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Nephron Sparing Management of Complex Emphysematous Urinary Tract Infection of the Whole Urinary System: A Case Report

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Abstract **Case Report**

Emphysematous urinary tract infections (EUI) are rare life-threatening infections that are often found in diabetic patients with a predilection for females. Emphysematous pyelonephritis (EPN) is more frequently reported than emphysematous cystitis (EC). However, concurrent occurrence has been reported as well. On the other hand, ureteric involvement in cases of EUI has not been described well in the literature. Treatment should be aggressive as the rate of death can be as high as 15.4%. Early surgical intervention has been described for severe infections. However, conservative approach has also been adopted especially in cases where preserving kidney function is of utmost importance. We present a 22-year-old lady who is known to have chronic kidney disease, bladder dysfunction and multiple reconstructive urological procedures, presented with emphysematous urinary tract infection affecting the whole urinary system (both kidneys, ureters and urinary bladder), which was successfully treated in a nephron sparing approach.

Keywords: case report; emphysematous pyelonephritis; emphysematous cystitis; emphysematous ureteritis; conservative; bilateral.

INTRODUCTION

Emphysematous urinary tract infections (EUI) are uncommon, life-threatening infections that are frequently diagnosed in diabetic patients, with a female predilection [1]. Furthermore, kidney stones and structural renal abnormalities have been described as among the most prevalent related comorbidities in the non-diabetic population [2].

Concurrent occurrences of both EP and EC have been described [3]. Ureteric involvement in cases of EUI has not been well described in the literature [4], This infection is often discovered late, which is attributed to the wide range of non-specific symptoms that could include fever, nausea, vomiting, abdominal pain, renal angle tenderness, septic shock, unconsciousness, and acute renal failure. The presence of an abnormal gas shadow in the renal bed or the area of the urinary bladder on a plain radiograph raises the suspicion of gas forming infection. To confirm the diagnosis, an ultrasound scan or computed tomography (CT) demonstrating intra-renal gas would support the diagnosis of EUI [1]. Treatment should be prompt and aggressive, as the overall mortality rate may be as high as 15.4% [5].

We present a 22-year old female with a known history of chronic kidney disease, bladder dysfunction, and multiple complex reconstructive urological surgeries, presenting with a complex emphysematous urinary tract infection involving the whole urinary system, which was managed in a nephron sparing approach.

CASE PRESENTATION

A 22-year-old female patient, who is known to have chronic kidney disease with a base line creatinine of 4 mg/dl, neurogenic bladder managed by clean intermittent catheterization and anticholinergic medications, has a history of boari flap and transureteroureterostomy at the age of 2 years for left ureteric injury during surgical correction of vesicoureteric reflux. Presented to the emergency department (ED) with fever, epigastric abdominal pain, recurrent vomiting, nausea, and chills for four days. Initial evaluation revealed a seriously ill patient with

signs of severe dehydration. Her vital signs were as follows: heart rate of 120 beats per minute, oral temperature of 38.5 °C, blood pressure of 120/80 mmHg, respiratory rate of 23 beats per minute, and oxygen saturation of 96%.

Laboratory workup revealed a serum creatinine of 6 mg/dl, a potassium level of 6.5 mEq/l, a normal white blood cell count of 5 x10^9/l and an elevated CPR of 88 mg/l. Urinalysis showed proteinuria, pyuria, and a positive nitrite test. A urine culture showed the growth of ESBL producing E.coli, and a blood culture showed no growth. An abdomen and pelvis computed tomography (CT) scan was done without contrast, which revealed class 4 emphysematous pyelonephritis according to Huang-Tseng CT-based classification system [6], associated with bilateral emphysematous ureteritis and emphysematous cystitis (Figure 1). At initial evaluation (Figure 2), left-sided plural effusion was also found.

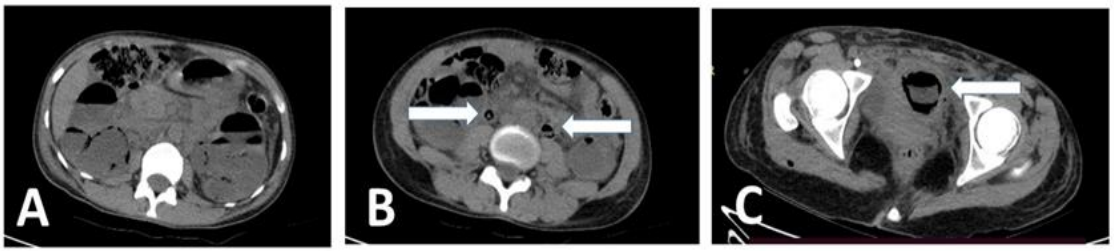

Fig-1: (a, b, c) Abdomen pelvis CT scan without contrast (a) grade 4 EP involving both kidneys. (b) Gas within both ureters (arrowed) representing bilateral EU. (c) Gas within the urinary bladder (arrowed) represents EC.

Fig-2: CT scan of the lower chest showing bilateral plural effusion

A multidisciplinary team was consulted, including urology, intensive care medicine, nephrology, infectious disease, pulmonary medicine, and interventional radiology. The patient was admitted to the intensive care unit (ICU). Intravenous meropenim and amikacin for a wide spectrum of coverage were started. During the first two days of ICU admission, she underwent two sessions of hemodialysis (HD) for persistent hyperkalemia. After initial stabilization, she underwent bilateral nephrostomy tube insertion under CT guidance (Figure 3), in addition to the urethral catheter previously inserted in the ED. After that, the patient's clinical status gradually improved, and her kidney function returned to the base line value, so she did not require further sessions of HD. Expectant management of pleural effusion was decided first, but as the patient reported shortness of breath, a chest x-ray was done on the eighth day of admission and showed persistent plural effusion on the left side. Pleural tapping was done, and 500 cc were drained at insertion. Further work up was in favor of reactionary plural effusion. On the eighth day of admission, a follow-up CT scan of the abdomen and pelvis revealed a significant decrease in intracalyceal system gas bubbles.

