

# A case of emphysematous pyelonephritis in diabetic patient

## Przypadek ephysematosus pyelonephritis u pacjentki z cukrzycą

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### Streszczenie

**Wstęp:** Emphysematous pyelonephritis (EPN) to ostre powikłanie zakażenia dróg moczowych bakteriami produkującymi gaz. Śmiertelność w tym schorzeniu, jak podają niektórzy autorzy, może dochodzić nawet do 80%. Najczęstszym patogenem powodującym EPN jest *Escherichia coli*. Terapia oparta jest na empirycznym podawaniu antybiotyków oraz na leczeniu chirurgicznym.

**Opis przypadku:** Prezentujemy przypadek Emphysematous pyelonephritis (EPN) u 63-letniej kobiety chorującej na cukrzycę. Pacjentka była leczona antybiotykami i poddana radykalnej nefrektomii z dobrym rezultatem.

**Wnioski:** EPN jest rzadko występującym, ale potencjalnie śmiertelnym powikłaniem. Liczba pacjentów z cukrzycą ciągle wzrasta, dlatego prawdopodobieństwo wystąpienia podobnych przypadków rośnie.

**Słowa kluczowe:** emphysematosus pyelonephritis, cukrzyca t2, nefrektomia

### Abstract

**Background:** Emphysematous pyelonephritis (EPN) is severe complication of urinary tract infections and it is caused by gas-forming uropathogens. Some authors report that mortality rates can be as high as 80%. The most common pathogen causing EPN is *Escherichia coli*. Treatment is based on empiric antibiotic therapy and surgical management.

**Case report:** Case of 63-years old female with diabetes mellitus who developed emphysematous pyelonephritis is presented in the paper. In our patient wide range antibiotics and a surgical procedure performed in optimal clinical condition were effective and caused full recovery.

**Conclusions:** EPN is a rare, but potentially fatal complication and with increasing number of diabetic patients, we can expect more similar cases.

**key words:** emphysematous pyelonephritis, diabetes mellitus, nephrectomy

Otrzymano: 8-10-2014 → Zaakceptowano: 02-02-2015 → Opublikowano: 19-03-2015

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## Introduction

Emphysematous pyelonephritis (EPN) is one of the most severe complications of urinary tract infections. There is evidence that as much as 95% of patients with EPN have diabetes mellitus [1–4]. Female sex, urinary tract obstruction, immunodeficiency, urinary calculi, neoplasm and trauma are other predisposing factors [5, 6]. EPN carries poor prognosis because of possible urosepsis and septic shock. Some authors report that mortality rates can be as high as 80% [7]. It is shown that altered mental status, thrombocytopenia, renal failure, severe hyponatremia type I emphysematous pyelonephritis, bilateral emphysematous pyelonephritis and thrombocytopenia are associated with higher mortality [8]. The most common pathogen causing EPN is *Escherichia coli*. Other bacterial agents, which can possibly cause EPN, are *Klebsiella pneumoniae*, *Enterobacter*, *Pseudomonas*, *Proteus mirabilis*, *Candida*, *Clostridia* and *Citrobacter* species [1, 2, 5–7].

CT imaging is regarded the method of choice for diagnosing EPN. However, CT is limited to the patients who can be given contrast agents (patients without advanced renal failure). There are reports that diffusion-weighted magnetic resonance imaging has the potential to surmount this disadvantage [9].

Treatment is based on empiric antibiotic therapy and prompt surgical management. Drainage can be undertaken in patients in stable condition without risk factors like elevated serum creatinine level, or septic shock, however, for most patients, early nephrectomy is obligatory due to extensive renal parenchyma destruction [1, 10–13]. We report a case of EPN in female patient with diabetes, which was treated with antibiotics and radical nephrectomy.

## Case report

A 63-year-old woman was transferred from internal ward, where she was treated for urinary tract infection with fever, to urological department in University Hospital in Wrocław. The patient had long history of diabetes mellitus with poor glucose control, hypertension and liver steatosis due to hepatitis C and alcohol abuse.

During hospitalization in internal ward she presented episodes of bleeding from urinary and gastrointestinal tract due to severe thrombocytopenia. Patient required several platelets transfusions and additionally red blood cells transfusions because of coexisting anemia and was treated with amoxicillin plus clavulanic acid without clinical improvement.

A plain computerized tomography (CT) scan revealed multiple fluid and gas collections localized in both cortex and medulla of renal parenchyma, as well in subscapular area of left kidney and in perinephric space. The biggest collection was 4cm x 2,8cm, there were no signs of urinary retention. CT also showed enlarged liver with symptoms of liver steatosis, splenomegaly with some linear calcifications and enlarged retroperitoneal lymph nodes 9 (Fig. 1,2). USG of abdomen, which had

been performed 3 months earlier, didn't demonstrate any pathological changes in kidneys.



