

# EMPHYSEMATOUS CYSTITIS AND PYELONEPHRITIS IN A NON-DIABETIC PATIENT: CASE REPORT



## Key words (MeSH)

Cystitis  
Pyelonephritis  
Adult

## Palabras clave (DeCS)

Cistitis  
Pielonefritis  
Adulto

Cistitis y pielonefritis enfisematosa en paciente no diabético: presentación de caso

Gabriel Caviedes<sup>1</sup>  
Jenny Barbosa Tavera<sup>2</sup>  
Andrés Felipe Pineda Martínez<sup>2</sup>  
María José Veloza Vega<sup>3</sup>

## Summary

Cystitis and emphysematous pyelonephritis (EPN) are the most common urinary tract infections in women, 90%, with risk factors such as diabetes and obstruction. They are caused by the colonization of gram-negative pathogens (*E. Coli*, *Klebsiella*), which are capable of producing gas and cause the corresponding clinical and imaging pattern. We present a case in which the patient diagnosed with emphysematous pyelonephritis does not have the usual characteristics or frequent risk factors of this entity. It is emphasized that a correct analysis of the radiological images and an adequate clinical evaluation are fundamental for its diagnosis and appropriate treatment.

## Resumen

La cistitis y la pielonefritis enfisematosa (PNE) son las infecciones del tracto urinario más frecuentes en mujeres, un 90 %, con factores de riesgo como diabetes y obstrucción. Son provocadas por la colonización de patógenos gramnegativos (*E. Coli*, *Klebsiella*), los cuales producen gas lo que genera un patrón clínico e imagenológico característico. Se presenta un caso en el que el paciente diagnosticado con pielonefritis enfisematosa no cuenta con las características habituales ni con los factores de riesgo frecuentes de esta entidad. Se destaca que un análisis correcto de las imágenes radiológicas y una evaluación clínica adecuada son fundamentales para su diagnóstico y apropiado tratamiento.

## Introduction

Emphysematous cystitis (EC) and emphysematous pyelonephritis (EPN) are rare entities that are characterized by the presence of gas in the tractourinary tract; However, in the first of these, the gas is found in the wall of the bladder and occasionally within it (1), while in the second, which is a diffuse, suppurative,

necrotizing and potentially fatal infection caused by negative uropathogens (2), the gas is located in the renal parenchyma, the collecting system or the perinephric tissue (3).

This article describes the case of an 83 year-old man who, in addition to suffering from both pathologies concomitantly, diagnosed by means of radiological imaging, had sepsis as a complication of the same.

<sup>1</sup>Radiologist, Department of Diagnostic Images, Fundación Cardioinfantil. Bogotá, Colombia.

<sup>2</sup>Medical student, Universidad Colegio Mayor Nuestra Señora del Rosario. Bogotá, Colombia.

<sup>3</sup>General practitioner, Universidad El Bosque. Bogotá, Colombia.



Figure 1. Urinary tract ultrasound, mode B. Right kidney, transverse plane: Pyelocalytic dilation of the right kidney with 26 mm anteroposterior diameter of the renal pelvis. Echogenic images without acoustic shadowing suggestive of gas (arrow).

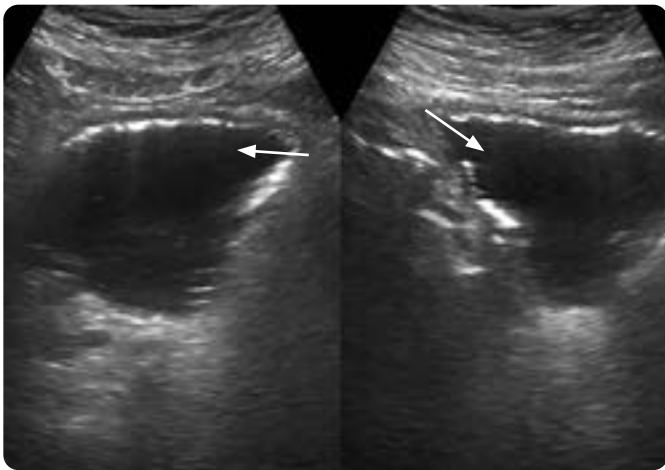


Figure 2. Urinary tract ultrasound, mode B. a) Sagittal plane. b) Transverse plane: Bladder with echogenic images on wall, without posterior acoustic shadow (arrows).