Fig-3: Bilateral nephrostomy tubes inserted under CT guidance

One day before discharge, the patient underwent a follow up CT scan which documented complete resolution of gas bubbles from the urinary system (Figure 4). A CT nephrostogram done on the same day showed ureteric obstruction distal to the area of anastomosis with the contrast freely flowing between the two kidneys (Figure 5). Atrial of antigrade and retrograde duple-J stent insertion failed due to complete ureteric obstruction. After 16 days, the patient was discharged home with unilateral nephrostomy due to the common connection of both kidneys.

Fig-4: Abdomen and pelvis CT scan done on day eight showing an interval decrease in air bubbles in the urinary system.

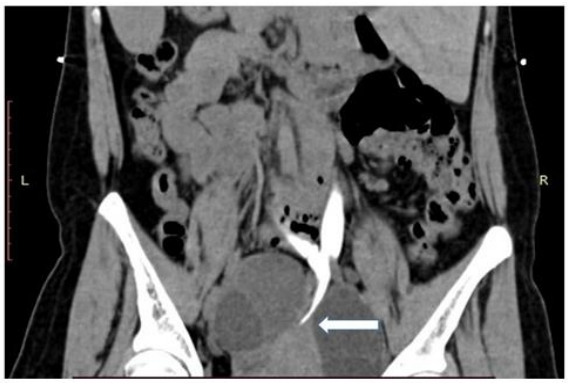

Fig-5: CT nephrostogram showing complete obstruction of the common ureter distal to the site of transureteroureterostomy (arrowed).

DISCUSSION

EUIs are considered rare, life-threatening conditions that affect the urinary system. Concurrent EP and EC is a rare occurrence, while emphysematous ureteritis (EU) has been rarely described. Studies have demonstrated that diabetes, structural and functional urinary tract abnormalities carries an increased risk of the occurrence of EUI. A seriously ill patient with non-specific signs and symptoms is the usual presentation for patients with EUI. CT scan of the abdomen and pelvis is the gold standard test to diagnose EUI. In our patient it was done without intravenous contrast in view of the acute on top of chronic kidney disease and it was sufficient to demonstrate the extent of the disease and the concurrent occurrence of reactionary plural effusion as well.

Our patient had several risk factors for developing EUI: female gender, neurogenic bladder, ureteric stricture, history of boari flap, and transureteroureterostomy. Obviously, EUI affects people with other significant comorbidities that usually complicate the course of the disease and affects the treatment decisions; the presence of renal impairment or a single functioning renal unit complicates the situation more.

While some authors described an aggressive surgical approach in patients with EUI, especially with evidence of severe disease [4], collective analysis was conducted on some retrospective cohort studies that demonstrated that EPN patients who had been managed with early nephrectomy were associated with increased mortality, in contrast to those who were treated with renal salvaging therapy, who had a good prognosis and low mortality [6]. EU has been linked with severe infections. A report of unilateral renal and ureteric involvement has been described. The patient was managed with urgent nephroureterictomy [4]. Although EC is usually managed by bladder drainage in addition to intravenous antibiotics, some cases are complicated by bladder perforation that warrants immediate surgical intervention [7].

CONCLUSION

A multidisciplinary team approach was essential to ensure the best outcome given the rarity of the disease, severity of infection, multiorgan involvement, and patient comorbidities. In our patient, the goal was to provide a nephron-sparing approach in order to avoid the anephric state. Which was feasible because of the conservative approach's primary pillars of drainage and intravenous antibiotics.

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REFERENCES

1. Schicho, A., Stroszczynski, C., & Wiggermann, P. (2017). Emphysematous cystitis: mortality, risk factors, and pathogens of a rare disease. *Clinics and practice*, *7*(2), 54-55.
2. Eswarappa, M., Suryadevara, S., John, M. M., Kumar, M., Reddy, S. B., & Suhail, M. (2018). Emphysematous pyelonephritis case series from South India. *Kidney international reports*, *3*(4), 950-955.
3. Li, S., Wang, J., Hu, J., He, L., & Wang, C. (2018). Emphysematous pyelonephritis and cystitis: A case report and literature review. *Journal of International Medical Research*, *46*(7), 2954-2960.
4. Nana, G. R., Brodie, A., Akhter, W., Karim, O., & Motiwala, H. (2015). Nephroureterectomy for emphysematous pyelonephritis: An aggressive approach is sometimes necessary. A case report and literature review. *International journal of surgery case reports*, *10*, 179-182.
5. Godzisz, M., Mitura, P., Widz, D., Sudoł, D., Kuliniec, I., & Bar, K. (2021). Concurrent Bilateral Emphysematous Pyelonephritis and Emphysematous Cystitis: A Case Report of Glomerulonephritis Severe Complication. *Research and Reports in Urology*, *13*, 375.
6. Deoraj, S., Zakharious, F., Nasim, A., & Missouris, C. (2018). Emphysematous pyelonephritis: outcomes of conservative management and literature review. *Case Reports*, *2018*, bcr-2018.
7. Hudnall, M. T., Jordan, B. J., Horowitz, J., & Kielb, S. (2019). A case of emphysematous cystitis and bladder rupture. *Urology case reports*, *24*, 100860.