

Acute bilateral emphysematous pyelonephritis successfully managed by medical therapy alone. Case Report and Review of the Literature

Guillermo Flores, Haiko Nellen, Francisco Magaña, Juan Calleja

Section of Internal Medicine, Department of Medicine, Hospital de Especialidades Centro Médico Nacional Siglo XXI.

Emphysematous pyelonephritis managed by medical therapy alone.

Aristoteles 68 Mexico City Mexico 11560

Phone: (52-55) 2813085

Fax: (52-55) 2813029

E-mail: gmf368@medscape.com

Key Words: Bilateral emphysematous pyelonephritis  
Diabetes Mellitus

Address for Reprints:

Guillermo Flores

Aristoteles 68 Mexico City Mexico 11560

Phone: (52-55) 2813085

Fax: (52-55) 2813029

E-mail: gmf368@medscape.com

## Abstract

Bilateral emphysematous pyelonephritis is a life threatening condition usually occurring in diabetics. Management of this condition has traditionally been aggressive and surgery is considered mandatory. However, this is itself a hazardous intervention in a septic, unstable patient with circulatory or liver failure. When bilateral disease is present, the need for long term dialysis is obviously unavoidable.

We herein report one of the few cases of bilateral emphysematous pyelonephritis that was successfully treated with antibiotics alone.

## Acute Bilateral Emphysematous Pyelonephritis Successfully Managed By Medical Therapy Alone.

Emphysematous pyelonephritis (EPN) is a rare, life-threatening condition, usually occurring in diabetic patients[1]. Patients with emphysematous pyelonephritis are typically very ill with circulatory/liver failure caused by sepsis. In most cases, a normal native kidney is involved unilaterally, but in 10% of cases, the condition is bilateral[2]. Management of this condition has traditionally been aggressive and surgery has been considered mandatory. Many of the earlier series have stressed the very high mortality rate (75%) and the need for urgent nephrectomy[3-6]. However, this is itself a hazardous intervention in a septic patient with unstable circulatory or liver failure. In the case of bilateral renal disease, the patient requires long-term dialysis. With the advent of CT scanning, more powerful antibiotics, and better access to life support, an alternative medical approach to radical surgery has emerged[7].

appeared confused and obtunded, was febrile (39.0 C), tachycardic (110 beats/min) and hypotensive (90/60 mm Hg). She was conscious but not completely oriented in time and space. Cardiac and respiratory examinations were unremarkable.

Relevant laboratory data were as follows: glucose 31.5 mmol/L, urea of 89 mmol/L, creatinine of 168  $\mu$ mol/L, sodium of 133 mmol/L, and potassium of 5.2 mmol/L. Her hemoglobin was 7.7 g/dL, hematocrit 24 %, total peripheral white cell count of 17700 with a shift to the left, and a platelet count of 20 000. Arterial blood gases

showed high anion gap metabolic acidosis. Both blood and urine cultures showed the presence of *Escherichia coli*.

Initial ultrasound showed bilateral enlarged edematous kidneys. An abdominal computed tomography (CT) scan showed diffusely enlarged kidneys, with perinephric edema, extensive gas in the renal tissues and perinephric areas bilaterally (Figure 1).

The patient was transferred to the intensive care unit on day two and treated with intravenous fluids a tritrated insulin infusion and inotropic support with dopamine. On review by the urologists, it was thought that conservative management should be attempted given the absence of obstruction of the urinary tract.

The patient's clinical condition improved remarkably over the fourth day of treatment, thus obviating the need for surgery.

A Follow-up CT scan obtained 7 days after the initial study showed global improvement with marked reduction of the gas within the kidneys and a decrease in perinephric edema.

Two weeks after admission to the hospital, during which time she made a steady clinical recovery, her antibiotic was switched to ciprofloxacin and oral fluconazole and she was discharged 5 days later on oral antibiotics. A CT scan on discharge showed complete resolution of the renal emphysema.

Upon further review she is clinically well and free of infection.

