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Scientific letter

Multiresistant *Aeromonas hydrophila* bacteremia

Bacteriemia por Aeromonas hidrophyla *multirresistente*

Aeromonas hydrophila is a Gram-negative, facultative anaerobic, motile, mesophilic, oxidase-positive bacillus with global distribution in aquatic environments. It has several virulence factors such as proteases, phospholipases, lipases, enterotoxins, adhesins, invasins and aerolysins,[1] and can be the aetiological agent of gastrointestinal infections, wound infections, biliary system infections, post-traumatic cellulitis and bacteremia.[2]

The treatment of choice is third-generation cephalosporins, although there are reports of some resistant strains due to the production of extended-spectrum ®-lactamases (ESBL) and inducible AmpC ®-lactamases. In addition, they can present selective resistance to carbapenems by production of a class B CphA chromosomal carbapenemase.[3] Resistance to quinolones,[4] tetracyclines,[5] colistin (*mcr-3*-type plasmid) and sulfonamides[6] has also been described.

We present a clinical case of an infection caused by a strain of *A. hydrophila* with an unusual sensitivity profile.

This was a 72-year-old patient with a history of adenocarcinoma of the colon and chronic pulmonary embolism, who attended the Accident and Emergency Department of our centre with partial bowel obstruction and portal peripheral subsegmental thrombosis, for which, after being assessed, he was admitted to General Surgery. Subsequently, after suddenly developing speech problems, he was transferred to Neurology where, following a biopsy, he was diagnosed with cerebral aspergillosis.

Due to a fever spike of 38°C, two peripheral blood cultures were taken and the femoral catheter tip was cultured. The blood cultures were incubated in the BD BACTEC FX® incubator and were positive on the first day. In the catheter culture, 7 CFU were isolated using the Maki technique. After seeding the flasks, growth was observed of honey-coloured ®-haemolytic colonies on blood agar and oxidase-positive and lactose-fermenting colonies on MacConkey agar. Using MALDI-TOF, it was unanimously identified as *A. hydrophila*, with scores above 2; maximum of 2.34. In addition, a battery of biochemical tests was carried out in which the esculin, Voges-Proskauer and L-arabinose fermentation tests were positive, and cellobiose and sorbitol fermentation negative. Antibiotic susceptibility was determined by the broth microdilution method in MicroScan® (Beckman Coulter Inc., Brea, CA, USA) (Table 1). We used the EUCAST 2021 breakpoints corresponding to *Aeromonas* spp. and those corresponding to *Enterobacterales* for the rest of the antibiotics not contemplated. Some type of plasmid resistance mechanism was suspected, as the sensitivity to ceftazidime/avibactam was not consistent with the resistance mechanism to carbapenems most associated with this species,[3] and subsequently the presence of a KPC carbapenemase was detected using immunochromatography (NG-Test CARBA 5, NG Biotech®, Guipry, France). A specific PCR and a Sanger sequencing of the fragment were then performed. After comparing the sequence obtained in The Comprehensive Antibiotic Resistance Database® (CARD), the presence of a KPC-2-like coding gene was confirmed.

Table 1
Sensitivity of the KPC carbapenemase-producing strain of *Aeromonas hydrophila* (MIC in mg/l).

Antibiotic	MIC	Status
Ampicillin	>8	Resistant
Mecillinam	>8	Resistant
Piperacillin	>16	Resistant
Amoxicillin/clavulanic acid	>32	Resistant
Piperacillin/tazobactam	>16	Resistant
Cefazoline	>16	Resistant
Cefuroxime	>8	Resistant
Cefoxitin	>16	Resistant
Cefotaxime	>32	Resistant
Ceftazidime	8	Resistant
Ceftazidime/avibactam	≤2	Sensitive
Cefepime	>8	Resistant
Aztreonam	>4	Resistant
Imipenem	>8	Resistant
Meropenem	>32	Resistant
Ertapenem	>1	Resistant
Ceftolozane/tazobactam	4	Resistant
Amikacin	16	Resistant
Nitrofurantoin	≤64	Sensitive
Colistin	4	Resistant
Co-trimoxazole	≤2/38	Sensitive
Levofloxacin	>1	Resistant
Ciprofloxacin	>1	Resistant

At the time the isolation was made, the patient was being treated with moxifloxacin and voriconazole, although he had previously received antibiotic treatment with acyclovir, linezolid, amphotericin and meropenem. After the microbiological report, he was administered ceftazidime/avibactam. As this treatment was effective, he was placed under the care of Hospital at Home.

KPC carbapenemases are class A serine-carbapenemases first described in *Klebsiella pneumoniae*. These plasmid enzymes have been transmitted from *Klebsiella* spp. to other genera and species, from *Enterobacterales* to *Pseudomonas aeruginosa*. They show a wide range of MIC to carbapenems and are inhibited to varying degrees by classic ®-lactamase inhibitors; they are usually completely inhibited by the new inhibitors. As a result, strains that carry KPC are sensitive to combinations such as ceftazidime/avibactam, unlike class B carbapenemase-producing strains, such as those of the CphA type.

