Short Communication

Bilateral Emphysematous Pyelonephritis Cured by Antibiotics Alone: a Case and Literature Review

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SUMMARY: Emphysematous pyelonephritis (EPN) is a rare but severe infectious disease. This disease sometimes presents bilaterally, making it difficult to cure. Diabetes mellitus is a common cofactor in this disease. Drainage or nephrectomy, often combined with antibiotics, is ordinarily used for treatment. To our knowledge, only 8 cases of bilateral EPN cured by antibiotics alone have been reported. We report the case of an 86-year-old woman with bilateral EPN cured by antibiotic therapy alone, thus avoiding surgery or drainage in a frail elderly patient.

Emphysematous pyelonephritis (EPN) is a severe necrotizing infection of the renal parenchyma in which gas is produced in collecting tubes, renal parenchyma, and/or pararenal tissue. About 200 cases of EPN have been reported in the literature, to our knowledge. EPN occurs bilaterally in 5-7% of patients. To our knowledge, only 8 cases of bilateral EPN cured by antibiotics alone have been reported (1,2). Abdominal computed tomography (CT) findings provide significant information that helps to determine the appropriate treatment for EPN (3). EPN is fatal when treated inappropriately, even if it is not fulminant.

An 86-year-old woman with a history of hydronephrosis and repeated pyelonephritis caused by urinary dysfunction presented with a high fever and vomiting in December 2007. She had a history of surgery for uterine cancer. She was first treated for acute colitis; however, this treatment was unsuccessful, and oral levofloxacin at 300 mg/day was administered from December 25 to December 29. However, urinalysis suggested a urinary tract infection because of the presence of pyuria (urine leukocyte >100/high-power field [HPF]). Her abdominal CT upon admission into the care of her previous doctor (December 25, 2007) showed bilateral hydronephrosis, and a repeat CT revealed further progression of hydronephrosis and air in the renal pelvis bilaterally (Figure 1). She was then referred to our department on January 9, 2008. Laboratory data showed a high leukocyte count (10,600/ul) and C-reactive protein (CRP) (21.0 mg/dl). Antibiotic therapy with meropenem 1.0 g/day (0.5 g twice per day) was initiated under the diagnosis of bilateral EPN beginning January 8, and a CT on January 11 revealed diminished air in the renal pelvis bilaterally. Her urine bacterial culture tests were positive for *Anaerococcus*, which produced gas (all bacteria cultured from the urine are shown in Table 1). Her laboratory data and symptoms improved thereafter (leukocyte 4,700/ul, CRP 2.1 mg/dl on January 15). Her serum creatinine improved in accordance with the CT findings (Table 2).

EPN is a rare but life-threatening disease. Patients with EPN are typically very ill with circulatory failure caused by sepsis. Management of this condition has traditionally been aggressive, and surgery has been considered mandatory. Recently, an alternative to radical surgery has become possible using a combination of CT for diagnosis, antibiotics, and drainage (4). Most patients with EPN (87-97%) have diabetes mellitus (DM) or obstruction of the urinary tract derived from a stone or tumor for instance. The most common pathogens are *Escherichia coli* (68%), *Klebsiella pneumoniae* (9%), and *Proteus* among others.

Falagas et al. (5) reported a meta-analysis of the risk factors for mortality in 175 patients with EPN. The overall mortality rate was 25%, ranging from 11 to 42%. They found that conservative treatment alone, Type I disease, bilateral EPN, and thrombocytopenia were risk factors for fatal outcomes in patients with EPN, and delayed nephrectomy may reduce the chances of survival. Wan et al. (3) classified their CT findings for EPN into two types. Type I was characterized by parenchymal destruction with either absence of fluid collection or production of streaking, spotted gas. Type I is more fulminating and has a higher mortality rate (69%). A lower mortality rate (18%) was reported for Type II, characterized by either renal or perirenal fluid collection with bubbly or loculated gas, or gas in the collecting system. The differentiation of Types I and II is important due to the prognostic
difference, and this classification is significant for treatment decisions.