## Discussion

First described in 1898, emphysematous pyelonephritis (EPN) is an acute necrotizing parenchymal and perirenal infection caused by gas forming uropathogens[8-10]. Four factors appear to be involved in the pathogenesis of EPN: gas-forming bacteria, high tissue glucose, impaired tissue perfusion and a defective immune response[11]. Diabetics account for 70-90% of all cases[9, 12].

The organisms most commonly associated with EPN are E. Coli, Klebsiella pneumoniae, Proteus mirabilis, Pseudomonas aeruginosa, Aerobacter aerogenes, Citrobacter and rarely yeast. Left untreated, EPN is uniformly fatal[13].

Estimates of mortality using current therapy range from 10% to 40% with patients treated medically having a higher mortality than those treated surgically, 70% versus 30%, respectively[8, 9, 12, 14]. Thus, traditionally, it is thought that antibiotic therapy alone is usually ineffective, and prompt nephrectomy is necessary[12].

In a previous report of 48 cases of EPN patients were classified in four classes according to CT findings, from class 1(the mildest) to class 4 (the most severe form)[15]. Ninety-six per cent (96%) had diabetes mellitus with 22% also having urinary obstruction. The mortality rate in those receiving antibiotics alone was 40% (2 of 5). The success rate of those treated with percutaneous catheter drainage (PCD) plus antibiotics (27 of 41) was 66% and those who had nephrectomy was 90% (9 of the 10 patients) . In EPN class 1 and 2, all the patients who were treated with PCD plus antibiotics survived. In extensive EPN (classes 3 and 4),

85% (17 of 20) were successfully treated with PCD and antibiotics. Eight of the 14 who had an unsuccessful treatment using a PCD underwent nephrectomy, seven of whom survived.

Hui reported a case of EPN treated with nephrectomy and stated that based on available data, surgical intervention appears to be the preferred treatment[16].

Chen et al described 10-year experience with 25 EPN patients[17]. Eighty per cent (80%) required antibiotics plus PCD only; 12% underwent nephrectomy and 8% died. Shokeir reviewed their 15-year experience of 20 patients with EPN in Egypt[18]. He emphasized that immediate nephrectomy, as soon as the patient is medically stable, should not be delayed.

Goldsmith[19], Kondo[20], Labussiere[21, 22], Punnose[22], Jain[23], and Best[24] all have described individual cases of EPN treated successfully with antibiotics alone.

Angulo[25], Grozel[26], Shimizu[27] and Tahir[19] et.al. each reported cases of bilateral EPN that were successfully treated with antibiotics alone, thus obviating the need for renal replacement therapy which would have been needed if they were treated with bilateral nephrectomies.

We believe now that nephrectomy is not the preferred treatment anymore for all cases of emphysematous pyelonephritis. EPN shall be classified into grades of severity and treatment planned accordingly. Although difficult to perform because of the rarity of EPN, randomized controlled studies for management of EPN are greatly needed.

