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Emphysematous Pyelonephritis: A Conservative Approach

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ABSTRACT

Emphysematous pyelonephritis is an entity most commonly treated through surgery, with the associated risks and complications; the use of a more conservative approach, using antibiotics alone in selected patients, may prove to have favorable outcomes with fewer complications and risks, as described in this case.

1 | Case Description

A 47-year-old man, diagnosed with type 2 diabetes, medicated with oral antidiabetic drugs, poor metabolic control, arterial hypertension, dyslipidaemia, and grade 2 obesity, was admitted to the emergency department complaining of fever with 2 days of evolution, nausea, vomiting, and diffuse abdominal pain. No complaints of dysuria, evidence of pyuria, or decreased urine output were described.

On physical examination, diffuse pain was observed on abdominal palpation. Renal Murphy sign was positive on the left. The patient was hypotensive, tachycardic, and with a fever.

The study showed C-reactive protein of 47.92 mg/dL, leukocytosis 12,600, thrombocytopenia 57,000, acute kidney injury (AKI) with creatinine 2.23 mg/dL, urea 88 mg/dL, and hyponatremia 130 mmol/L. Urinary study demonstrated leukocyturia and positive nitrites, and the urine sediment showed more than 20 leukocytes per field. No metabolic acidemia, but with a significant hyperlactacidemia of 4.1 mmol/L.

Abdominal and pelvic computed tomography (CT) showed suggestive signs of acute left pyelonephritis associated with the presence of gas bubbles inside the renal basin and the left upper calical group. Two nonobstructive stones in the left renal basin were also described (Figure 1).

The diagnosis of complicated emphysematous pyelonephritis (EPN) was assumed in association with acute kidney injury, thrombocytopenia, and hyponatremia, which are complications associated with a higher mortality rate [1].

Emphysematous urinary tract infection can be classified into four classes: in class 1, there is gas in the collecting system only; in class 2, there is gas in the renal parenchyma without extension to the extrarenal space; in class 3, gas extends out to the extrarenal space; class 4 happens when both kidneys are affected or when it affects a person with a single kidney.

Urology specialists were involved in the decision of the therapeutic approach, having decided on an exclusive antibiotic therapy due to the fact that there was no evidence of abscesses or pyelocaliceal dilatations.

He completed 7 days of antibiotic therapy with piperacillin and tazobactam. The urine culture revealed an *Escherichia coli* that was sensitive to the prescribed antibiotic. The therapeutic focus included the optimization of glycemic control and a plan to increase health literacy.

After 48 h of antibiotic therapy, there was a noticeable clinical improvement. The patient's fever subsided, there was a reduction in inflammatory parameters, and the glomerular filtration rate and platelet count normalized.

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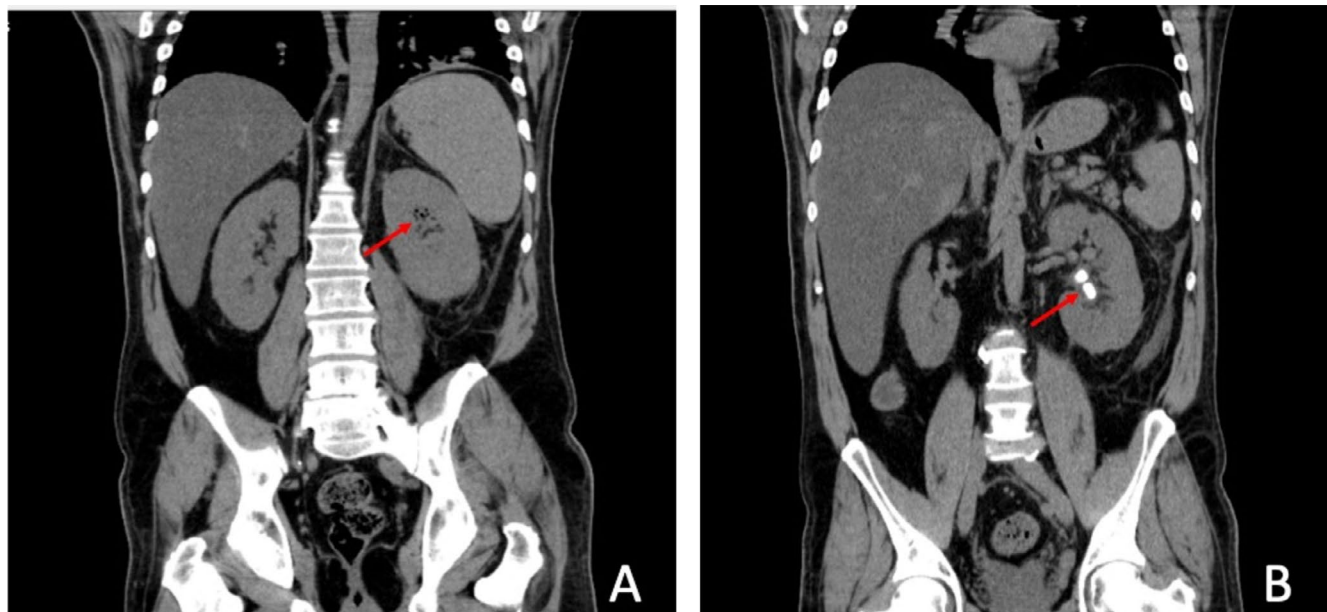


FIGURE 1 | Computed tomography of the abdomen and pelvis where we see the gas bubbles inside the left renal basin and the left uppercalyceal group (A) and two nonobstructive stones in the left renal basin (B).

CT control revealed the absence of gas bubbles inside the renal basin.

Emphysematous pyelonephritis is an infection of the upper urinary tract associated with the formation of gas that surrounds the kidneys. The most common risk factors associated with this entity are Diabetes mellitus and renal lithiasis. The most common microorganisms isolated are *Escherichia coli* or *Klebsiella pneumoniae*.

The pathogenesis of EPN is poorly understood. Among patients with diabetes mellitus, elevated tissue glucose levels may provide a more favorable microenvironment for gas-forming microbes. However, bacterial gas production does not fully explain the pathogenic and clinical manifestations of EPN [2].

Typical symptoms are fever, flank or abdominal pain, nausea, and vomiting.

The CT scan is more sensitive than other modalities and can delineate the extent of gas formation and any obstructing lesions in the urinary tract. CT findings have also been used for prognostic classification of EPN [3].

The existent data about treated EPN with antibiotics alone is reduced, but the existing one has revealed favorable outcomes.

The management of EPN typically includes antibiotic therapy, relief of any tract obstruction, and drainage of gas and purulent material. Nephrectomy is reserved for persistent or worsening infections.

Author Contributions

Carolina Veiga: conceptualization, data curation, formal analysis, investigation, project administration, supervision, validation, writing

– original draft, writing – review and editing. **Rita Seivivas:** conceptualization, data curation, validation, writing – review and editing. **Gabriela Paulo:** conceptualization, formal analysis, investigation, writing – review and editing. **Ilda Coelho:** conceptualization, data curation, formal analysis, validation, writing – review and editing.

Consent

Written informed consent was obtained from the patient.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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