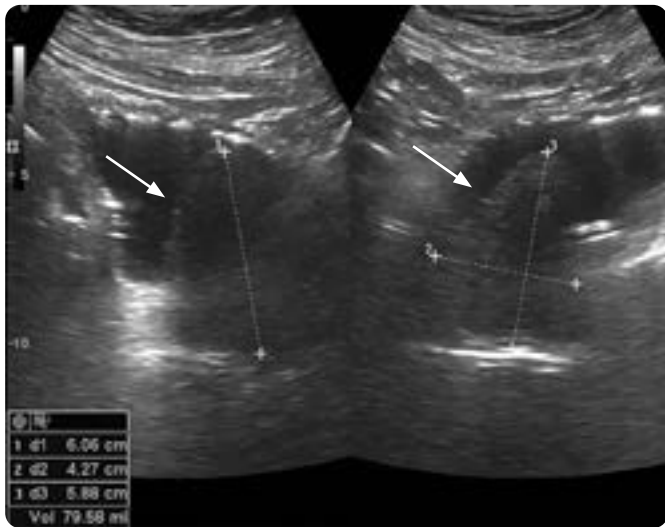


Figure 3. Urinary tract ultrasound, mode B. a) Sagittal plane. b) Transverse plane: Prostatic hyperplasia with a volume of 79 cm<sup>3</sup> (arrows).

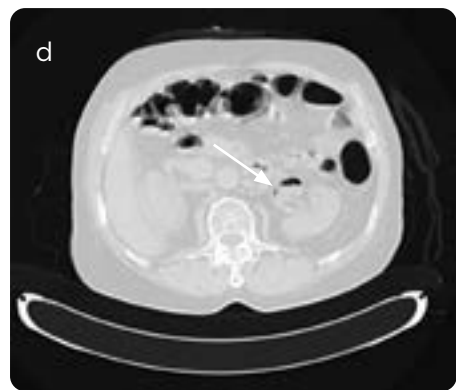
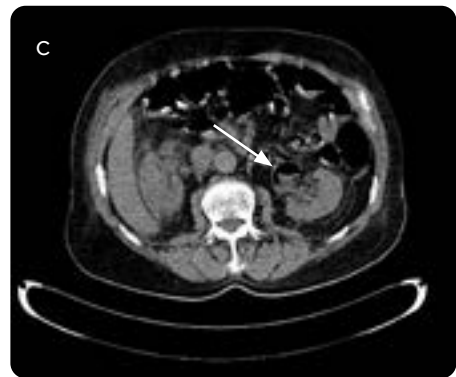
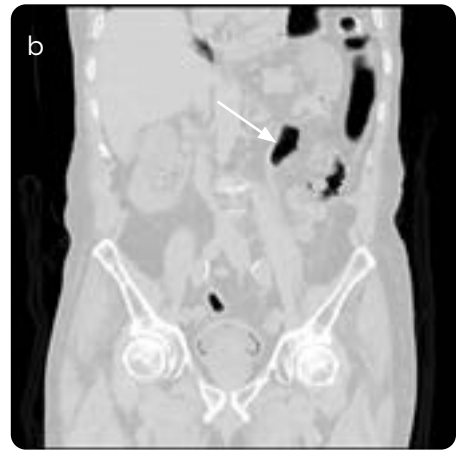
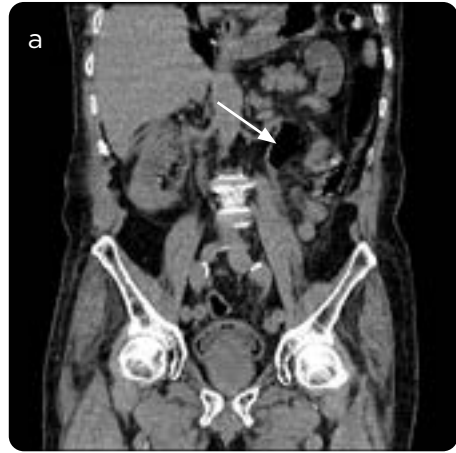


Figure 4. UROTAC. a) Coronal cuts in soft tissue and lung window. b) Axial cuts in soft tissue and lung window: left extrarenal pelvis, dilated, with gas inside (arrows).

