her medical history revealed that she suffered from kidney stones, thyroid disease, grade 1 fatty liver disease, anemia, and cardiovascular disease. The patient was diagnosed with emphysematous pyelitis using computed tomography (CT) scanning and was promptly treated with antibiotics. Subsequently, the patient's condition improved considerably, and abscess drainage was recommended. After symptoms abated, the patient was discharged from the hospital, receiving Litorex B for removing the stones. Surgery for the removal of the stones was not pursued immediately, given that the patient's kidneys were continuing to produce urine.

**Conclusion:** The patient in this case report was diagnosed with emphysematous pyelitis using a CT scan and treated with antibiotics, while abscess drainage was suggested. Reporting uncommon cases such as this can significantly increase medical students' awareness of such diseases, leading to prompt diagnosis and appropriate treatment. Additionally, further research in the field of emphysematous pyelitis can reduce the incidence and mitigate the complications arising from this rare condition.

**Keywords:** Emphysematous pyelitis, Pyelitis, Kidney infection, Pyelonephritis, X-ray Computed tomography.

## Introduction

Emphysematous pyelitis is a bacterial infection of the pelvic and kidney regions that can occur alone or in conjunction with emphysematous pyelonephritis, a more severe variant of the disease.[1] Although both conditions share similar symptoms, emphysematous pyelitis is considered a less aggressive form of the disease, with a better prognosis and a mortality rate of only 20% compared to the latter, which has a mortality rate of 50%.[2,3] Emphysematous pyelitis is characterized by gas-forming bacterial infection of the renal pelvis, whereas emphysematous pyelonephritis also comprises necrotizing infection of the kidney parenchyma.[1,4]

Pyelitis is caused by a variety of causes, including emphysema, diabetes, and bacterial infections, the most common of which is E. coli.[5] The generation of gases, mainly CO2 and nitrogen, by bacteria such as E. coli and Klebsia during glucose fermentation characterizes this disease.[5] Because of the elevated glucose concentration in the interstitial fluid produced by glycolysis problems, diabetic patients, particularly those with poor glucose control, are at a higher risk of developing emphysematous

infections.[6] The disease's initial symptoms include fever, vomiting, fatigue, and abdominal, heartburn, and flank pain. Pyelitis mainly affects the kidney and urinary systems.[7]

Emphysematous pyelitis can lead to various complications, such as intra-kidney perinephric abscess, spontaneous kidney bleeding, and, in severe cases, death.[8] However, early diagnosis and treatment can improve both morbidity and mortality rates.[9] Imaging plays a crucial role in the timely diagnosis and management of emphysematous pyelitis, with CT scans being the gold standard for detecting gas and assessing the extent of involvement. Treatment for emphysematous pyelitis includes abscess drainage and a prolonged course of antibiotic therapy.[10,11] The aim of this study is to report a rare case of emphysematous pyelitis.

## Case presentation

On December 20, 2022, a 51-year-old woman from northern Iran with a height of 162 cm and a weight of 89 kg was admitted to the hospital with symptoms of fever (39.7°C), chills, weakness, lethargy, and bilateral flank pain at midnight (12:30 am). The patient has no prior history of diabetes; however, she has a medical history of kidney stones, thyroid issues, grade 1 fatty liver, anemia, and cardiovascular disease, along with elevated blood pressure (140/100 mmHg). Upon examination, blood tests revealed elevated levels of total and direct bilirubin, AST, urea, creatinine, alpha 1 and 2 proteins, and beta globulin, along with a high white blood cell count and ESR (>125). The patient's blood sodium, albumin, number of red blood cells, hemoglobin, and platelets were lower than normal. A CT scan was recommended to further evaluate the patient's condition.

As per the radiologist's report, the patient's right kidney exhibits an unusual deformation with varying degrees of parenchymal thickness reduction. The pilocalyx system of the right kidney contains numerous stones, with the largest stone having a diameter of 12 cm. Notably, emphysema is present in the pyloric calyx system of the kidney but not in the kidney parenchyma. No signs of inflammation or edema are detected in the right kidney and perinephric space. A mild to moderate form of hydronephrosis is also observed. Intriguingly, emphysema is detected in the non-dependent area. In contrast, the left kidney shows slight inflammation and a case of mild hydroureteronphrosis.

A 6 cm-diameter gallstone was identified in the distal portion of the left ureter, resulting in urinary tract obstruction for the patient. No abnormality was noticed in the abdominal region at the sensitivity level of a CT scan without contrast. Subsequently, emphysema pyelitis was determined as the final diagnosis based on radiological findings. During the patient's treatment and recovery, medications such as Nephrovit, Dexamethasone, Calcium Carbonate, Folic Acid, Vitamin E, Meropenem, Expectorant, Tavanex, Diphenhydramine, and Amikacin were administered. Notably, the treatment resulted in noticeable relief from the patient's symptoms, and she was discharged from the hospital.

