

EMPHYSEMATOUS PYELONEPHRITIS CAUSED BY KLEBSIELLA OXYTOCA IN A PATIENT WITH DIABETIC NEPHROPATHY

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ABSTRACT

A 50-year-old woman with a 30 years history of diabetes mellitus and has been diagnosed with diabetic nephropathy for the last 4 years presented with abdominal pain, nausea and vomiting. Abdominal ultrasonography revealed a hyperechogenic air image at right kidney and with the aid of subsequently performed abdominal tomography type 2

emphysematous pyelonephritis diagnosis was made.

Klebsiella oxytoca was isolated in blood culture and with appropriate antibiotic therapy and subsequent percutaneous drainage the patient made a full recovery .

• **Key Words:** Emphysematous pyelonephritis, *Klebsiella oxytoca*, diabetes mellitus *Nobel Med 2010; 6(2): 101-104*

ÖZET

DIYABETİK NEFROPATİLİ BİR HASTADA KLEBSIELLA OXYTOCA NEDENLİ AMFİZEMATÖZ PYELONEFRİT

30 yıldır diabetes mellitus tanısıyla izlenmekte olan ve son 4 yıldır diabetik nefropati tanısı almış olan 50 yaşında ki kadın hasta hastanemize karın ağrısı , bulantı ve kusma şikayetleri ile başvurdu. Batın ultra-

sonografisinde sağ böbrekte hiperekojenik hava imajı saptanması üzerine çekilen batın tomografisinde tip 2 amfizematöz pyelonefrit tanısı kondu. Kan kültürlerinde *Klebsiella oxytoca* izole edildi ve uygun antibiyoterapi ve perkütan drenaj sonrası hastada tam iyileşme elde edildi.

• **Anahtar Kelimeler:** Amfizematöz pyelonefrit, *Klebsiella oxytoca*, diabetes mellitus *Nobel Med 2010; 6(2): 101-104*

INTRODUCTION

Emphysematous pyelonephritis (EPN) characterized by gas formation in the renal parenchyma, collecting system or perinephric tissues, is a rare, life threatening, necrotizing infection of the renal parenchyma and its surrounding tissues.^{1,2} The main microorganisms causing EPN are Enterobacteriaceae. *Klebsiella oxytoca* was isolated in the blood sample of our patient which is very rarely reported in the literature.

THE CASE

A 50-year-old female patient was admitted to our emergency room with complaints of fatigue, abdominal pain, nausea and vomiting lasting for the last 72 hours. Her past history was remarkable for uncontrolled type 2 diabetes mellitus being present for nearly 30 years. She was also diagnosed with diabetic nephropathy 4 years ago. Current medications included glimepiride 4 mg once a day, losartan 50 mg per day and subcutaneous long acting insulin given once a day at bedtime. Physical examination revealed a pale, lethargic patient, with fever (body temperature was 38.9 °C, blood pressure was 90/50 mm Hg, pulse rate was 109/min). A mass 10 cm in diameter was palpated in the right upper quadrant, and there was costovertebral tenderness in the right side. Laboratory data were as follows: Serum glucose was 412 mg/dl, serum urea was 195 mg/dl, serum creatinine was 4.6 mg/dl and serum phosphorus concentration was 9.9 mg/dl. The hemoglobin was 9.0 g/dl, leukocytes were 10,230/mm³, platelets were 83,000/mm³, C-reactive protein (CRP) concentration was 456 mg/L and erythrocyte sedimentation rate (ESR) was 140 mm/h. Glucose and protein were (++) in urine analysis, and there was 20-25 leukocytes per high power field.

Abdominal ultrasound (US) demonstrated right kidney at a size of 158x76 mm with an edematous parenchyma, an image compatible with emphysematous pyelonephritis with hyperechogenic air image and dirty shadowing of 36x14 mm in diameter located posteriorly of the cortex of right upper kidney. Left kidney was normal in size and shape, and normal parenchymal thickness and echogenicity. The abdominal computed tomography (CT) without contrast obtained upon suspicion of peripheral abscess demonstrated an enlarged right kidney. The corticomedullary differentiation was lost, and there were multiple images of air at peripheral localization within the parenchyma, thickening in the right Gerato's fascia and dirtying in the peripheral fatty tissues (Figure). These findings were compatible with the diagnosis of type 2 emphysematous pyelonephritis. Blood and urine cultures were obtained immediately and after consulting to the infectious diseases department

