Enferm Infecc Microbiol Clin. 2020;38(2):88–93

Enfermedades Infecciosas y Microbiología Clínica

www.elsevier.es/eimc

Scientific letter

Arthrobacter creatinolyticus: An emerging human pathogen causing urinary tract infection

Arthrobacter creatinolyticus*: un patógeno emergente en el ser humano causante de infecciones del tracto urinario*

Arthrobacter creatinolyticus is a Gram-positive aerobic coccobacillus, catalase-positive, belonging to the family *Micrococcaceae*, order Actinomycetales, usually found in soil and in the environment. This organism produces urease, an extracellular enzyme with many industrial applications and a potential use in anti-cancer therapy due to its cytotoxic effect.[1]

We have only found in the literature one case of bacteremia due to this microorganism, and none confirmed as a cause of urinary tract infection. We present a case of urinary tract infection due to *A. creatinolyticus.*

A woman, in her ninety, came to the primary care with signs of agitation. The patient presented several pathologies as hypertension, diabetes, Parkinson's disease and vascular dementia. She was aggressive at the time of consultation and the exploration was complicated as well as the anamnesis that was unable to stablish the presence of urethral syndrome. In addition no urine test strip or sediment analysis was done. The caregiver confirmed that the patient did not had fever but she had been agitated for the past four days. On the suspicion of urinary infection, the doctor ordered a urine culture and prescribed fosfomycin empirically. After 24 h of incubation in the chromogenic medium UTI^{R} (Oxoid LTD, UK), >100,000 CFU/mL of *A. creatinolyticus* were isolated (Fig. 1).

The identification of the microorganism was performed by mass spectrometry using the MALDI-TOF Biotyper 3.1 (Bruker Daltonic GmbH, Bremen, Germany), resulting in *A. creatinolyticus* with a score of 2.3. This identification was confirmed by sequencing the 16 rRNA gene. To our surprise, the result was different: *Glutamicibacter creatinolyticus*. In fact, this is the same microorganism, being *A. creatinolyticus* its basonym (Hou et al., 1998),[2] which has recently been reclassified into a new genus. The sequence was 99% indentical to *G. creatinolyticus* type strain KY814694.1 using the NCBI 16S rRNA gene database.

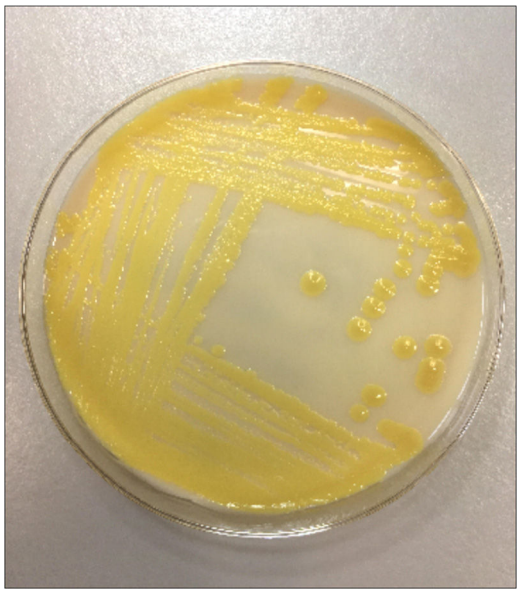

Fig. 1. Colonies of *Arthrobacter creatinolyticus* grown in UTI® chromogenic agar.

The susceptibility to antimicrobials was performed by disc diffusion test and also by broth microdilution method using the automated system MicroScan Walkaway (Beckman Coulter, USA) using the Pos MIC Panel Type 33. The interpretation of the minimum inhibitory concentrations (MICs) was performed according to the breakpoints for *Corynebacterium* spp. and related groups established by the Clinical and Laboratory Standards Institute (CLSI) (Table 1).

After knowing the pattern of antimicrobial susceptibility, the treatment was changed to oral levofloxacin 250 mg daily for five

Table 1
Antimicrobial susceptibility profile of *Arthrobacter creatinolyticus*.