Huang and Tseng (6) reported 48 cases of EPN, 38 (79%) of whom had fever and 14 (29%) of whom were in a state of shock. Nine (19%) cases died. The fatal cases showed a longer duration of symptoms or a longer time to diagnosis, thrombocytopenia, disturbances of consciousness, and more severe shock in comparison with the non-fatal cases. Five of these 48 cases were treated with antibiotics alone (2 [40%] of whom died), while nephrectomy was performed in 2 cases (neither died), and combined therapy using drainage and antibiotics was administered in 41 cases (6 [15%] of whom died). Eight patients whose conditions were not improved by drainage needed to undergo nephrectomy (1 case [13%] died). The authors classified their CT findings in the 48 EPN cases as follows: Class 1, gas in the collecting system only; Class 2, gas in the renal parenchyma without extension to the extrarenal space; Class 3A, extension of gas or abscess to the perirenal space; Class 3B, extension of gas or abscess to the pararenal space; and Class 4, bilateral EPN or solitary kidney with EPN. For localized EPN (Classes 1 and 2), percutaneous drainage combined with antibiotic treatment can provide a good outcome. For extensive EPN (Classes 3 and 4) with a more benign manifestation, percutaneous drainage combined with antibiotic treatment has shown a high success rate and may preserve the kidney. However, nephrectomy can provide the best management outcome and should be promptly attempted for extensive EPN with a fulminant course (6).

Tang et al. (7) reported 21 cases (7 Type I and 14 Type II cases according to the classification of Wan et al. [3]). There were no significant differences as to sex, age, time to diagnosis, disease side, hospitalization time, or underlying disease between these types. Of the Type I cases, 3 were treated with antibiotics alone (1 of whom died), 3 were treated with combined therapy using antibiotics and drainage (none died), and 1 case whose condition was not improved by drainage underwent nephrectomy plus antibiotics. Of the Type II cases, 3 were treated with antibiotics alone (1 died), 10 were treated with the combined therapy with antibiotics and drainage (4 died), and 1 case whose condition was not improved by drainage underwent nephrectomy plus antibiotics. The report of Tang et al. (7) included a table of 21 previous cases of bilateral EPN; to our knowledge, our case would be the 22nd to be reported. Importantly, our patient is the only one who had no DM and is the oldest in age. Older patients (75 years old or older) could be considered immunocompromised regardless of the presence or absence of DM, and therefore should be regarded as at risk.

Our case is considered Type II according to the classification of Wan et al. (3) because the gas in the renal pelvis was confined to the kidney itself, and could be treated by antibiotics alone, while immediate drainage would be considered if the antibiotic treatment failed or the patient’s condition became worse. Tahir et al. stated in their report of cases cured by medical therapy that rapid diagnosis and full circulatory support allowed antibiotics time in which to work. In addition, normal renal parenchymal appearance on CT may be one sign of the patient’s response to intensive medical intervention (8). Another report observed that conservative treatment may be as effective as nephrostomy or percutaneous drainage in bilateral EPN without obstructive uropathy (9). According to these descriptions, our case could be considered treatable by antibiotics alone partly because of the rapid diagnosis and full circulatory support provided. Also, she had no DM. In addition, our case promptly responded to medical treatment that was initiated on the same day as the diagnosis of bilateral EPN.

This case has value in that: (i) bilateral EPN is rare; (ii) the patient did not have DM and could be treated with antibiotics alone even though the disease was bilateral; (iii) the patient could be cured without drainage even though she had urinary dysfunction; and (iv) gas-producing bacteria were detected only in anaerobic culture tests, partly because of the antibiotic treatment performed in the previous institution. Most of the previous literature has not reported the detection of causative bacteria but has involved cases diagnosed based only on clinical findings such as CT or symptoms. Our case suggests that both clinical and bacterial aspects could be of aid in diagnosis.

In conclusion, we report a case of bilateral EPN cured by antibiotics alone. The diagnosis was based on both clinical and bacteriological aspects, with reference to the classification systems described in the somewhat sparse literature on this rare but potentially lethal disease.

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REFERENCES