



Case Report

MANAGEMENT OF EMPHYSEMATOUS PYELONEPHRITIS – A CLINICAL CASE

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ABSTRACT

Emphysematous pyelonephritis is a rare, serious gas-forming infection of the renal parenchyma and surrounding tissues. Radiological classification and adequate therapeutic regimen are controversial, and prognostic factors and pathogenesis remain uncertain.

The aim of the research is to present the management of emphysematous pyelonephritis in a woman with newly diagnosed diabetes.

The clinical case presents a 68-year-old female patient admitted to the internal ward in a seriously damaged general condition- difficult to communicate, inadequate, in deep sopor, with severe febrile-intoxication, astheno-adynamic, upper- and lower-dyspeptic syndromes. With a negative test for COVID-19 upon admission, other tests from the emergency department showed hyperglycemia, ketoacidosis, slightly increased values of nitrogen bodies in the blood, significantly increased values of osteophase inflammatory markers, rich urine findings. The results of computer-axial tomography of the abdomen, performed the day after admission, with evidence of emphysematous pyelonephritis on the right, with distended intestinal loops along the course of the large intestine, without free air in the abdominal cavity.

The clinical picture and therapeutic behavior, as well as the outcome of the disease, were followed and described in the woman with emphysematous pyelonephritis and newly diagnosed diabetes.

Material and methods: clinical observation, analysis of medical documentation and literature sources

Discussion: Emphysematous pyelonephritis usually affects elderly patients, mostly women. A particularly favorable for development is observed among patients with diabetes and obstruction of the urinary tract. The main causative agent is *Escherichia coli*. Computed axial tomography is the key to diagnosis. Treatment requires a combination of intensive care with appropriate antibiotics and frequent drainage of the affected kidney. Nephrectomy may be required from the beginning or after drainage failure.

Key words: emphysematous pyelonephritis, clinical case

INTRODUCTION

Emphysematous pyelonephritis is a rare, severe gas-forming infection of the renal parenchyma and surrounding tissues. Radiological classification and adequate therapeutic regimen are controversial, and prognostic factors and pathogenesis remain uncertain (1).

Kelly and Callum (1898) reported the first case of gas-forming kidney infection (pneumatouria).

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Since then, multiple terms such as "renal emphysema," "pneumonephritis," and "emphysematous pyelonephritis" have been used to describe this gas formation of an infectious disease (2). As suggested by Schultz and Klorfein in 1962, emphysematous pyelonephritis is the preferred term because it emphasizes the relationship between the acute infectious process and gas formation (3). Some researchers suggest that the term emphysematous pyelonephritis should be applied only to gasses formed in the renal parenchyma or perinephric space. However, others advocate that the condition is an

infection of the renal parenchyma and perinephric tissue, resulting in the presence of gas in the collecting system, renal parenchyma, or perinephric tissue. Therefore, the latter definition is preferred because it includes all possible manifestations of gas-producing acute kidney infections (4).

Huang and Tseng reported a classification system for emphysematous pyelonephritis based on CT findings. It is currently widely used in clinical assessments on gas distribution: In Class 1, the gas is present only in the renal collecting system; in Class 2, the gas is present in the renal parenchyma, without extension to the extra renal area; in Class 3A, gas or abscess is present in the perinephric space; in Class 3B, gas or abscess is present in the pararenal space; and in Class 4 bilateral involvement can be observed (5).

The purpose of the scientific report is to present the management of emphysematous pyelonephritis in a woman with newly diagnosed diabetes.

MATERIALS AND METHODS

The materials and methods used are clinical observation, analysis of medical documentation and literature sources.

We are presenting a clinical case of a 68-year-old woman who was urgently admitted to the internal department in a seriously damaged general condition, difficult to contact, inadequate, in a deep sopor, with severe febrile-intoxication, astheno-adynamic, upper- and lower-dyspeptic syndromes. With a negative test for COVID-19 upon admission, other tests from the emergency department showed hyperglycemia, ketoacidosis, slightly increased values of nitrogen bodies in the blood, significantly increased values of osteophase inflammatory markers, rich urine findings.

The patient was admitted to the internal medicine department with newly diagnosed diabetes on the background of an acute kidney infection. The results of computer axial tomography (CT) of the abdomen (**Figure 1**), performed the day after admission, with evidence of emphysematous pyelonephritis on the right, with distended intestinal loops along the course of the large intestine, without free air in the abdominal cavity (**Figure 2**).

Computer axial tomography is an accurate diagnostic method for proving emphysematous pyelonephritis (6).

In 37 observational, 32 retrospective and 5 prospective studies, 1146 patients were reported, of whom 790 (68.9%) were women and 946 (82.5%) were diabetic. In addition, 184 (16.1%) patients had kidney stones and 235 (20.5%) had obstructive uropathy. Increased body temperature and pain in the flanks are the most common symptoms. Clinical features are pyuria, fever, flank pain, tachycardia, the most commonly isolated microorganisms are *E. coli*, *Klebsiella pneumoniae* and *Proteus*.

Assigned and conducted therapy with a triple antibiotic combination, rapid-acting insulin, infusions of water-electrolyte solutions and glucose, correction of the electrolyte balance, vitamins, small doses of corticosteroid, gastroprotector, anti spasmolytics, analgesics, antipyretics.

Patients with emphysematous pyelonephritis are often in severe general condition and require intensive medical treatment. The diagnosis should be considered in women with diabetes, lumbar pain, and septicemia. The function of the affected kidney is often very poor and nephrectomy offers the best outcome. Percutaneous drainage or incision and drainage of the abscess can be performed in patients who are too ill for an emergency nephrectomy (7).