Although it is not a common nosocomial pathogen, multidrug resistance in *Aeromonas* spp. should be taken into account. A study in Bangladesh showed that *Aeromonas* spp. was the enteric pathogen with the highest rate of multidrug resistance (81.5%) among immunocompromised patients and in critical care units.[7]

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Moreover, although we have not found any references in the literature to clinical isolates of KPC-producing *Aeromonas* spp., strains carrying the *blaKPC-2* gene have been reported in a wastewater treatment plant in Japan, so we should be alert to the emergence of these plasmid resistance mechanisms in *Aeromonas* spp.[8]

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Phenotypic and genotypic characterization of *Shigella sonnei* carrying the extended-spectrum beta-lactamase CTX-M-27. A report of two cases in Spain in men who have sex with men

Caracterización fenotípica y genotípica de Shigella sonnei *portadora de la betalactamasa de espectro extendido CTX-M-27. A propósito de dos casos en España en hombres que tienen sexo con hombres*

Case No.1

This was a 28-year-old patient from Portugal who had been in Spain for 15 days and had sexual relations with men (men who have sex with men [MSM]). He went to the Accident and Emergency department with diarrhoea and a fever of 38.1°C, plus mild dysuria and leucocytosis of 20×10^3 μl in blood. Stool and urine samples were collected, and the patient was admitted to the hospital and given intravenous ceftriaxone (1 g/24 h) as empirical treatment. *Shigella* spp. was isolated in the stool culture, and the patient was discharged with oral ciprofloxacin (500 mg/12 h for 3 days) before the susceptibility to antimicrobials had been determined. The isolate turned out to be a group 9 CTX-M extended-spectrum β-lactamase (ESBL)-producing *Shigella sonnei (S. sonnei)*, resistant to cephalosporins, cotrimoxazole and quinolones. Several days later, the patient was admitted again due to persistent symptoms of high fever and watery diarrhoea, this time being treated with ertapenem (1 g every 24 h intravenously for 5 days). He was discharged at the end of the course of antibiotics due to resolution of the symptoms.

Case No.2

This was a 47-year-old patient, MSM, taking ongoing treatment with pre-exposure prophylaxis (PrEP) who attended the sexually transmitted infection (STI) clinic for follow-up and to receive prophylaxis with ceftriaxone (1 g intramuscularly) due to risky sexual contact. He reported a 48-h history of symptoms of diffuse abdominal pain with increased bowel movements (up to 10 per day) with pathological products (mucus/blood), but at that point a watch and wait approach was adopted. He was seen again seven days later and, as the symptoms persisted, stool culture samples were collected from the patient and his current partner (with similar gastrointestinal symptoms) and active monitoring was continued while awaiting the results. In the stool sample, group CTX-M-9, cephalosporinase-type ESBL-producing *S. sonnei* was detected, while non-ESBL-producing *Shigella flexneri* (*S. flexneri)*, whose sensitivity to antimicrobials was different, was detected in its partner (only resistant to quinolones).

Microbiology

In the first case, a PCR panel STI Essential Assay, Allplex™ (Seegene Inc., Seoul, South Korea) was performed on the urine sample (first-catch sample) with detection of *Chlamydia trachomatis*. In both cases, a stool sample was extracted to perform the Enteric bacterial PCR panel of the BD Max™ system (Becton Dickinson, Franklin Lakes, NJ, USA) with detection of enteroinvasive *Shigella/Escherichia coli (E. coli)* DNA. Subsequently, the stool sample was seeded on MacConkey and Hektoen (BD™) agar media, with lactose-negative colonies isolated on the MacConkey agar which were identified as *Shigella* spp./*E. coli* by MALDI-TOF mass spectrometry (Bruker, Massachusetts, USA); this system is not able to distinguish between these two genera. Lactose-negative colonies were plated on triple sugar iron (TSI) agar and lysine iron agar (LIA) (BD™) media for identification, confirming the genus *Shigella* spp. (Fig. 1A). Agglutination was then performed with Difco™ Shigella Antisera Poly (BD™) to determine the species, and the identification of *S. sonnei* was confirmed.

The antibiogram was performed using the disc-diffusion technique, as well as the ID/NMIC 503 panel of the Phoenix BD® system (Becton Dickinson, Franklin Lakes, NJ, USA), through which resistance was detected to cephalosporins, aztreonam, trimethoprim/sulfamethoxazole and quinolones. Susceptibility to azithromycin was also studied in both isolates using E-test®, showing resistance with MIC > 256 mg/l (epidemiological cut-off point for wild strains at ≤16 mg/l). We performed a