CASE REPORT

Elizabethkingia meningoseptica: emerging multidrug resistance in a nosocomial pathogen

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Accepted 28 September 2017

SUMMARY

A 46-year-old male patient presented with complaints of burning micturition for 2 days. Initial history, physical examination and laboratory investigations were consistent with the diagnosis of congestive cardiac failure (CCF) and concomitant urinary tract infection. CCF was treated with diuretics and a urine culture/sensitivity (C/S) was sent which returned growing *Elizabethkingia meningoseptica* resistant to all tested drugs. Intravenous cefotaxime which had been started empirically 3 days earlier was withheld at this point, and a repeat urine C/S was sent revealing resistance to all tested drugs (including reserved drugs) barring minocycline. The patient was treated with oral minocycline for 14 days after which he was symptomatically better with sterile urine. The patient was subsequently discharged.

had been placed a month before in view of hydro-nephrosis. The patient's UTI resolved with treatment and he had been discharged on a catheter as per the urologist's advice. On this visit, he once again complained of burning micturition for 2 days.

On general examination, vital signs showed a pulse of 110 beats/minute and a blood pressure of 130/80 mm Hg. The patient was afebrile and not tachypneic. Pallor, grade 1 clubbing and bilateral pitting pedal oedema were present. Respiratory examination revealed decreased intensity of breath sounds and crepitations in bilateral basal lung fields. Cardiovascular examination showed an elevated jugular venous pulse (JVP). All other systemic examination findings were normal. Our provisional diagnosis at the time was CCF precipitated by anaemia or an infection.

BACKGROUND

Elizabethkingia meningoseptica, initially discovered as *Flavobacterium meningoseptica* by Elizabeth O King in 1959, is an aerobic gram-negative rod that has been established to cause nosocomial infections in immunocompromised individuals.^{1,2} Pneumonia, septicaemia and meningitis are the most widely reported infections caused by this multidrug-resistant organism, but other infections have been reported rarely as well.² *E. meningoseptica* has been isolated from the urine in a small number of reported cases but still remains rare.^{3–6} We present a case of urinary tract infection (UTI) caused by one of the most drug-resistant strains that has been reported of this pathogen.

CASE PRESENTATION

A 46-year-old male patient presented to us with complaints of cough with expectoration for 3 days. He was a known case of diabetes mellitus, hypertension, chronic kidney disease (CKD), ischaemic heart disease and chronic hepatitis B on treatment. His left lower limb was amputated due to gangrene several years ago. His cough was mucoid and non-blood stained. It was associated with shortness of breath at rest (New York Heart Association grade 4) and orthopnoea. He also had been admitted several times prior both for his aforementioned conditions and recurrent UTIs. He was admitted 2 months before with a UTI (urine culture/sensitivity (C/S) grew *Enterococcus faecium*) for which he was treated with intravenous teicoplanin for 14 days. He was catheterised in view of oliguria after the removal of his bilateral double J stents which

INVESTIGATIONS AND TREATMENT

His complete blood count confirmed anaemia (normocytic) with a haemoglobin of 7.8 g/dL (reference range: 13–17 g/dL) and his renal function tests showed a creatinine of 2.2 mg/dL (reference range: 0.8–1.3 mg/dL) indicative of CKD. N-terminal pro B-type natriuretic peptide levels were over 35 000 pg/mL (reference range: 10–55 pg/mL), highly suggestive of CCF which was confirmed by an echocardiogram that showed an ejection fraction <40% (reference range: 55%–70%). He was treated with intravenous furosemide following which his symptoms of cough and shortness of breath as well as his examination findings of bilateral basal lung crepitations and elevated JVP resolved. Urine analysis showed 24 white blood cells per high power field (WBC/hpf) (reference range: 0–5 WBC/hpf) and the presence of bacteria. Urine culture grew 100 000 colony forming units (CFU) of *E. meningoseptica*. Sensitivity testing showed this organism was resistant to all tested antibiotics (minimum inhibitory concentration (MIC) written next to each antibiotic) which were amikacin (≥64), amoxicillin-clavulanic acid (≥32), ampicillin/amoxicillin (≥32), cefotaxime/ceftriaxone (≥64), cefuroxime (≥64), trimethoprim-sulphamethoxazole (80), gentamicin (≥16) and norfloxacin (≥4). Following this, a repeat C/S was sent to test sensitivity towards reserved drugs. Blood cultures were sterile. The urine C/S returned 3 days later growing 50 000 CFUs of the same organism, this time resistant to all antibiotics that were previously tested as well as cefoperazone-sulbactam (≥64), cefepime (≥64), imipenem (≥16), piperacillin-tazobactam (≥128) and vancomycin (MIC not listed).