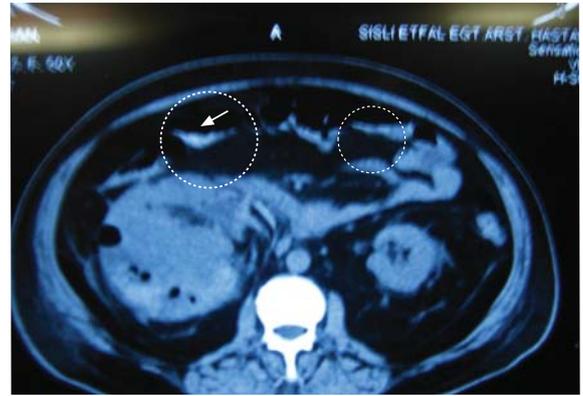


Figure. Non-contrast transverse CT scan showing that the right kidney is bigger than normal and images of the air in the upper pole.

Table: Minimum inhibitory concentrations (MIC) of antibiotics against *Klebsiella oxytoca* and susceptibility of the microorganism to these antibiotics

Antibiotic	MIC (µg/ml)	Susceptibility
Ampicillin	> 24	R
Cefazolin	10	I
Ceftazidime	18	R
Ceftriaxone	7	I
Sulfmetaxazole/TMP	>30	R
Sulbactam/Cefoperazone	4	S
Levofloxacin	<0,5	S
Tobramycin	<0,5	S
Meropenem	<0,14	S

R: resistant, S: sensitive, I: intermediate

and ceftriaxone 2x1 gr was initiated empirically. Blood sugar was controlled by intensive insulin therapy. At 5 days after initiation of antibiotic treatment the patients condition did not improve, her fever did not drop and she was still lethargic. *Klebsiella oxytoca* was isolated in the two blood samples, obtained prior to the antibiotic treatment and ceftriaxone was replaced with meropenem therapy since the cultured organism was found to be resistant to cephalosporins (Table). No surgical interventions were planned for the patient after consulting with the urology department. Therefore medical therapy was continued. Dramatic improvement was noted in the general state of the patient. Temperature returned to normal on the 4th day of meropenem therapy and did not increase again. CRP, ESR and the other acute phase reactants regressed to values close to normal. An abdominal US control was performed on the 10th day of treatment: right kidney sizes were found to have regressed to 137x72 mm, a hyperechogenic air image with posterior dirty shadowing of 30x15 mm →

was observed in the upper pole. Meropenem therapy was prolonged to 3 weeks.

After completion of medical therapy a repeat renal ultrasonography was performed which revealed a persistent peripheric abscess image at the upper pole of right kidney. Therefore with the assistance of urology department percutaneous abscess drainage was performed without any complications. During the follow up her ESR, CRP and other acute phase reactants remained normal while her renal function status stayed stable through out the hospitalization treatment. One week later the patient was discharged with intensive insulin therapy and angiotensin receptor blocker treatment. Six months later the patient presented to our out patient clinic for routine follow up. Her laboratory examination results showed that serum urea was 126 mg/dl, serum creatinine was 3.2 mg/dl, hemoglobin was 9.1 g/dl and microalbuminuria was 450 mg/dl/24 h. Blood and urine cultures were negative.

DISCUSSION

In our case the organism causing emphysematous pyelonephritis was identified as *Klebsiella Oxytoca*. On Mac Conkey agar, Klebsiella colonies typically appear large, mucoid and red, with red pigment indicating fermentation of lactose and acid production. Production of indol can be used to separate the two principal species. *Klebsiella pneumoniae* is indol-negative, and *Klebsiella oxytoca* is indol-positive.³

High fever, flank pain, nausea and vomiting are the most common clinical signs. Costovertebral angle sensitivity, distention and sensitivity of the abdomen, leukocytosis, hyperglycemia and impairment of electrolyte and acid-base balance may be observed. Thrombocytopenia (46%), acute kidney failure (35%), confusion (19%) and shock (29%) may be the initial symptoms.⁴ This case also had initial findings of confusion, acute renal failure on chronic basis and thrombocytopenia.

Huang et al. reported that 96% of the EPN patients were diabetic and among these 22% had concomitant urinary obstruction.⁴ However there is an underlying obstruction in the majority of non-diabetic patients.^{5,6} The ultrasonography, computer tomography scan and the radionuclide studies did not reveal obstruction in our patient.

The diagnosis should be supported by radiological findings. The ipsilateral reflection of the psoas muscle disappears and air bubbles may be noted in the renal parenchyma, collecting system or perirenal tissues; an x-ray is also needed to exclude a diagnosis of renal

calculus. US is generally inadequate in terms of establishing the diagnosis and extension of the disease, although it is the method of first choice.^{5,7} There is no doubt that CT is the best imaging method in the diagnosis and follow-ups after the administration of treatment.

