Infect Dis Trop Med 2020; 6: e643

A rare case of *Raoultella planticola* spondylodiscitis in an HIV, former drug user, and glucose-6-phosphate dehydrogenase deficiency patient.

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ABSTRACT:

- ***Background:*** *Raoultella planticola* is a Gram-negative capsulated bacillus within the Enterobacteriaceae family. In literature, there have been sporadic case reports caused by this microorganism.
- ***Case presentation:*** A 53-year-old HIV-infected man on HAART, former drug user and glucose-6-phosphate dehydrogenase (G6PDH) deficient presented a *Raoultella planticola* spondilodyscitis. The patient was treated with intravenous amoxicillin/clavulanic acid for eight weeks, with progressive improvement of his clinical and radiological condition.
- ***Discussion:*** We described the first Italian case report of spondylodiscitis caused by *Raoultella planticola* occurring in acquired immunodeficiency status caused by HIV.
- ***Conclusions:*** *Raoultella planticola* could represent an emerging clinical problem in patients with immunodeficiency status.

- ***Keywords:*** Discitis, Enterobacteriaceae, Anti-bacterial agents, HIV infections, Glucosephosphate dehydrogenase deficiency.

BACKGROUND

Raoultella planticola is a Gram-negative capsulated bacillus, non-motile, oxidase negative, facultative anaerobic bacteria within the *Enterobacteriaceae* family. It was initially called as *Klebsiella planticola* or *Klebsiella trevisanii,* classifying as a member of the *Klebsiella* genus. After 16S rRNA and rpoB gene sequencing studies, it was renamed as *Raoultella planticola*[1-3]. It is an environmental bacteria found in water and soil, rarely considered as a pathogen[4,5]. There have been sporadic case reports caused by this microorganism[6-11]. The major predisposing factor is immunodeficiency associated with solid tumors and haematological neoplasia[12].

It was suggested that *Raoultella planticola* should be accepted as pathogenic species for the virulence capabilities, including carbapenemase-resistance genes expressions, similar to those of *Klebsiella pneumoniae*[13,14].

CASE REPORT

A 53-year-old HIV-infected man on Highly Active Antiretroviral Therapy (HAART) with tenofovir alafenamide 25 mg/emtricitabine 200 mg QD and dolutegravir 50 mg QD (TAF/FTC + DTG), previously treated with direct-acting antiviral (DAA) for chronic hepatitis C with viral clearance, former drug addict and glucose-6-phosphate dehydrogenase (G6PDH) deficiency presented for an outpatient visit, at the Infectious Disease Clinic of the University Hospital in Sassari (Italy), describing worsening of low back pain lasting for the past two years. He was previously investigated with thoracic-lumbar Magnetic Resonance Imaging (MRI) showing multiple thoracic spinal disc herniations.

Patient's vital signs were normal, and the clinical examination showed thoracic vertebrae pain. Blood tests revealed normal white cell count, neutrophils 72.8%

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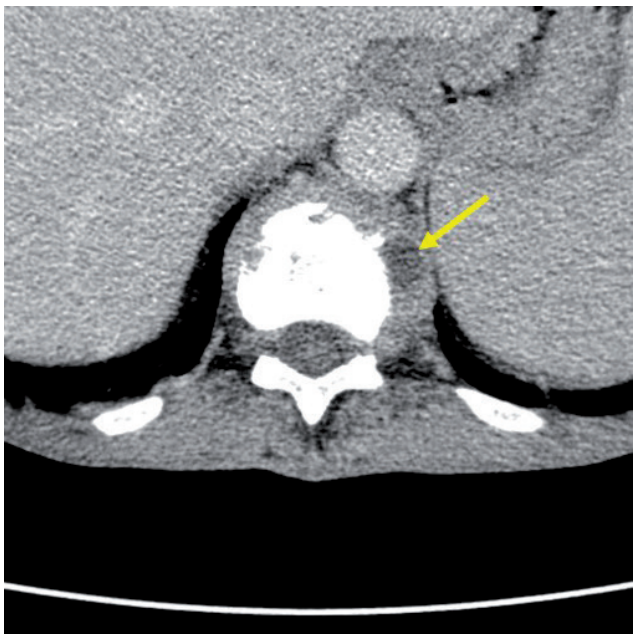

Figure 1. Hypodense fluid-corpusculated lesion (dimension 20x12x12 mm) of the soft tissue and the left paravertebral muscle at T11-T12 level at the CT.

and lymphocytes 18.3%) and moderate-high level of inflammatory proteins [C-Reactive protein (CRP) 6.44 mg/dL]. Viral-immunological profile showed CD4+ 243 cell/mm^3 and HIV-RNA 50 cps/mL.

