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Klebsiella variicola in a 92-Year Old Patient: A Case Report

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Abstract

Objective and Importance: In this article we present a case of the emerging pathogen *Klebsiella variicola* which is still not easy to identify and which is becoming more multidrug resistant.

Clinical presentation: This case is about a 92-years old woman with abdominal pain, nausea and vomiting. Her body temperature was 38.5°C. Clinical examination revealed slight tenderness of the abdomen. Laboratory results showed inflammation. Chest radiography showed no abnormalities and an abdominal CT showed increased intra-abdominal fluid. Blood cultures revealed *Klebsiella variicola*, which was resistant to amoxicillin in this case. Favorable outcome was achieved by applying antibiotic treatment during 14 days.

Discussion: *Klebsiella variicola* is structurally very similar to *Klebsiella pneumoniae*, so this bacillus is often misidentified and cases may be underreported. *K. variicola* is intrinsically resistant to amoxicillin and *K. pneumoniae* is often Multidrug Resistant (MDR). It is concerning that *K. variicola* and *K. pneumoniae* can exchange plasmids because consequently *K. variicola* can also become resistant to more types of antibiotics. Since *K. variicola* is also identified in the food chain, these multidrug resistant species can easily be distributed all over the world.

Conclusion: MDR cases of *Klebsiella variicola* are increasingly reported worldwide. A standardized detection method is indispensable to correctly identify *K. variicola* and to choose the right antibiotics to prevent even more resistance to antibiotics.

Introduction

Klebsiella variicola is a Gram-negative, facultative anaerobic and non-motile bacillus. Originally it was considered as a benign endosymbiont in plants. Nowadays *K. variicola* is found in a wide diversity of natural niches and it has been associated with diseases in humans and cattle [1,2]. This bacterium has been misidentified for a long time as *K. pneumoniae* since it is part of the *K. pneumoniae* complex. Due to the development of better detection techniques it is more and more possible to distinguish different species [3-5]. *K. variicola* is an opportunistic pathogen responsible for a variety of infections such as blood stream infections, respiratory tract infections, urinary tract infections and infections in immunocompromised individuals [4-7].

Case Presentation

A case of a 92-years-old woman living in a nursing home with a *Klebsiella variicola* bacteremia will be presented. The patient was admitted to the hospital because of abdominal pain, nausea and vomiting. Body temperature was 38.5°C. This patient was under chronic treatment with Lactulose syrup 15 mL once a day, Ursodeoxycholic acid 300 mg twice a day and vitamin D 25.000 IE every two weeks. In the past, she was already hospitalized twice due to a sepsis.

At admission, she was alert, well-oriented and not critically ill. Her blood pressure was 151/61 mmHg, heart rate 68 bpm, oxygen saturation 97% without oxygen support and respiratory rate 16/min. Cardiac auscultation revealed a systolic murmur and pulmonary auscultation was normal. Auscultation of the abdomen showed normoperistalsis. Abdominal inspection was normal. Further abdominal examination showed no guarding, rigidity or rebound pain. Palpation was diffuse painful, but was the most clear in the right hypochondriac and upper abdomen. There were no peripheral edemas.

The laboratory findings at admission showed no elevated total white blood cell count (8.22 × 10^3 mm^3), increased neutrophils (79.5%), normal serum creatinine (0.75 mg/dl), elevated total bilirubine (1.5 mg/dl), normal ionogram with a light hyponatremia (132 mmol/l), a subclinical hyperthyroidism (known multinodular stroma), and an elevated C-Reactive Protein (CRP) (63.72 mg/l). Blood cultures were taken and treatment with moxifloxacine 400 mg per day was initiated

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empirically because of a penicillin allergy. Chest radiograph revealed no abnormalities compared to a recent X-ray. Because of a history of diverticulitis, a Computed Tomography (CT) of the abdomen was ordered but this showed no abnormalities except some increased intra-abdominal fluid, which was suitable for a gastro-enteritis. Urinary culture was negative. Fever disappeared on day three of the hospitalization. Blood cultures showed gram-negative bars, later specified as *Klebsiella variicola*. The CRP doubled (110 mg/dl) and the other laboratory findings normalized. Because of the anti biogram (Table 1), Moxifloxacine was switched to Ciprofloxacin high dose (2 mg × 750 mg). The total needed duration of this antibiotic treatment was 14 days. After 5 days of hospitalization she had no complaints anymore and because of a decreasing CRP (39 mg/dl) she was sent back to the nursing home.