## References

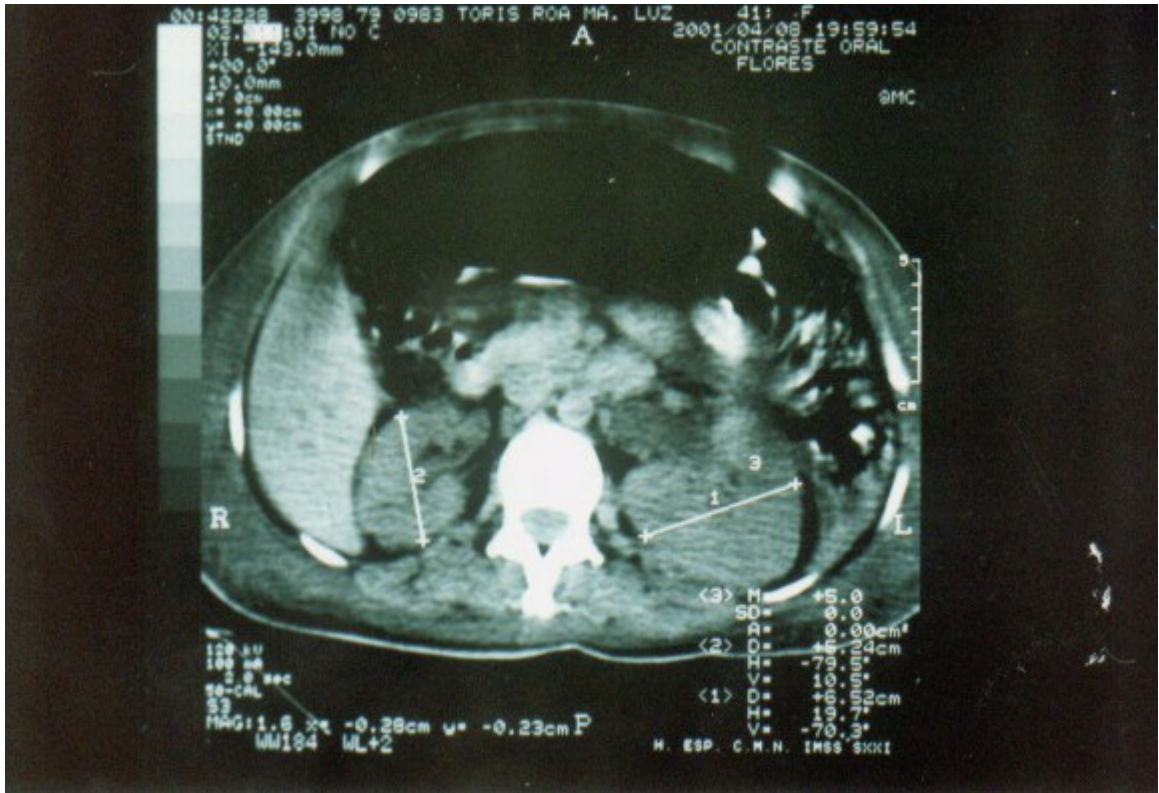
1. Costas, S., *Renal and perirenal emphysema*. BJU 1972;**44**:311-9.
2. Zabbo, A., Montie, JL, Popowniak KL, et al., *Bilateral emphysematous pyelonephritis*. Urology 1985;**25**:293-6.
3. Ahlering, T.E., Boyd SD, Hamilton CL, et al., *Emphysematous pyelonephritis: a 5-year experience with 13 patients*. J Urol 1985;**134**:1086-8.
4. Ballanger, P., Petit J, Thomas G, et al., *La pyelonephrite emphysemateuse. Revue de la litterature a propos de quatre nouveaux cas*. Ann Urol 1986; **20**:195-200.
5. Dunn, S.R., W.C. Dewolf, and R. Gonzalez, *Emphysematous pyelonephritis: report of 3 cases treated by nephrectomy*. J Urol 1975;**114**:348-50.
6. Picron, B., Mauerhoff T, Farchakh E, et al., *Pyelonephrite emphysemateuse (P.N.E.) chez une patiente diabetique. Revue de la litterature a propos d'un cas*. Acta Clin Belg 1991;**46**:94-9.
7. *Campbell's Urology Walsh, Patrick C 7th ed Cloth Text*. 1997.
8. Ouellet, L.M. and M.P. Brook, *Emphysematous pyelonephritis: an emergency indication for the plain abdominal radiograph*. Ann Emerg Med 1988;**17**:722-4.
9. Evanoff, G.V., Thompson CS, Foley R, et al., *Spectrum of gas within the kidney. Emphysematous pyelonephritis and emphysematous pyelitis*. Am J Med 1987;**83**:149-54.
10. Michaeli, J., Mogle P, Perlberg S, et al., *Emphysematous pyelonephritis*. J Urol 1984;**131**:203-8.
11. Chen, K.W., Huang JJ, Wu MH, et al., *Gas in hepatic veins: a rare and critical presentation of emphysematous pyelonephritis*. J Urol 1994;**151**:125-6.
12. Cook, D.J., M.R. Achong, and J. Dobranowski, *Emphysematous pyelonephritis. Complicated urinary tract infection in diabetes*. Diabetes Care 1989;**12**:229-32.
13. Andersen, J.B., *Pyelonephritis emphysematosa. En alvorlig komplikation til diabetes mellitus*. Ugeskr Laeger 1992;**154**:1419-21.
14. Joris, L., van Daele G, Timmermans U, et al., *Emphysematous pyelonephritis*. Intensive Care Med 1989;**15**:206-8.