Antibimicrobials	Disc diffusion Inhibition zone (mm)	MIC (μg/mL)	Clinical category
Penicillin	30	<=0.12	S
Ampicillin–Amoxicillin	30	<=0.25	S
Amoxicillin/clavulanate	36	<=4/2	S
Vancomycin	24	<=0.25	S
Teicoplanin	26	<=1	S
Gentamicin	24	<=1	S
Linezolid	38	<=1	S
Ciprofloxacin	25	<=1	S
Levofloxacin	26	<=1	S
Nitrofurantoin	8	64	R
Fosfomycin	20	>64	R
Trimethoprim–Sulfametoxazole	46	<=2/38	S

CLSI criteria: S, susceptible; R, resistant.

days. One week after the end of treatment and due to the persistence of the agitation, the doctor ordered a new urine culture. Again, the same microorganism was isolated (>100,000 CFU/mL), and a new treatment was prescribed, with ciprofloxacin 250 mg bid for two weeks.

In a third urine culture taken 3 weeks later, *A. creatinolyticus* was isolated once again in a lower count (less than 10,000 CFU/mL) and the antimicrobial susceptibility profile remained unchanged. At this point, the clinical status of the patient had improved but she had developed a cystocele, and we considered that the organism was colonizing the urinary tract.

As we have previously mentioned, there is only one reported case of bacteremia due to this microorganism in an elderly person with diabetes and acute cholangitis.[3] On the other hand, another case reported describes the isolation of *A. creatinolyticus* strains found in the urine of patients with neuroblastoma[4] and low levels of creatinine in serum and urine. The authors emphasized that this bacterium possesses creatinase, an enzyme able to hydrolyze creatinine, but they did not find any clinical evidence of urinary infection caused by this organism.

In our patient, the existence of urinary tract infection based on the recent change on her clinical or functional status (acute confusional disorder, discomfort or agitation)[5] was confirmed twice by the presence of significant bacteriuria due to *A. creatinolyticus*. The patient clinical status improved but finally developed a cystocele due to the weakening of the pelvic muscles indicating that the organism was colonizing the bladder of the patient.

Another species of this bacterium have also been described[6,7] as the etiologic agents of urinary tract infection (*A. albus*, *A. aurescens*, *A. cumminsii*, *A. protophormiae)*, and according to our case, we must include *G. creatinolyticus* (bfn. *Arthrobacter*) as an emerging pathogen causing urinary infection in the elderly.

References

1. Rajendran R, Pandi A, Ramchary A, Thiagarajan H, Panneerselvam J, Niraikulam A, et al. Extracellular urease from *Arthrobacter creatinolyticus* MTCC 5604: scale up, purification and its cytotoxic effect thereof. Mol Biol Rep. 2018, http://dx.doi.org/10.1007/s11033-018-4453-8.
2. Busse HJ. Review of the taxonomy of the genus *Arthrobacter*, emendation of the genus *Arthrobacter* sensu-lato, proposal to reclassify selected species of the genus *Arthrobacter* in the novel genera *Glutamicibacter* gen. nov., *Paeniglutamicibacter* gen. nov., *Pseudoglutamicibacter* gen. nov., *Paenarthrobacter* gen. nov. and *Pseudarthrobacter* gen. nov., and emended description of *Arthrobacter roseus*. Int J Syst Evol Microbiol. 2016;66:9–37, http://dx.doi.org/10.1099/ijsem.0.000702.
3. Yamamoto K, Hayakawa K, Nagamatsu M, Fujiya Y, Mawatari M, Kutsuna S, et al. Bacteremia due to *Arthrobacter creatinolyticus* in an elderly diabetic man with acute cholangitis. Jpn J Infect Dis. 2017;70:201–2, http://dx.doi.org/10.7883/yoken.JJID. 2016.033.
4. Hou XG, Kawamura Y, Sultana F, Shu S, Hirose K, Goto K, et al. Description of *Arthrobacter creatinolyticus* sp. nov., isolated from human urine. Int J Syst Bacteriol. 1998;48:423–9, http://dx.doi.org/10.1099/00207713-48-2-423.
5. Verdejo C. Peculiaridades de la infección urinaria en la persona mayor. In: Polo, Arribi, Candel, Salinas, editors. Actualización de la Infección urinaria en urología. Madrid: Asociación Española de Urología; 2018., ISBN 978-84-09-02546-6 p. 179–84.
6. Mensa J, Gatell JM, García-Sánchez JE, Letang E, López-Suñé E, Marco F. Guía de terapeútica antimicrobiana. 27th ed Barcelona: Antares; 2018. p. 294.
7. Funke G, Hutson RA, Bernard KA, Pfyffer GE, Wauters G, Collins MD. Isolation of Arthrobacter spp. from clinical specimens and description of *Arthrobacter cumminsii* sp. Nov. and *Arthrobacter woluwensis* sp. Nov J Clin Microbiol. 1996;34:2356–63.

