Inflammation and infection

Air bubbles in the urinary tract. Incidental and asymptomatic combined emphysematous pyelitis, ureteritis and cystitis. A rare case report and review of the literature

Ahmad Alenezi a,*, Mohammed A.K. Al-Ruwaished b, Ahmed Almujalhem b

a Mubarak Al-Kabeer Hospital & Sabah Al Ahmad Urology Centre, Kuwait
b Mubarak Al-Kabeer Hospital, Kuwait

Background and purpose

Emphysematous urinary tract infections (EUTIs) are rare emergency complications caused by gas-forming organisms. EUTIs can be progressive and occasionally fatal requiring aggressive intervention. Only 4 cases of emphysematous pyelonephritis or abscess caused by Citrobacter were reported in the last 40 years. We herein report the first case ever reported of combined emphysematous pyelitis, ureteritis and cystitis induced by Citrobacter freundii in an asymptomatic patient. This was discovered incidentally and managed conservatively. We also present review of the literature.

Case descriptions

A 72-year-old female with diabetes and chronic kidney disease was referred to clinic because of raised serum creatinine above her baseline (250 μmol/L). She was asymptomatic; denying flank pain, lower urinary tract symptoms or systemic manifestations. Vital signs and examination were unremarkable. CBC was normal. Ultrasound showed a new onset of bilateral hydronephrosis. KUB X-ray showed a striking shadow abnormalities delineating the left kidney, ureter and partially circumventing the bladder area with no evidence of radio-opaque substances. Fig. 1. CT showed marked left hydro-uretero-nephrosis with thinning of the parenchyma. A significant amount of air was noted within the lumen of left pelvicaliceal system, ureter and bladder confirming the findings of combined left emphysematous pyelitis (EP), ureteritis and cystitis (EC). Figs. 2 and 3. Urine culture showed Citrobacter freundii of extended beta lactamase sensitive to intravenous meropenem. Urinary catheter and nephrostomy were inserted to maximize drainage. One week later, a repeat CT KUB showed complete resolution of the previous air. Antegrade pylogram was performed and the entire course of the left-sided pelvicalyceal system and ureter were patent and unremarkable and the nephrostomy tube was removed. Cystoscopy and urodynamic findings confirmed the diagnosis of diabetic cystopathy. Subsequently she underwent suprapubic catheterization.

Results

Radiological findings are shown.

Discussion

In this case report, the patient was an elderly, diabetic and asymptomatic with incidental radiological findings of air as illustrated.

A literature review demonstrates diabetes in >50% of EUTIs. Elderly females are frequently affected. EP manifestation can be non-specific and can present with symptoms of upper respiratory tract infection, lethargy and back pain. Emphysematous pyelitis is reported to carry a mortality rate of up to 20%, which is significantly lower than that of emphysematous pyelonephritis, which carries a mortality rate of approximately 50%.

The clinical management of EP and EPN are different. Intra-parenchymal gas usually requires drainage or nephrectomy. However many authors are accepting to manage non-obstructing emphysematous pyelitis with antibiotic only, we treated our patient with broad-spectrum antibiotic, indwelling foley catheter and nephrostomy tube.

In EC, dysuria, frequency, urgency or bacteremia tend to present in 50% of patients. EC is often treated conservatively. In a review of

* Corresponding author.
E-mail address: dr_enazi@hotmail.com (A. Alenezi).

https://doi.org/10.1016/j.eucr.2018.01.029
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135 published cases, 10% of patients required combined medical and surgical intervention with an overall mortality of 7%.\(^1\)

Other studies have indicated that \textit{E. coli} (61.9%), Candida species (12.7%), and gram-positive cocci (12.7%) were the commonest microbes isolated from the urine cultures of patients with diabetes and UTIs. Moreover, \textit{E. coli} (69%) and \textit{Klebsiella pneumonia} (29%) were reported to be the commonest microbes in patients with diabetes and EPN.\(^2,3\)

In our case the patient was asymptomatic and CP was isolated in urine culture. CP is facultative anaerobic gram-negative bacteria of the Enterobacteriaceae family and can be part of the normal intestinal flora. The organism has been implicated in nosocomial urinary and respiratory tract infections as well as abdominal, blood, and brain, joint and neonatal sepsis. Immunocompromised, elderly, neonatal and debilitated patients tend to have an increased risk of morbidity and mortality.

\textit{Citrobacter} possess broad range of virulence factors including verotoxins.\(^4\) Horizontal and vertical transmissions among hospital staff and from mother to child respectively, have been described. Direct contact from person to person remains the most prevalent method of transmission. In addition, ingestion of environmental sources via fecal-oral route and parsley contaminated with \textit{C. freundii} contained in swine manure has caused an outbreak of severe gastroenteritis, hemolytic uremic syndrome (HUS) and thrombocytopenic purpura (TTP) in nursery school and kindergarten. The outbreak resulted also in 8 urinary tract infections (UTIs) and 1 death in Canada.\(^5\)

**Conclusion**

EUTI might declare itself with non-specific symptoms or discovered incidentally. Neurogenic bladder, chronic obstruction, diabetes and female gender are predisposing factors for combined EUTIs. Multi drug-resistant \textit{Citrobacter freundii} is emerging.

**Appendix A. Supplementary data**

Supplementary data related to this article can be found at https://doi.org/10.1016/j.eucr.2018.01.029.

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