According to a report by Gade and Borup, recent studies point to internal/percutaneous drainage and antibiotics as a better alternative for the treatment of emphysematous pyelonephritis (6).



Figure 1. Computer tomography - with the presence of a large formation with free gas in the area of the upper pole of the right kidney and a small amount of gas in the area of the lower pole of the right kidney.

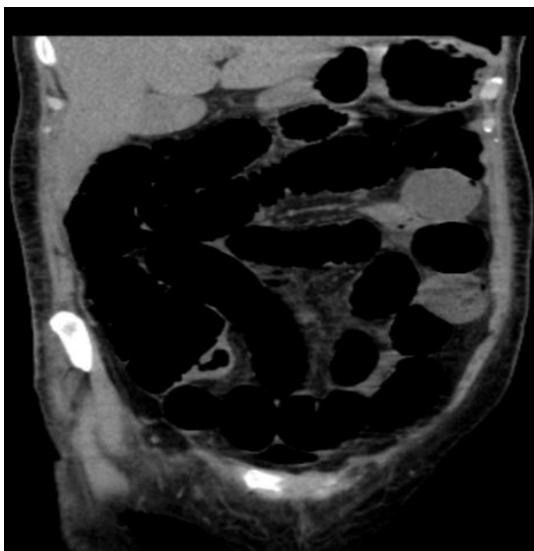


Figure 2. Evidence of a large amount of free gas along the course of the small and large intestine

Laboratory parameters during hospitalization:

- Bleeding Time - 90 Sec; Clotting Time - 270 Sec; Sec - 10.8 Sec; % - 98.56 %; INR - 1.05 sec.;
- Creatinine - 258.0 $\mu\text{mol/l}$; Urea - 23...28 mmol/L;
- Leukocytes (WBC) – 31.43...15 $10^9/l$ g/L; Hemoglobin (HGB) - 122.0 g/l;

- Erythrocytes (RBC) - 4.24 T/l; Hematocrit (HCT) - 0.33 l/l;
- Platelets (PLT) - 60.0 ...2 *10⁹/L;
- APTT Sec - 22.94 sec, APTT Ratio - 1.0 sec., Fibrinogen F-I – 5.2 g/L;
- Urine sediment - unit ER, 10-12 BGN. Bacteria.
- Sodium - 129.0 mmol/L, Potassium - 3.9 mmol/L, Chloride - 104.2 mmol/L
- Glucose - 30.78 mmol/L;
- C-reactive protein = 279.2 mg/L;
- D-dimer = 8800...14800 mcg/mL;
- Uroculture- Klebsiella pn. Candida spp.;
- Hemoculture - Enterobacter cloacae

In the meantime, consultations were held with an urologist, a surgeon and an anaesthesiologist-resuscitator.

A control CT scan of the abdomen was performed with evidence of resorption of free gas in the area of the right kidney (**Figure 3**). From the obtained hemocultures, Enterobacter cloacae was isolated twice, and the treatment carried out according to the antibiogram.

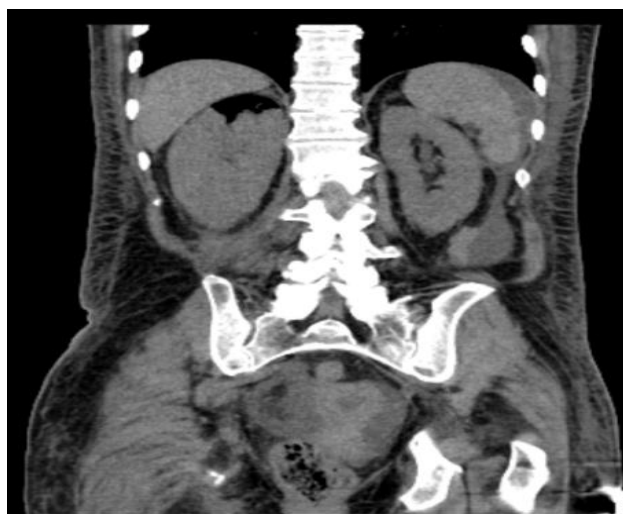


Figure 3. CT (control) with contrast with evidence of free gas resorption in the area of the right kidney

Subsequently, a cough with scarce expectorants and a new worsening of the patient's general condition appeared. This requires a new rapid test for COVID-19 which turns out to be positive, x-ray and CT scan of the lungs - with evidence of bilateral pneumonia.

From the acid-alkaline state with evidence of respiratory insufficiency, therefore, oxygen is additionally included with a mask at a rate of 5-8 l/min.. and the patient maintains a satisfactory oxygen saturation.

Six days after the positive test for COVID-19, in the evening, the patient experienced a hemodynamic collapse, which necessitated the inclusion of Dopamine perfusion, increasing the rate of oxygen delivery to 10 l/min. That same evening, breathing and heart activity stopped no peripheral pulse was detected, cardiopulmonary resuscitation was performed in full volume - without result.

CONCLUSION

Emphysematous pyelonephritis usually affects elderly patients, mostly women. A particularly favorable condition for development is observed in patients with diabetes and obstruction of the urinary tract. *Escherichia coli* is the main causative agent. Computer axial tomography is the key to diagnosis. Treatment requires a combination of intensive care with appropriate antibiotics and frequent drainage of the affected kidney. Nephrectomy may be required from the beginning or after drainage failure.

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