Fig. 1: Computer tomography of abdomen, horizontal view  
*Tomografia komputerowa brzucha, przekrój poprzeczny*



Fig. 2: Computer tomography of abdomen, coronal view  
*Tomografia komputerowa brzucha, przekrój czolowy*

At admission patient was afebrile and presented general weakness. She reported pain on the left lumbar region. Skin was pale with numerous „spider” angiomas, ecchymosis and trophic lesions on both shanks. Systemic examination revealed rales at the base of left lung, blood pressure of 143/71 mmHg and heart rate of 111 beats/min. Blood test showed red cells count of  $3,5 \times 10^6/\text{mm}^3$ , white blood cells count of  $10,460/\text{mm}^3$  (61% neutrophils and 24% band forms), platelet count of 76,000, hematocrit level of 33,9% and hemoglobin level 10,9 g/dL. Blood urea was slightly elevated (53 mg/dL) and serum creatinine level was normal (0,95 mg/dL). Arterial blood gas tests indicated pH level of 7.50,  $p\text{CO}_2$  were 26,9 mmHg,  $p\text{O}_2$  were 64,9 mmHg,  $\text{SaO}_2$  were 96%, and  $\text{HCO}_3^-$  were 27,6 mEq/L. Concentrations of C-reactive protein was 37

mg/l, procalcitonin 2,15 ng/ml, sodium 143 mmol/l, potassium 2,68 mmol/l. Liver function tests showed concentration of ALT 42 U/l, AST 40 U/l and GGT 385 U/l. International normalized ratio (INR) was 1,17, thrombin time was 19 sec and activated partial thromboplastin time (APTT) was 25 sec. The random blood sugar value was 145 mg/dl. Analysis of urine revealed glycosuria, pyuria and proteinuria without nitrites or ketone bodies. HIV antibodies were negative. X-ray of thorax revealed multiple post-infectious changes and small amount of fluid in both pleural spaces.

Because of negative urine culture empirical antibiotic therapy (metronidazole, vancomycin and ceftazidime) was introduced at admission to urological ward. Nine days later radical extraperitoneal nephrectomy (nephrectomia simplex) was performed. After procedure, patient was transferred to intensive care unit because of acute respiratory failure, and poor general condition. X-ray of thorax performed at the time showed considerable amount of fluid in both pleural spaces.

*Klebsiella pneumonia* sensitive for cefotaxime, ceftazidime, gentamicin, meropenem and imipenem was cultured from fluid collected from the removed kidney (Fig. 3).

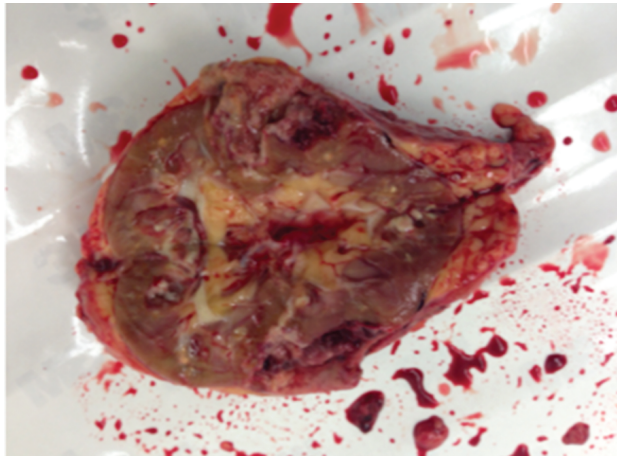


Fig. 3: The removed kidney with visible puss formations remaining  
*Usunięta nerka z widocznymi pozostałościami ropni*

Histological analysis of collected tissue confirmed diagnosis of EPN. Performed blood cultures, two urine and wound catheter tip cultures were sterile, throat, sputum and stool culture showed *Candida Albicans*. Antibiotic therapy was continued and after 4 weeks patient was discharged home in good general condition. At discharge laboratory tests revealed normal complete blood count values (RBC 4,58 x10<sup>6</sup>/mm<sup>3</sup>, WBC 5,700/mm<sup>3</sup>, Hct 41,7%, Hgb 13,9 g/dL, Plt 149,000). Concentrations of C-reactive protein and procalcitonin were normal (CRP 4,4 mg/l procalcitonin 0.05 ng/ml), as well as liver function tests (ALT 13 U/l ASPT 18 U/l).

## Discussion

In literature two types of EPN classification based on CT imaging are described. In the first, five stages based on extension of pathological formations, are comprised [1].

- Class 1 - Gas confined to the collecting system
- Class 2 - Gas confined to the renal parenchyma alone
- Class 3A - Peri-nephric extension of gas or abscess
- Class 3B - Extension of gas beyond the Gerota fascia
- Class 4 - Bilateral EPN or EPN in solitary kidney

According to above taxonomy, our case of EPN can be classified as 3B.

The second classification offered in literature discriminates 2 types of EPN. The first, in which CT scans shows parenchymal destruction without fluid formations or presence of streaky or mottled gas radiating from the medulla to the cortex, is associated with high mortality rate (66%). Gas on Ct scans may as well be present as well in subcapsular or perinephric area. However, Type-II of EPN occurs more often – it pertains to two-third of patients and is presented on CT scans as renal and perinephric fluid collections with gas, and gas within the renal pelvis. That type is associated with lower, 18% mortality rate [14]. Our case meets the criteria of Type 2. According to the data available in literature EPN, alike in our patient, affects left kidney more often [5]. Treatment options for the EPN contain antibiotic therapy and percutaneous drainage or surgery. In presented case, due to the severity of pathological changes in kidney, wide range antibiotics and a surgical procedure performed in optimal clinical condition (in our patient after obtaining satisfactory platelets count) were performed and caused full recovery.

## Conclusions

EPN is a rare, but potentially fatal complication and, with increasing number of diabetic patients, we can expect more similar cases.

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