Table 1: Antibiogram of *Klebsiella variicola*.

Klebsiella variicola +++	Aerobic culture (blood)	1
Amoxicilline	Clamoxyl, Flemoxin	R
Amoxicilline-clavulanic acid	amoxiclav, Amoxlane, Clavucid	S
Temocilline	Negaban	S
Piperacilline-tazobactam	piperacilline-tazobactam	S
Cefuroxim	Cefuroxim	S
Cefotaxim	Claforan, Ceftriaxone, Rocephine	S
Ceftazidim	Glazidim, Ceftazidim	S
Cefepim	Maxipime	S
Meropenem	Meronem	S
Amikacin	Amukin	S
Ciprofloxacin	Ciproxine	S
Trimethoprim-sulfamethoxazol	Eusaprim, Bactrim	S

Discussion

We presented the case of a 92-year old woman with a Blood Stream Infection (BSI) with *K. variicola*. This patient wasn't critically ill. This bacterium is normally susceptible to most antibiotic classes so this infection should be treated without any problems. The antibiogram in this case showed no resistance to antibiotics except amoxicillin to which *K. variicola* is intrinsically resistant because of the LEN beta-lactamase [3]. Due to the administration of the right antibiotics this elder woman could return to the nursing home already after a couple of days because she recovered well and quickly.

It is important to take in mind that this pattern of susceptibility has changed over time. There are an increased number of Multidrug-Resistant (MDR) cases with *K. variicola*. Resistant isolates were already found worldwide (US, Mexico, in the north of South-America, Asia and also in Europe (Scotland, the Netherlands, Sweden and Norway)). [8-11]. In Mexico *K. variicola* resistant to cephalosporin was found. The dissemination of this resistance was due to related plasmids carrying the Extended Spectrum Beta Lactamases (ESBL), mainly SHV-genes [9]. In the UK an isolate was found in a soft tissue infection which was susceptible to cephalosporins but resistant to carbapenems [10]. Very concerning is that there also have been outbreaks of MDR K. variicola in neonates. Neonatal sepsis is already associated with poor prognostic outcomes and when the pathogen is multidrug-resistant, the survival rates are even worse. Low and middle income countries, for example Bangladesh, often have under resourced hospitals, which do not have the necessary antibiotics in stock to treat a MDR bacterium [11].

A possible explanation for this increasing number of MDR cases is that *Klebsiella variicola* is structurally very similar to *Klebsiella pneumoniae*, which is a human pathogen associated with resistance to multiple antibiotics and a high mortality. This is an additional cause for concern because they can exchange plasmids and as a consequence *K. variicola* can become more resistant to different types of antibiotics [4].

Another important way of contamination to keep in mind is the food chain. The worldwide spread of carbapenemase-producing *Enterobacteriaceae* is already a known concern to public health services. Now, it is also found that *Klebsiella variicola* can be present in the food supply. In Switzerland this bacterium has been detected in fresh vegetables delivered from Asia. As a consequence the multidrug-resistant species can easily be distributed all over the world and become more widespread. Good agriculture techniques, hygiene and water quality are important factors to prevent further distribution of MDR bacteria [12,13].

It is still difficult to discover all isolates of *K. variicola*. Because of the misidentification, cases are underreported. There are already different ways to identify *K. variicola*, such as microbial methods, the Polymerase Chain Reaction (PCR) and Whole Genome Sequencing (WGS). But none of these have been routinely adopted. And still not all countries and laboratories have the necessary detection methods to identify this emerging pathogen. As it currently stands, the incorrect classification of *Klebsiella variicola* continues to form an issue [8].

Conclusion

Even though the condition of the patient in the presented case was not life threatening and the bacterium was susceptible to most antibiotics, we have to be aware that MDR cases of *K. variicola* exist and that they are more and more reported. Like with all the other bacteria we need to choose our antibiotics carefully and use them in a correct indication with the most appropriate spectrum to prevent even more resistance to antibiotics. There also has to come a generalized and standardized way to detect *K. variicola* so everyone is capable of identifying this pathogen, all over the world including low and middle income countries. These countries often lack the right methods and materials and are sometimes short of the right antibiotics to treat multidrug-resistant species.

