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A RARE CASE OF URINARY TRACT INFECTION BY *BURKHOLDERIA CEPACIA*

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Abstract. *Burkholderia cepacia* is a motile, aerobic, non-fermentative, gram-negative bacillus and has been widely documented as a lung pathogen in patients with cystic fibrosis and chronic granulomatous disease. It is documented as an important emerging cause of multi-drug resistant nosocomial infections, and an important cause of morbidity and mortality. A 64-year-old male patient visited the Nikea Primary Healthcare Center, Piraeus, Greece, referred by the family doctor (GP), for follow-up due a history of prostate cancer (patient on immunosuppression) and recurrent UTIs with subsequent admission to the hospital. Patient history revealed diabetes mellitus type 2, arterial hypertension, hypercholesterolemia, hypertriglyceridemia, history of recurrent UTIs, with 4 hospitalizations in a tertiary hospital during the last 2 years, prostatic hypertrophy, 2 episodes of prostatitis before the diagnosis of prostate cancer Gleason score 6, at the end of 2019, with subsequent total prostatectomy, and radiotherapy. Patient history also revealed dysuria, frequent urination, pain and burning sensation during urination and erectile dysfunction. Urinalysis showed intense pyuria, abundance of micro-organisms and abundance of red blood cells. The urine culture grew monomicrobial *Burkholderia cepacia* > 10^5 CFU/ml. The bacterium was identified by the RapID™ REMEL ONE identification system (Thermo Fisher Scientific). Antimicrobial susceptibility testing revealed susceptibility to antibiotics such as, Ceftazidime, Ciprofloxacin, Norfloxacin, Levofloxacin and Imipenem.The patient received treatment with Levofloxacin. *Burkholderia cepacia* infections outside the respiratory system are rare. Moreover, recurrent UTIs with *B. cepacia* is a rare finding, which highlights the importance of our study. UTIs with *B. cepacia* have been associated with bladder irrigation or use of contaminated hospital objects and liquids. *B. cepacia* is one of the most antimicrobial-resistant organisms and treatment options are limited. The patient was treated with Levofloxacin (3rd generation fluoroquinolone — Tavanic) 500 mg daily per os for 2 weeks, due to his history.

Key words: *Burkholderia cepacia, urinary tract infection, monomicrobial, morbidity, mortality, susceptibility, respiratory system, treatment.*

РЕДКИЙ СЛУЧАЙ ИНФЕКЦИИ МОЧЕВЫХ ПУТЕЙ, ВЫЗВАННОЙ *BURKHOLDERIA CEPACIA*

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Резюме. *Burkholderia cepacia* представляет собой подвижную, аэробную, неферментирующую грамотрицательную палочку. Этот патоген широко известен в качестве возбудителя бронхо-легочных инфекций у паци-

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ентов с муковисцидозом и хронической гранулематозной болезнью, а также внутрибольничных инфекций с множественной лекарственной устойчивостью, высоким уровнем заболеваемости и смертности. 64-летний пациент мужского пола посетил Центр первичной медико-санитарной помощи Никеа, Пирей, Греция, по направлению семейного врача для наблюдения в связи с раком простаты (пациент с иммуносупрессией) и рецидивирующими инфекциями мочевых путей (ИМП) и был госпитализирован. В анамнезе: сахарный диабет 2 типа, артериальная гипертензия, гиперхолестеринемия, гипертриглицеридемия, рецидивирующие ИМП, 4 госпитализации в специализированную больницу третичного звена за последние 2 года, гипертрофия предстательной железы, 2 эпизода простатита в конце 2019 г. до установления диагноза рака простаты (6 баллов по шкале Глисона), с последующей тотальной простатэктомией и лучевой терапией. Предъявлял жалобы на частые мочеиспускания, сопровождавшиеся болью и жжением, эректильную дисфункцию. Анализ мочи выявил выраженную пиурию, обилие микроорганизмов и эритроцитов. В посеве мочи обнаружены *Burkholderia cepacia* > 10^5 КОЕ/мл. Вид бактерии был идентифицирован с помощью системы RapID™ REMEL ONE (Thermo Fisher Scientific). Была установлена чувствительность возбудителя к цефтазидиму, ципрофлоксацину, норфлоксацину, левофлоксацину и имипенему. Пациент получал лечение препаратом левофлоксацина (Таваник, по 500 мг ежедневно перорально в течение 2 недель). Инфекция *Burkholderia cepacia* за пределами респираторного тракта встречается редко. Более того, мономикробные рецидивы ИМП, вызванные *B. cepacia*, являются редкой находкой, что подчеркивает важность представленного исследования. ИМП, вызванные *B. cepacia*, были связаны с промыванием мочевого пузыря или использованием загрязненных больничных предметов и жидкостей. *B. cepacia* является одним из наиболее устойчивых к противомикробным препаратам микроорганизмов, поэтому возможности лечения инфекций, обусловленных этим патогеном, сильно ограничены.