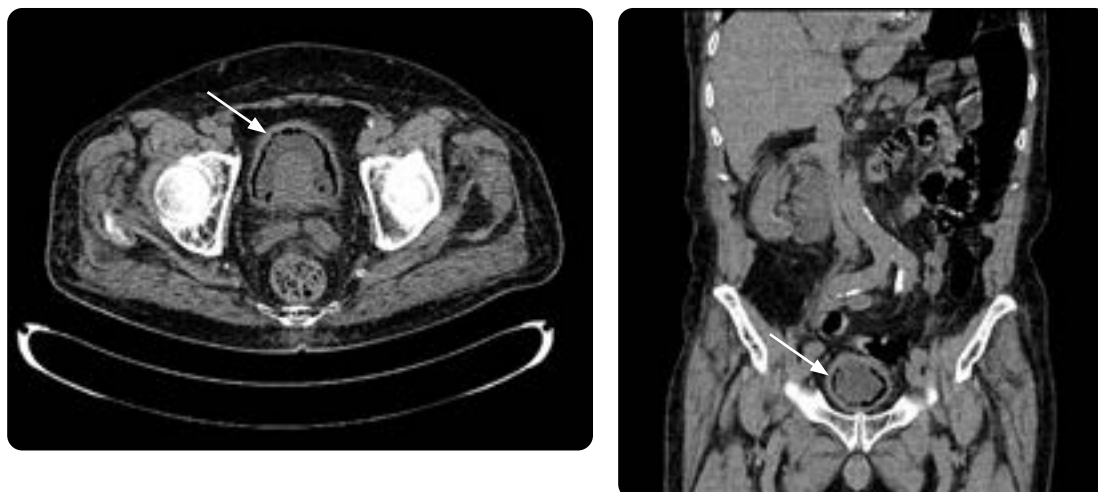


Figure 5. UROTAC. a) Corte axial. b) Coronal section: slightly distended bladder, thickened walls, with air inside (arrows).

## Case report

This is an 83-year-old male patient with a history of high blood pressure, heart failure, atrial fibrillation, benign prostatic hyperplasia (BPH) in driving with alpha-blocker, bychotopenia (leukopenia, thrombocytopenia) and chronic alcoholism. He consulted for a three-day clinical picture consisting of dysuria, urinary urgency and hematuria, associated with fever and hyporexia. On physical examination, he was found hypotensive, with no other relevant findings.

Urinary tract ultrasound examination identified pyelocalytic dilatation of the right kidney with an anteroposterior diameter of the renal pelvis of 26 mm (Figure 1), ultrasound images without posterior acoustic shadowing in the calyx groups, suggestive of gas, and bladder with ultrasound images of similar characteristics (Figure 2). Additionally, prostatic hyperplasia was found with a volume of 79 cm<sup>3</sup> (figure 3). Under the suspicion of diagnosis of emphysematous cystitis, a urinary tract tomography (UROTAC) was performed, which, in addition to confirming this diagnosis, determined bilateral Huang 4 emphysematous pyelonephritis, given the findings of dilated extrarenal pelvis with hydroaerial levels (figure 4) and bladder with thickened walls with air inside (figure 5).

In addition, hyperlactation was documented in the other paraclinics and gram-negative bacilli typed in uroculture as *Escherichia coli* (*E. coli*) were isolated by means of blood cultures.

## Discussion

Both the EC and the EPN have as classic risk factors: female sex (75%), diabetes mellitus (DM), advanced age with an average of 55 years (2), immunosuppression, urinary stasis, insertion of urinary catheters or anatomical abnormality (1). More than half of the cases of EC and 90% of EPN are associated with DM (2, 4), which generates an increase in glucose elimination and thus facilitates its metabolism by aerobic gram-negative bacteria, which facilitates the production of gases such as CO<sub>2</sub> (3, 4). In patients without DM it is postulated that microorganisms use urinary lactate and proteins to produce the gas (4). However, in the case described, although the patient does not have DM, he or she is older, with a probable obstructive component in relation to BPH and immunosuppression due to a history of alcoholism, which increases the risk of potentially lethal infections (5).