Another alarming discovery is the detection of MDR *K. variicola* in fresh vegetables. Food safety has to be taken into mind and appropriate hygiene standards have to be followed to prevent further spreading of MDR pathogens.

Already a lot of different MDR cases with *K. variicola* have been documented worldwide over the last years. It is even present in our food chain. It is unknown what the future will bring regarding this pathogen. We can conclude that *Klebsiella variicola* is a bacterium that we will have to take into account in the future.

References

1. Podschun R, Pietsch S, Höller C, Ullmann U. Incidence of *Klebsiella* species in surface waters and their expression of virulence factors. Appl Environ Microbiol. 2001;67(7):3325-7.

2. Rosenblueth M, Martínez L, Silva J, Martínez-Romero E. *Klebsiella variicola*, a novel species with clinical and plant-associated isolates. Syst Appl Microbiol. 2004;27(1):27-35.

3. Garza-Ramos U, Silva-Sánchez J, Martínez-Romero E, Tinoco P, Pina-

Gonzales M, Barrios H, et al. Development of a multiplex-PCR probe system for the proper identification of *Klebsiella variicola*. BMC Microbiol. 2015;15:64.

4. Long SW, Linson SE, Ojeda Saavedra M, Cantu C, Davis JJ, Brettin T, et al. Whole-genome sequencing of human clinical *Klebsiella pneumoniae* isolates reveals misidentification and misunderstandings of *Klebsiella pneumoniae*, *Klebsiella variicola*, and *Klebsiella quasipneumoniae*. mSphere. 2017;2(4):e00290-17.

5. Potter RF, Lainhart W, Twentyman J, Wallace MA, Bin Wang B, Burnham CA, et al. Population structure, antibiotic resistance, and uropathogenicity of *Klebsiella variicola*. mBio. 2018;9(6):e02481-18.

6. Holt KE, Wertheim H, Zadoks RN, Baker S, Whitehouse CA, Dance D, et al. Genomic analysis of diversity, population structure, virulence, and antimicrobial resistance in *Klebsiella pneumoniae*, an urgent threat to public health. Proc Natl Acad Sci U S A. 2015;112(27):E3574-81.

7. Maatallah M, Vading M, Kabir MH, Bakhrouf A, Kalin M, Nauclér P, et al. *Klebsiella variicola* is a frequent cause of bloodstream infection in the Stockholm area, and associated with higher mortality compared to *K. pneumoniae*. PLoS One. 2014;9(11):e113539.

8. Rodríguez-Medina N, Barrios-Camacho H, Duran-Bedolla J, Garza-Ramos U. *Klebsiella variicola*: An emerging pathogen in humans. Emerg Microbes Infect. 2019;8(1):973-88.

9. Garza-Ramos U, Martínez-Romero E, Silva-Sánchez J. SHV-type Extended-Spectrum β-Lactamase (ESBL) are encoded in related plasmids from enterobacteria clinical isolates from Mexico. Salud Publica Mex. 2007;49(6):415-21.

10. Hopkins KL, Findlay J, Doumith M, Mather B, Meunier D, D'Arcy S, et al. IMI-2 carbapenemase in a clinical *Klebsiella variicola* isolated in the UK. J Antimicrob Chemother. 2017;72(7):2129-31.

11. Farzana R, Jones LS, Rahman A, Andrey OD, Sands K, Portal E, et al. Outbreak of hyper virulent multidrug-resistant *Klebsiella variicola* causing high mortality in neonates in Bangladesh. Clin Infect Dise. 2019;68(7):1225-7.

12. Zurfluh K, Poirel L, Nordmann P, Klumpp J, Stephan R. First detection of *Klebsiella variicola* producing OXA-181 carbapenemase in fresh vegetable imported from Asia to Switzerland. Antimicrob Resist Infect Control. 2015;4:38.

13. Veldman K, Kant A, Dierikx C, van Essen-Zandbergen A, Wit B, Mevius D. Enterobacteriaceae resistant to third-generation cephalosporins andquinolones in fresh culinary herbs imported from Southeast Asia. Int J Food Microbiol. 2014;177:72-7.