Ключевые слова: *Burkholderia cepacia, инфекция мочевыводящих путей, мономикробная инфекция, заболеваемость, смертность, восприимчивость, респираторная система, лечение.*

Introduction

B. cepacia was discovered by Walter Burkholder in 1949 as the cause of onion skin rot, and first described as a human pathogen in the 1950s. It was first isolated in patients with cystic fibrosis (CF) in 1977, when it was known as *Pseudomonas cepacia*. In the 1980s, outbreaks of *B. cepacia* in individuals with CF were associated with a 35% death rate. *B. cepacia* has a large genome, containing twice the amount of genetic material as *E. coli*.

Burkholderia cepacia is a motile, aerobic, non-fermentative, gram-negative bacillus with multitrichous polar flagella, found in various soil and aquatic environments. It has been widely documented as a lung pathogen in patients with cystic fibrosis and chronic granulomatous disease and is associated with fatal outcomes. Moreover, recently it is documented as an important emerging cause of multi-drug resistant nosocomial infections and consequently, as an important cause of morbidity and mortality [3, 6]. The aim of our study is to present a case of urinary tract infection (UTI) caused by *Burkholderia cepacia*.

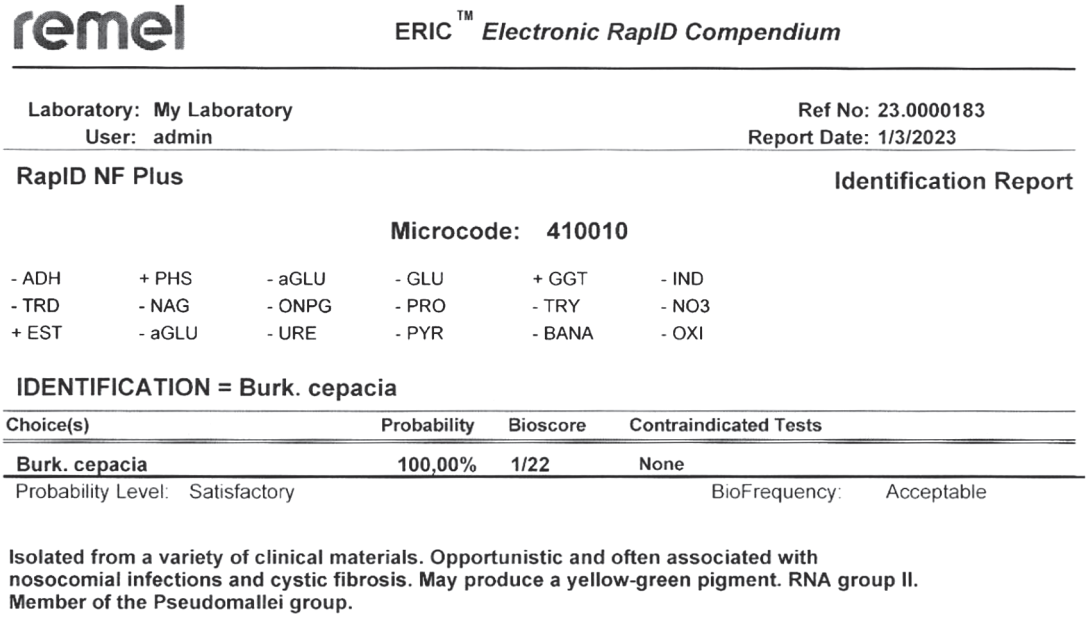
Burkholderia cepacia complex (BCC) is a species complex consisting of *Burkholderia cepacia* and at least 20 different biochemically similar species of Gram-negative bacteria. They are catalase-producing and lactose-nonfermenting. Members of BCC are opportunistic human pathogens that most often cause pneumonia in immunocompromised individuals with underlying lung disease. Patients with sickle-cell haemoglobinopathies are also at risk.

The group includes *B. cepacia, B. multivorans, B. cenocepacia, B. vietnamiensis, B. stabilis, B. ambifaria, B. dolosa, B. anthina, B. pyrrocinia* and *B. ubonensis*, among other species.

Treatment typically includes multiple antibiotics and may include ceftazidime, minocycline, piperacillin, meropenem, chloramphenicol, and trimethoprim/sulfamethoxazole (co-trimoxazole). Although co-trimoxazole has been generally considered the drug of choice for *B. cepacia* infections, ceftazidime, minocycline, piperacillin, and meropenem are considered to be viable alternative options in cases where co-trimoxazole cannot be administered because of hypersensitivity reactions, intolerance, or resistance. Newer beta-lactam/beta-lactamase combinations like ceftazidime-avibactam or ceftolozane-tazobactam can also be effective. BCC intrinsically resistant to colistin and usually resistant to aminoglycosides.