Sandra Nabal Díaz, Juan M. García-Lechuz Moya *, Saray Mormeneo Bayo, María Isabel Millán Lou

Servicio de Microbiología, Hospital Universitario Miguel Servet, Zaragoza, Spain

* Corresponding author.
E-mail address: jmgarcialechuz@salud.aragon.es (J.M. García-Lechuz Moya).

https://doi.org/10.1016/j.eimc.2019.02.003

Candida albicans skull base osteomyelitis due to malignant otitis externa: The role of echinocandin therapy associated with surgical debridement☆

Osteomielitis de la base del cráneo secundaria a otitis externa maligna por Candida albicans: *papel del tratamiento con equinocandina asociado a desbridamiento quirúrgico*

Malignant otitis externa (MOE), also called necrotising otitis externa, is a rare condition in Spain, with the annual incidence recently being estimated at 1.30 cases per million population.[1] It generally affects older patients with poorly controlled diabetes or immunosuppression.[1] After originating in the squamous epithelium of the external auditory canal (EAC), MOE can invade adjacent bone structures and lead to life-threatening skull base osteomyelitis. Although over 90% of episodes are caused by *Pseudomonas aeruginosa*, MOE caused by *Aspergillus* spp. is well reported in patients with human immunodeficiency virus (HIV) infection or neutropenia, with other fungal aetiologies being rarer.[2–4] We present a case of MOE due to *Candida albicans* complicated by skull base osteomyelitis in a patient without predisposing factors and we discuss the role of echinocandins in the treatment of this unusual scenario.

This was a 63-year-old male patient, originally from Ecuador but resident in Spain for over 20 years, whose previous medical history included hypertension, dyslipidaemia, subclinical hypothyroidism and gout. His usual treatment consisted of bisoprolol, simvastatin and acetylsalicylic acid. The symptoms had begun at least two months before the initial consultation and consisted of earache, hearing loss and otorrhoea from the right ear (RE). Otoscope examination at that time showed an EAC with oedematous and erythematous walls, with the eardrum intact. After a cycle of topical treatment with dexamethasone and gentamicin, repeat otoscope examination revealed a laceration in the floor of the EAC exposing bone tissue, with an inflammatory reaction and abundant otorrhoea. The patient reported progressive worsening of the earache and preauricular pain despite analgesic treatment. Once the clinical diagnosis of MOE was established, treatment was started with oral and topical ciprofloxacin and a computed tomography (CT) scan of the ears and mastoids was requested. The CT scan showed areas of osteolytic rarefaction affecting the walls of the right EAC, with bone sequestration and small gas bubbles, findings consistent with skull

☆ Please cite this article as: Fernández-Ruiz M, Ruiz-Ruigómez M, Montojo J. Osteomielitis de la base del cráneo secundaria a otitis externa maligna por *Candida albicans:* papel del tratamiento con equinocandina asociado a desbridamiento quirúrgico. Enferm Infecc Microbiol Clin. 2020;38:89–91.