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To cite: Raghavan S, Thomas B, Shastry BA. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-221076

The sole antibiotic to which the strain was sensitive was minocycline (MIC not listed) which the patient was started on orally for 14 days of monotherapy. Urine analysis sent 8 days after starting therapy showed two WBC/hpf and urine C/S sent on the same day returned sterile, suggestive of resolution of the infection.

Ultrasonography of the abdomen and pelvis, and CT of the kidneys, ureters and bladder were done which were suggestive of bilateral hydronephrosis (left kidney grade 4; right kidney grade 3). Bilateral double J stenting was planned but was only done on the left due to technical difficulties with the other side. The patient was discharged on his regular medications after the resolution of his burning micturition.

DISCUSSION

E. meningoseptica is abundantly present in soil and water. It has the ability to exist as biofilm structures allowing the organism to colonise intravascular devices, catheters and ventilators. This is attributed to its hydrophilic cell surface and multiple adhesins located around the cell.⁷ This is also thought to be the reason for its apparent resistance to chlorinated water that allows its colonisation of sinks and taps in hospitals.⁸ The bacterium is associated with high levels of mortality especially in intensive care unit (ICU) patients on broad-spectrum antibiotics owing to its multidrug-resistant nature.^{2,9}

The diagnosis is still overwhelmingly made via microbiological culture that grows beta-haemolytic white-yellow colonies after 24–48 hours of incubation that are catalase, oxidase and indole positive. They are negative for the urease and nitrate test and use glucose and mannitol oxidatively. Greyish discolouration may be present around the colonies as evidence of proteinases and gelatinases. Resistance to penicillin, polymyxin B and colistin is characteristic.^{1,10} Despite all these supposed features, microbiological workup via culture is complicated by variable growth on MacConkey agar and misidentification on certain automated platforms. Newer techniques for diagnosis include the adoption of matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry which has significantly improved confidence in the reporting of this organism.¹¹ There has also been a report of a case where the diagnosis was confirmed genetically through analysis of the 16S rRNA sequence.⁵

Furthermore, the pathogenicity of *E. meningoseptica* is enhanced by its unique antibiotic resistance profile. It is a multi-drug-resistant organism because of chromosomal and plasmid-mediated resistance genes and because of its ability to exist as biofilm structures and survive intracellularly.¹¹ It is characteristically resistant to drugs used to treat gram-negative infections such as third and fourth-generation cephalosporins, carbapenems, extended spectrum penicillins and aminoglycosides, but susceptible to drugs like vancomycin and rifampin which are typically used to treat gram-positive infections. In addition, the emergence of resistance during monotherapy with antibiotics that display in vitro effectiveness as well as anecdotal reports showing improvement only on employment of antibiotic combinations lead to concern about what constitutes appropriate antimicrobial therapy against this organism.²

Outbreaks of infection with this bacterium in neonatal ICUs (NICUs) and ICUs should ideally be followed up with an epidemiological investigation by way of swabbing sinks to identify the source of infection in the hospital. It has also been suggested that for optimal infection control the water tanks must be chlorinated, flushed and inspected for repairs yearly. The benefit of this is believed to arise from the sheer force generated by flushing.^{6,11,12} In this case, the infection was most likely acquired

via the Foley's catheter that was inserted during the patient's prior visit and on which the patient was discharged. An attempt to identify the source of contamination within the hospital, however, proved unsuccessful.

In conclusion, this report serves to underline the importance of this emerging pathogen in causing healthcare-associated infections. In view of the immunocompromised demographic that is affected and the degree of drug resistance exhibited by the bacterium, it would be prudent to initiate appropriate antibiotic therapy with haste as soon as the organism is cultured and antibiotic sensitivities are known. It is our opinion that doing so would prevent significant morbidity and mortality.

Learning points

- Clinicians must have a high index of suspicion for *Elizabethkingia meningoseptica* infections, particularly in immunocompromised individuals. With increasing diagnostic precision, it is becoming clear that the prevalence and clinical significance of this bacterium is greater than previously thought.
- Outbreaks or even isolated cases of *E. meningoseptica* infection must spark an investigation as to the source of contamination. As this is a hospital-acquired pathogen, doing so will likely prevent further cases of infection.
- Laboratories must try to adopt more advanced methods of diagnosis such as the matrix-assisted laser desorption/ionisation time-of-flight to be able to report *E. meningoseptica* infections with greater certainty.
- Further studies are required on the resistance pattern of *E. meningoseptica* in an attempt to establish much needed empiric treatment protocols.

Contributors SR: primary author. BT: guide. SBA: guide.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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