Case Reports

Kluyvera cryocrescens Bacteremia

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Abstract

Kluyvera cryocrescens is a gram-negative enterobacteria that has been isolated from sputum, urine, bile secretion, peritoneal fluid and blood in humans, but rarely causes clinically significant infections. However, there are several cases described in the literature that have presented with symptoms of severe sepsis and septic shock, some with adequate response to different antibiotic therapies. A case of severe sepsis due to *Kluyvera cryocrescens* bacteremia is described in a 73 year old male, regarding his diagnosis, treatment and outcome. He develops the infection while hospitalized and received a 10 day course of a third generation cephalosporin achieving adequate resolution of the infection.

Keywords: Bacteremia, *Kluyvera cryocrescens*, nosocomial infection, Sepsis.

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The *Kluyvera* species were described in 1936 by Kluyver and van Niel. However, they were molecularly characterized by Farmer, in 1981. The genus contains 4 species: *Kluyveracryocrescens, Kluyveraascorbata, Kluyvera georgiana,* and *Kluyveracochleae*. The latter, has not been detected in humans.

This enterobacteria is a free-living organism, found in water, soil, sewers, hospital sinks, and animal-derived products. In human beings, it is part of the normal intestinal flora, but in small amounts. Most often, this pathogen behaves as a commensal organism, however, it can rarely lead to sickness, and also behaves as an opportunistic pathogen. It is unknown if the infections caused by this germ are endogenous versus acquired from the environment, or if both ways are equally important.

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The *Kluyvera* species belong to the Enterobacteriaceae family, with Gram-negative bacilli that have peritrichous flagella, which allows them to move, catalase-positive and oxidase-negative, which grow in McConkey agar, they can ferment glucose, they are indole-positive, methyl red-positive; Vogues Proskauer-negative, citrate-positive, H2S-negative, urease-negative, phenylalanine deaminase-negative, and arginine dihydrolase-negative, lysine-positive, and ornithine decarboxylase-positive. The colonies are similar to *E. Coli*, however, they are drier and rougher.

The sites of infections vary. They include peritoneal fluid, urine, and skin, even bacteremia. As of now, there isn't a specific clinical pattern of infections by this bacteria.

Case description

73 year old male, works in automotive repair, diabetic for over 20 years, has hypertension, dyslipidemia, ischemic cardiomyopathy for the past 15 years, and benign prostatic hyperplasia status post transurethral resection 7 years prior. His last hospital admission was 11 months ago, secondary to an ischemic cerebrovascular accident due to atherothrombosis, which left a partial hemiparesis of left upper extremity and a Rankin 2. There is no history of smoking, alcohol intake or drug addiction.

The patient was admitted to the Emergency Room with a one month history of an infectious process of his 4th and 5th toes of the right foot. Empiric treatment with oxacillin and clindamycin was initiated , without response, and a systemic inflammatory response and fever persisted. He also was found to have severe arterial insufficiency involving the distal circulation of the right lower extremity, for which a below-the-knee amputation was recommended. After surgery, the systemic inflammation resolved, therefore oxacillin and clindamycin were stopped.

Several days after surgery, the patient remained oxygen dependent; bilateral reticulonodular lung infiltrates were documented on the chest x-ray and an increase in C-reactive protein (CRP) at 149 ng/ml, and for this reason empiric treatment with third generation cephalosporins (Cefotaxime) was started, and both blood and urine cultures were obtained.

Both sets of blood cultures grew a gram-negative bacillus at 10.3 and 13.7 hours. Subsequently it was identified in VYTEK2 system as *Kluyvera cryocrescens*, which was corroborated as Kluyvera sp by analytical profile index. By

Table 1. Antibiotic sensitivity profile of *Kluyvera cryocrescens* isolated in the case		
ABX	**MIC**	**INT**
Nalidixic acid	16	S
Amikacin	< = 2	S
Ampicillin	> = 32	R
Ampicillin sulbactam	8	S
Cephalotin	> = 64	R
Cefotaxime	< = 1	S
Ceftazidime	< = 1	S
Ciprofloxacin	< = 0.25	S
Gentamicin	< = 1	S
Imipenem	< = 0.25	S
Meropenem	< = 0.25	S
Trimethropin-Sulfamethoxazole	< = 20	S

that moment the antibiotic sensitivity testing was available and showed it was sensitive to cefotaxime (Table 1).

10 days of antibiotic treatment were completed with Cefotaxime, with a significant clinical improvement with a reduced requirement in oxygen supplementation and a significant decrease in the CRP.

Discussion

The *Kluyvera cryocrescens* infection is rare in humans; only 13 cases have been reported where *Kluyvera cryocrescens* has been isolated as the culprit pathogen. Of these, 9 have caused bacteremia (4 were considered a small outbreak in 2008, in a cardiovascular medicine ward), one in the urine of a patient with persistent proteinuria, one in the peritoneal fluid, one on bladder fluid in a patient with an acute emphysematous cholecystitis, and one case of soft tissue infection in a finger.

Some of the patients had a central venous catheter, as our patient did, but hasn't been the most common finding. The consistent presentation was fever, however, some cases presented with dyspnea, cough, chills, nausea, thrombocytopenia and hypoglycemia. The outcome appears to be favorable in the majority of the cases. Of the 13 reported cases of *K. cryocrescens*, only two died. In regards to the *in-vitro* treatment, *K cryocrescens* is naturally sensitive to tetracycline, aminoglycosides, ampicillin/sulbactam, ticarcillin, piperacillin-tazobactam, third-generation cephalosporins, carbapenems, aztreonam, quinolones, trimethoprim, chloramphenicol, fosfomycin and nitrofurantoin. Likewise, it is resistant *in vitro* to erythromycin, clarithromycin, lincosamides, streptogramins, glycopeptides, linezolid and rifampin.

The largest published experience with clinical success is with third-generation cephalosporins, fluoroquinolones, carbapenems and aminoglycosides, which comes from case reports. So, there isn't a first- line treatment backed up by evidence. One must take into account the availability, cost, adverse reactions, toxicity, and development of resistance, at the time when starting treatment.

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