Wan et al. divided EPN into two subgroups according to the radiological findings. Type I EPN is characterized by parenchymal destruction with either absence of fluid collection or presence of streaky or mottled gas. Type II EPN is characterized as either renal or perirenal fluid collections with bubbly or loculated gas or gas in the collecting system. The mortality rate for type I EPN (69%) is higher than that for type II (18%).² The first line treatment of emphysematous pyelonephritis includes prevention and treatment of shock, establishment of fluid and electrolyte balance, control of diabetes and correction of the underlying renal obstruction. Next, antibiotic therapy with broad spectrum antibiotics should be initiated after the blood and urine specimens are obtained for culture. The antibiotic therapy should at least last 14 days. There are studies reporting successful treatment of EPN with medical therapy only.^{8,9} We initiated the meropenem therapy and continued the same regimen for 3 weeks after confirming the sensitivity in the antibiogram. The presence of obstruction is important in choosing a treatment modality in EPN patients. However, today percutaneous drainage together with broad spectrum antibiotics is most commonly used. In addition, it should also be noted that nephrectomy performed in high-risk uremic patients with uncontrolled diabetes and poor general condition is life saving.^{10,11}

The patient was diagnosed as type II EPN. Although she seemed to have a poor prognosis with uncontrolled blood glucose, confusion, acute kidney failure on chronic basis and thrombocytopenia, the absence of obstruction and destruction, and rapid initiation of effective antibiotic therapy facilitated the recovery of our patient with appropriate antibiotic regimen.

CONCLUSION

EPN is a rarely seen infection which is considered as a life threatening condition and should be treated immediately. The symptoms, signs and laboratory findings of patients with emphysematous pyelonephritis are nonspecific and cannot be differentiated from those of upper urinary system infection. It is of utmost importance to suspect emphysematous pyelonephritis and perform the appropriate imaging methods in order to establish an early diagnosis and decrease mortality particularly in diabetic patients with impaired blood glucose control, impaired kidney functions and signs →

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of sepsis. Treatment with broad spectrum antibiotics should be initiated and patient should be evaluated in

terms of percutaneous drainage and nephrectomy if there is no response to medical treatment.



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REFERENCES

- 1 Klein FA, Smith MJ, Vick CW, et al. Emphysematous pyelonephritis. *S Med J* 1986; 41-46.
- 2 Wan YL, Lee TY, Bullard MJ, et al. Acute gastroproducing bacterial renal infection correlation between imaging findings and clinical outcome. *Radiology* 1996; 198: 443-438.
- 3 Brisse S, and Verhoef J. "Phylogenetic diversity of Klebsiella pneumoniae and Klebsiella oxytoca clinical isolates revealed by randomly amplified polymorphic DNA, gyrA and parC genes sequencing and automated ribotyping." *Int J Syst Evol Microbiol* 2001; 51: 915-924.
- 4 Huang JJ, Tseng CC. Emphysematous pyelonephritis clinocoradiological clasification, management, prognosis and pathogenesis. *Arch Intern Med* 2000; 27: 797-805.
- 5 Turunc T, Turunc T, Guvel S. Amfizematoz Piyelonefrit. İnönü Üniversitesi Tıp Fakültesi Dergisi 2004; 11: 201-206.
- 6 Gilles CL, Flocks R. Spontaneous renal and perirenal emphysema. Report of a case in a diabetic from Escherichia coli infection. *Amer J Roentgen* 1941; 46:173.
- 7 Eroğlu M, Kandıralı E. Acute pyelonephritis and pyelonephrosis . *Türkiye Klinikleri J Surg Med Sci* 2007, 3: 24-28
- 8 Kando T, Okudo H, Suzuki M. A case of emphysematous pyelonephritis improved with conservative therapy. *Hinyokiko Kyo* 2000; 46: 335-338.
- 9 Jain SK, Agarwall N. Emphysematous pyelonephritis a rare presentation. *J Postgrad Med* 2000; 46: 31-32.
- 10 Caliskan Z, Cift A, Vuruskan H, Kordan Y, Yavascaoglu I, Oktay B. Emphysematous pyelonephritis: case report. *Turk J Urol* 2005; 31: 441-443.
- 11 Flores G, Nellen H, Mayona F. Acute bilateral emphysematous pyelonephritis successfully managed by medical therapy alone: A case report and review of the literature. *BMJ Nephrol* 2002; 3: 4.