15. Huang, J.J. and C.C. Tseng, *Emphysematous pyelonephritis: clinicroadiological classification, management, prognosis, and pathogenesis*. Arch Intern Med 2000;**160**:797-805.
16. Hui, L. and J. Tokeshi, *Emphysematous pyelonephritis*. Hawaii Med J 2000;**59**:336-7.
17. Chen, M.T., Huang CN, Chou YH, et al., *Percutaneous drainage in the treatment of emphysematous pyelonephritis: 10-year experience*. J Urol 1997;**157**:1569-73.
18. Shokeir, A.A., El-Azab M, Mohsen T, et al., *Emphysematous pyelonephritis: a 15-year experience with 20 cases*. Urology 1997;**49**:343-6.
19. Tahir, H., Thomas G, Sheerin N, et al., *Successful medical treatment of acute bilateral emphysematous pyelonephritis*. Am J Kidney Dis 2000;**36**:1267-70.
20. Kondo, T., Okuda H, Suzuki M, et al., *[A case of emphysematous pyelonephritis improved with conservative therapy--indication for conservative therapy]*. Hinyokika Kyo 2000;**46**:335-8.
21. Labussiere, A.S., Gazonne J, Walker P, et al., *Pyelonephrite emphysemateuse. Un cas traite medicalement*. J Urol 1996;**102**:127-9.
22. Punnose, J., Yahya TM, Premchandran JS, et al., *Emphysematous pyelonephritis responding to medical therapy*. Int J Clin Pract 1997;**51**:468-70.
23. Jain, S.K., N. Agarwal, and S.K. Chaturvedi, *Emphysematous pyelonephritis: a rare presentation*. J Postgrad Med 2000;**46**:31-2.
24. Best, C.D., Terris MK, Tacker JR, et al., *Clinical and radiological findings in patients with gas forming renal abscess treated conservatively*. J Urol 1999;**162**:1273-6.
25. Angulo, J.C., Dehaini A, Escibano J, et al., *Successful conservative management of emphysematous pyelonephritis, bilateral or in a solitary kidney*. Scand J Urol Nephrol 1997;**31**:193-7.
26. Grozel, F., Berthezene Y, Guerin C, et al., *Bilateral emphysematous pyelonephritis resolving to medical therapy: demonstration by US and CT*. Eur Radiol 1997;**7**:844-6.
27. Shimizu, H., Hariu K, Kamiyama Y, et al., *Bilateral emphysematous pyelonephritis with autosomal-dominant polycystic kidney disease successfully treated by conservative method*. Urol Int 1999;**63**:252-4.

## Legends

### Figure # 1

An abdominal computed tomography (CT) scan showed diffusely enlarged kidneys, with perinephric edema, extensive gas in the renal tissues and perinephric areas bilaterally.



00:42228 3998 79 0983 TORIS ROA MA. LUZ 41: F  
 02.00:01 NO C  
 XI -143.0mm  
 +00.0°  
 10.0mm  
 47 sec  
 \* +0.00cm  
 \* +0.00cm  
 STNO

A 2001/04/08 19:59:54  
 CONTRASTE ORAL  
 FLORES

GMC



120 kV  
 100 mA  
 2.0 sec  
 90-CAL  
 S3  
 MAG: 1.6 X -0.28cm V\* -0.23cm P  
 WM194 ML+2

<3> M	+5.0
SO	+0.0
A	+0.00cm
<2> O	+10.0
H	-7.0
V	+10.0
<1> O	+10.0
H	+1.0
V	-7.0

H. ESP. C.H.H. IMSS SXKI

Figure 1