As for the clinical manifestation of both entities, symptoms similar to those of a urinary tract infection with dysuria, hematuria and fever are observed. However, this is very variable, ranging from completely asymptomatic disruptions to potentially lethal cases, with no correlation between the degree of inflammation and the clinical state of the patient (3).

Although there is a high degree of diagnostic suspicion due to the clinical picture, risk factors and the finding of focal ultrasound images (US), the accurate diagnosis is made by computerized tomography (CT), which first detects the emphysematous process and determines its extension, possible causes and complications (1, 4); secondly, it decreases the biases in the interpretation of the US that has a low sensitivity due to the limited visualization by intestinal gas; and thirdly, it allows to evaluate the amount of affected renal parenchyma and to classify the EPN, as referred to in the case where class Huang-4 corresponds to bilateral renal emphysema. In this way, it is evident that CT is a useful method for diagnosis, treatment planning and determining prognosis (2, 4, 6, 7).

Regarding treatment of EC, this consists of bladder drainage to reduce intravesical pressure and antibiotic broad-spectrum parenteral therapy adjusted according to the antibiogram (1). However, despite the early introduction of this treatment in the patient, he had complications of EPN and sepsis, requiring, according to the literature, more aggressive therapies, such as percutaneous drainage or nephrectomy to reduce the associated morbidity and mortality, since in the cases of medically treated EPN it reaches 80% (2). However, therapeutic decisions should be based on the clinical condition. In the study case, the clinical picture was resolved with conservative therapeutic management.

## Conclusion

La cistitis y la pielonefritis enfisematosa son entidades poco frecuentes. Emphysematous cystitis and pyelonephritis are rare entities. Their diagnosis is difficult, as it cannot be established by clinical criteria or basic radiological imaging, and they have significant severity as they can cause potentially lethal complications, such as septic shock. It is essential to have a high level of suspicion in patients with risk factors or who do not respond to usual medical treatment, in order to perform imaging studies to confirm the diagnosis, with the aim of early medical

or surgical treatment. It can be concluded that computerized tomography and adequate radiological interpretation are fundamental in the diagnosis of these pathologies.

## References

1. Vera AN, Zwanzger MC, Troncoso CP. Emphysematous cystitis: Report of one case. *Rev Med Chil.* 2015;143(3):387-90.
2. Motta-Ramírez G, González-Merino L, Castillo-Lima J, Flores-Terrazas E, Bustamante-Romero F, Ríos-Mondragón L. Pielonefritis enfisematosa. Estudios radiológicos y de imagen Ultrasonido (US)-Tomografía Computada (TC) para su diagnóstico y manejo. *Acta Médica Grupo Angeles* [Internet]. 2014 [citado 2019 feb.16];12(1). Disponible en: <https://www.medigraphic.com/pdfs/actmed/am-2014/am141a.pdf>.
3. Behera V, Vasantha Kumar RS, Mendonca S, Prabhat P, Naithani N, Nair V. Emphysematous infections of the kidney and urinary tract: a single-center experience. *Saudi J Kidney Dis Transpl.* 2014;25(4):823-9.
4. Irusta H, Ocantos J, Ulla M, Frank L, García Mónaco R. Cistitis enfisematosa en varón no diabético. *Revista Argentina de Radiología.* 2015;79(3):150-4.
5. Jacob A, Alagusundaramoorthy SS, Verma I, Bodala D. Unusual association of emphysematous cystitis and chronic alcoholism. *BMJ Case Rep.* 2017;2017.
6. Li S, Wang J, Hu J, He L, Wang C. Emphysematous pyelonephritis and cystitis: A case report and literature review. *J Int Med Res.* 2018;46(7):2954-60.
7. Islam M, Bancil AS, Ingram O. Emphysematous cystitis: a radiographic diagnosis. *MJ Case Rep.* 2016; 2016.

## Correspondence

María José Veloza Vega  
Servicio de Imágenes Diagnósticas.  
Fundación Cardioinfantil  
Calle163A # 13B-60, piso 1  
Bogotá, Colombia  
[velozamariajose@gmail.com](mailto:velozamariajose@gmail.com)

Received for evaluation: 15 May 2019

Accepted for publication: 8 August 2019