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Case report

Multidrug-resistant *aeromonas caviae* causing cystitis in a renal failure patient

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ABSTRACT

A 49-year-old female with multiple myeloma complicated by renal failure had dysuria. The urine culture revealed multidrug-resistant *aeromonas caviae* during her hospital stay. Her symptoms and signs significantly improved after receiving a seven-day course of piperacillin-tazobactam treatment. She had no history of urinary tract infections(UTIs). On follow-up, she felt clinically well. *Aeromonas caviae* is a rare cause of UTI. We review previous cases of *aeromonas caviae* UTIs. The purpose of this case report is to assist in the diagnosis and management of *aeromonas caviae* cystitis.

Introduction

Aeromonas species are gram-negative rods considering as emerging human pathogens involving gastrointestinal, wound and blood infection, while urinary tract infection (UTI) has been less frequently reported [1]. Here we described a case of cystitis caused by multidrug-resistant *aeromonas caviae* in a multiple myeloma complicated by renal failure patient. The role of *aeromonas caviae* as an uropathogen and appropriate antimicrobial treatment warrants clinical awareness.

Case history

A 49-year-old female, suffering from fatigue and anorexia for one year and denying underlying medical history, was transferred to our hospital after 10-day hospitalization in local hospital with blood creatinine level of 14.52 mg/dl and her urinalysis results showed 795 white blood cells (normal range 0–17/μl), and 3419 bacteria per high-power field (normal range 0–130/μl), as well as 1 + protein and negative nitrite. She complained of urinary urgency frequency and dysuria for 4 days before transferring. She had no fever, flank pain or costovertebral angle tenderness and was not catheterized. On admission, her vital signs were normal. Initial blood tests revealed a white blood cell count of 6.67 × 10e9 /L with a differential of 77 % neutrophils and 14 % lymphocytes, hemoglobin level of 71 gr/dL, platelet count of 117 × 10e9 /L. Her urine sample was sent to the laboratory for culture. Urine MALDITOF-MS (Matrix Assisted Laser Desorption Ionization Time of Flight Mass Spectrometry) revealed a*eromonas caviae* of more than 100,000 colony-forming units, resistant to ceftazidime (MIC ≥ 64 ug/ml), aztreonam(MIC ≥ 64 ug/ml), ciprofloxacin (MIC ≥ 4 ug/ml), cotrimoxazole (MIC = 8/152 ug/ml), and intermediately sensitive to cefepime (MIC = 8 ug/ml), whereas sensitive to meropenem (MIC ≤ 0.25 ug/ml), amikacin (MIC ≤ 2 ug/ml), and piperacillin/tazobactam (MIC ≤ 4 ug/ml). The bone marrow exam coupled with cytometry revealed the new diagnosis of multiple myeloma.

Regarding the symptomatic urinary tract infection, the patient was administered 450 mg of intravenous piperacillin/tazobactam every 12 h for 7days based on the susceptibility data. She was clinically improved. The patient received routine renal dialysis treatment and finished chemotherapy. On follow up, she is still free of UTI symptoms and generally well until now.

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Discussion

There are seven English language publications on *aeromonas* species causing urinary tract infection (one of which specifically on a*eromonas caviae*) [2–8], presenting four features: 1) the risky subjects involving both immunocompromised and immunocompetent, mostly immunocompromised patients. The background conditions of these report cases included congenital spina bifida with an indwelling urethral catheter, new born baby with bladder and bilateral renal dilatation, a 69-year-old diabetic patient and invasive therapeutical procedures_(such as repetitive indwelling of urethral catheter, nephrostomy for obstructive uropathy, neurogenous bladder with suprapubic cystostomy for paraplegia and catheterization for benign prostatic hypertrophy). Our patient was consistent with an immunocompromised state as renal failure and multiple myeloma 2) it can be a nosocomial infection [9]. Our patient likely acquired this non common multi-drug resistant uropathogen in hospital although she did not receive catheterizaiton, because she had no previous urinary tract infection history and she got urinary tract discomforts during local hospital stay. Certainly, a. *caviae* has been proved to reside in the human gastrointestinal tract [1] and is likely to translocate to the urinary tract when the host is in the immunosuppressed state [9]. 3) the resistance spectrum evolves: previously fluoroquinolones, at least 3rd generation cephalosporin, or aminoglycosides were suggested as the antibiotic treatment of choice in the clinical setting of *aeromonas* urinary tract infection [9], but now more and more multidrug species were isolated resistant to fluoroquinolones and cephalosporins, even to carbapenems. As in our case, piperacillin/tazobactam was selected based on the susceptibility data, concentration in the urine and safety consideration.The alternative option is cefoperazone-sulbactam sodium (MIC $\leq$ 8 ug/ml) and carbapenem (MIC $\leq$ 0.25 ug/ml) according to low MIC values. Carbapenems are more costly and mainly used in severe infection. The susceptibility test for our case did not report the production of enzyme such as extended-spectrum beta-lactamases (ESBL), yet previous studies demonstrated the harbor of Ambler class B, C, and D beta-lactamases. Metallo-beta-lactamases (MBL), AmpC beta-lactamases, penicillinases and ESBL in *aeromonas spp* [10,11]. 4) Although the majority of the patients have severe or even life-threatening underlying diseases, such as malignancies, cirrhosis, end-stage renal diseases et al., the outcomes of most of the aeromonas causing UTI patients in these publications were benign, which is possibly ascribed to the local infection and relatively low virulence of the species.

Notably, two things are concerned in these publications: firstly, it is unclear that those patients were symptomatic or asymptomatic, which involving whom required treatment or not; meanwhile, the prognosis is actually obscure due to lack of follow-up of clinical, information in these published reports.

As for complicated multidrug-resistant UTIs (cUTIs), according to the literatures, the 30-day mortality rate for cUTIs is 8.7 %, with most patients having catheter related UTIs, and the older people especially over 70 can be serious. In our case, the patient did not receive catheterization and she is not old. Multidrug-resistant UTI pathogens are not considered as a risk factor for mortality. Studies suggested that in patients with cUTI no benefit was found of early appropriate empirical treatment on survival rates or other outcomes. We might consider watchful waiting and supportive treatment in stable patients until the causative pathogen and drug susceptibility are defined [12,13]. The accurate identification and drug sensitive results bring precisely antimicrobial usage for clinicians. Empirical selection of antibiotics of symptomatic UTIs recommends combination beta-lactamase inhibitors or carbapenems due to the evolving resistance of a*eromonas spp*., beneficial for patient particularly who has serious comorbidities such as cancer and other end-stage diseases.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report. A copy of the written consent is available for review by request.

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CRediT authorship contribution statement

Tian bing Xiao: Writing – review & editing, Formal analysis. **Yu qing Huang:** Writing – review & editing, Formal analysis. **Jian rong Tang:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Bei Jia:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Guo jian Wu:** Writing – review & editing, Formal analysis. **Xiao bing Zhang:** Data curation. **Jiao Zhou:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

All authors involved in the writing of this report have no conflicts of interest to report.

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