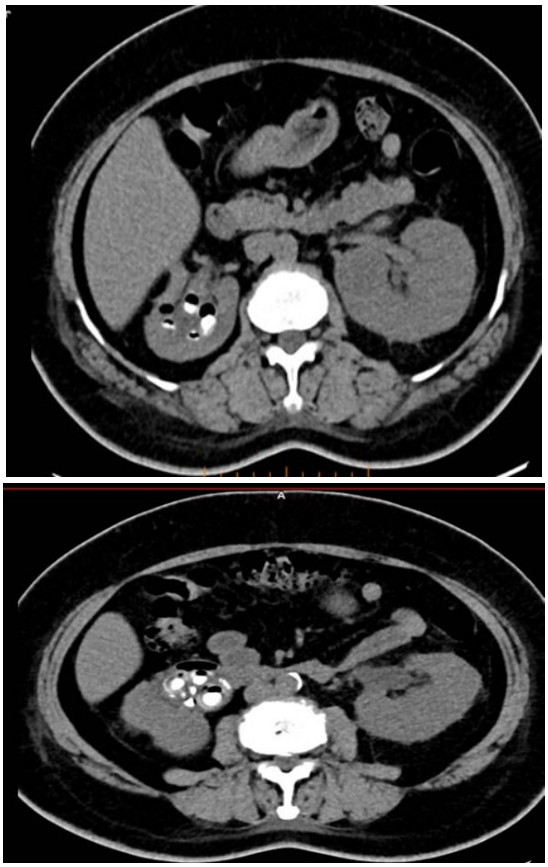

**Figure 1.** Nonenhanced computed tomography (CT) images in a case report of Emphysematous pyelitis

Following hospital discharge, the patient turned to the use of Litorex B, an herbal remedy known for preventing kidney stones and expelling urinary stones. Despite the continued production of urine by the kidneys, surgery was

not conducted immediately, and the kidney surgery is scheduled to take place on March 7th, 2022. However, in a recent phone call, the patient disclosed having traveled from Gorgan to Mashhad city for the surgery, but the specialists found a painful mass-either a gland or fat-in the patient's throat, and the type of mass could not be established, leading to the cancellation of the operation.

### Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval for this case report was obtained from the Ethics and Research committee of Golestan University of Medical Sciences (IR.GOUMS.REC.1402.020).

## Discussion

The patient arrived at the hospital presenting with fever, chills, weakness, lethargy, and side pain, all indicative of emphysematous pyelitis. Prior research by McCafferty et al. showed that common symptoms of this disease are fever, vomiting, weakness and lethargy, heartburn, abdominal pain, and flank pain,[2] while Mazumder et al. identified flank pain as a primary symptom.[10] Therefore, side pain, fever, weakness, and lethargy may be the critical indicators for diagnosing this disease. In the case of the involved patient, a CT scan confirmed a diagnosis of emphysematous pyelitis. Accurate imaging methods like CT scans play a crucial role in the prompt detection and management of pyelitis emphysema.[6] A CT scan is an essential imaging method for detecting gas and assessing the degree of involvement.[12] Among the treatments for this rare disease are long-term antibiotic therapy or abscess drainage through surgery.[13] For the patient in this case, drugs containing antibiotics, namely Meropenem, Tavanex, and Amikacin, were administered, resulting in improved symptoms. Additionally, the abscess will need to be drained after a period of antibiotic therapy.

The patient's case of emphysematous pyelitis was confirmed through a CT scan and subsequently treated with antibiotics, with abscess drainage recommended for future care. Greater and more extensive research in the field of emphysematous pyelitis can heighten public awareness of the disease, enabling a timely diagnosis and reducing incidence rates, complications, and fatalities.[9] As such, it may be prudent for researchers to engage more extensively with the public and focus on the cause and more effective and less risky treatment methods for emphysematous pyelitis, especially within Iranian communities.

## Conclusions

The patient's diagnosis of emphysematous pyelitis was achieved through a CT scan, after which he was treated with antibiotic therapy and recommended for abscess drainage. Reporting rare and unique cases of the disease, such as this patient's, can serve to raise general awareness among medical students. Moreover, further research focused on emphysematous pyelitis can prove tremendously valuable in both reducing incidence rates and minimizing the potential complications associated with the disease.

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### Competing interests

The authors declare that they have no competing interests.

### Abbreviations

Computed tomography: CT;

Aspartate aminotransferase: AST;

Erythrocyte sedimentation rate: ESR.

### Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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### Availability of data and materials

The data used in this study are available from the corresponding author on request.

## Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval for this case report was obtained from the Ethics and Research committee of Golestan University of Medical Sciences (IR.GOUMS.REC.1402.020).

## Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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