Case report

A 64-year-old male patient visited the Nikea Primary Healthcare Center, Piraeus, Greece, referred by the family doctor, for follow-up due a history of prostate cancer (patient on immunosuppression) and recurrent UTIs with subsequent admission to the hospital. Patient history revealed diabetes mellitus type 2, arterial hypertension, hypercholesterolemia, hypertriglyceridemia, history of recurrent UTIs, with 4 hospitalizations in a tertiary hospital during the last 2 years, prostatic hypertrophy, 2 episodes of prostatitis before the diag-



remel

ERIC™ *Electronic RapID Compendium*

Laboratory: My Laboratory
User: admin

Ref No: 23.0000183
Report Date: 1/3/2023

RapID NF Plus

Identification Report

Microcode: 410010

- ADH	+ PHS	- aGLU	- GLU	+ GGT	- IND
- TRD	- NAG	- ONPG	- PRO	- TRY	- NO3
+ EST	- aGLU	- URE	- PYR	- BANA	- OXI

IDENTIFICATION = Burk. cepacia

Choice(s)	Probability	Bioscore	Contraindicated Tests
Burk. cepacia	100,00%	1/22	None

Probability Level: Satisfactory BioFrequency: Acceptable

Isolated from a variety of clinical materials. Opportunistic and often associated with nosocomial infections and cystic fibrosis. May produce a yellow-green pigment. RNA group II. Member of the Pseudomallei group.

Figure. Identification of *Burkholderia cepacia* by RapID™ REMEL ONE

nosis of prostate cancer Gleason score 6, at the end of 2019, with subsequent total prostatectomy, and radiotherapy. Patient history also revealed dysuria, frequent urination, pain and burning sensation during urination and erectile dysfunction. For the recurrent UTIs he had received initially antimicrobial treatment *per os*, for *Pseudomonas* spp. There is no further evidence of the antimicrobial treatment he received prior to his admissions to hospital (4 admissions in the last 2 years). On his last admission he received antimicrobial treatment for pseudomonas, his condition improved and he was discharged from the hospital with some of his symptoms persisting, but he does not remember the antimicrobial treatment he received there. However, on worsening of his condition, with subsequent high fever, elevation of CRP, ferritin and ESR values, as well as elevation of leucocyte count, he was admitted to the hospital and received intravenous antimicrobial treatment. The performed urinalysis (Multistix 10 SG Reagent Strips, Siemens Healthineers) and urine culture (incubation at 37°C for 24 hours on MacConkey agar, Columbia blood agar, and Sabouraud dextrose agar for fungi) took place at the Laboratory of Biopathology of Nikea Prime Care Center. We have no information on the diagnosis of the urine culture done at the hospital where the patient was hospitalized.

Results

Urinalysis showed intense pyuria, abundance of micro-organisms and abundance of red blood cells. The urine culture grew monomicrobial *Burkholderia cepacia* > 10^5 CFU/ml. The bacterium was identified by the RapID™ REMEL ONE identification system (Thermo Fisher Scientific) (see Figure). Antimicrobial susceptibility testing revealed susceptibility to Ceftazidime, Ciprofloxacin, Norfloxacin, Levofloxacin and Imipenem. The patient was treated with Levofloxacin (3rd generation fluoroquinolone — Tavanic) 500 mg daily *per os* for 2 weeks, due to his history, and recovered [1].

Discussion

Burkholderia cepacia infections outside the respiratory system are rare. Moreover, recurrent UTIs with *B. cepacia* is a rare finding, which highlights the importance of our study. UTIs with *B. cepacia* have been associated with bladder irrigation or use of contaminated hospital objects and liquids [2, 4, 5]. *Pseudomonas* spp. and *Burkholderia* spp. have been previously classified in the same genus. Given that they have similar biochemical properties, *Burkholderia* can be mislabeled as *Pseudomonas*, as occurred with the patient in our study. *B. cepacia* is one of the most antimicrobial-resistant organisms and treatment options are limited [2, 4, 5]. The patient does not specify on whose orders he was treated for pseudomonas, at that time he was seen for prostate cancer by a urologist and an oncologist, as well as a diabetologist for diabetes mellitus. In general, this is a patient who has suffered a great deal because of his history.

Conclusion

Burkholderia cepacia is a motile, aerobic, non-fermentative, gram-negative bacillus and has been widely documented as a lung pathogen in patients with cystic fibrosis and chronic granulomatous dis-

ease. It is documented as an important emerging cause of multi-drug resistant nosocomial infections, and an important cause of morbidity and mortality.

Diagnosis of infectious diseases, especially in immunodeficiency patients and particularly in urinary tract is of great importance. Early and accurate identification of *B. cepacia* help patients' management with proper therapeutic intervention. The critical opinion of doctor microbiologist can help in differential diagnosis among microbes of the same group.

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