A new thoracic-lumbar MRI was requested, showing in T2-weighted scans high signal in T11-T12, in T1-weighted scans soft low signal in disk space and a fluid collection in the paravertebral muscles on the left. In T1 contrast-enhanced scans, there was a moderate enhancement of vertebral endplates and disk space with evidence of T11-T12 spondylodiscitis.

Blood culture was negative and, to exclude a tuberculosis aetiology, QuantiFERON was required and was negative.

Fine-needle CT guided aspiration biopsy was performed on the hypodense fluid-corpusculated lesion (dimension 20x12x12 mm) of the soft tissue and the left paravertebral muscle at T11-T12 level (Figure 1). *Raoultella planticola* was isolated and antibiotic susceptibility tests were performed using the automated VITEK 2 system (bioMerieux, Marcy l'Etoile, France). The microorganism was susceptible to all tested antibiotics (Table 1).

Table 1. *In vitro* susceptibility profile of Raoultella planticola isolate automated VITEK 2 system (bioMerieux, Marcy l'Etoile, France).

Antibiotic	MIC*	
	<=1	S+
Amoxicillin/clavulanic acid	<=2	S
Cefotaxime	<=0.25	S
Ceftazidime	<=0.12	S
Ciprofloxacin	<=0.06	S
Ertapenem	<=0.12	S
Fosfomycin	32	S
Gentamicin	<=1	S
Meropenem	<=0.25	S
Piperacillin/tazobactam	<=4	S
Tigecycline	<=0.5	S
Trimetoprim/sulfamethoxazole	<=20	S

*Minimum inhibitory concentration, +Sensitive

The patient was initially treated with intravenous amoxicillin/clavulanic acid 2.2 g q.i.d. for fourteen days, followed by oral amoxicillin/clavulanic acid 875/125 mg 1 tablet q.i.d for six weeks, with progressive improvement of his clinical condition. At one month follow-up evaluation, the MRI showed no more hypodense fluid collection of the soft tissue and in T2-weighted scans a resolution of the high signal finding in T11-T12 preciously described.

DISCUSSION

To our knowledge, we present the first Italian case report of spondylodiscitis caused by *Raoultella planticola* occurring in an HIV-infected patient. Another similar case of spondylodiscitis T7-T8 with epidural abscess was reported in a not HIV-infected patient treated with piperacillin/tazobactam for 6 weeks followed by oral levofloxacin for 2 weeks[11].

Raoultella planticola was identified for the first time in 1981 by Bagley et al[5], and it has traditionally been considered a nonclinical and environmental bacteria found in water, plants and soil[5]. In the world, there are more and more cases of human infection caused by *Raoultella planticola*, commonly associated with immunodeficiency status as in neoplastic condition[12].

Cases of hospital-acquired infection caused by invasive medical procedures have been also reported[15] and the microorganism has been isolated in non-bacterial liquid hand soap[16].

For a long period, *Raoultella planticola* was considered a low-virulence organism[12]. However, the taxonomic similarities to the genus *Klebsiella* and the presence with multidrug-resistant and carbapenem-resistant genes into the *Raoultella planticola* could explain how this microorganism is more and more considered as a clinical development problem[13,14]. The presence of carbapenem-resistance genes such as, $bla_{KP\ C}$, bla_{IMP-8}, bla_{NDM-1} and bla_{OXA-48} were also shown in literature and these can be transferred by *Klebsiella* spp. to *Raoultella* spp., as found in *vitro*[13,17].

Considering the G6PDH-deficiency, the possible drug-drug interaction between HAART and antibiotic therapy and, according to the *vitro* susceptibility, we decided to use a high-dose beta-lactam antibiotic monotherapy as amoxicillin/clavulanic acid. Rifampicin was excluded, because interacts with HAART decreasing their Cmax and AUC of TAF and DTG[18,19]. Fluoroquinolones and trimethoprim-sulfamethoxazole that resulted *in vitro* susceptibility, can cause haemolysis in G6PDH-deficiency patients[20]. Therefore, these antibiotics should not be used in this specific case.

CONCLUSIONS

We described the first Italian case of spondylodiscitis caused by *Raoultella planticola* occurring in HIV patient. *Raoultella planticola* could represent an emerging clinical problem and can occur in patients with immunodeficiency status.

Funding:
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' contributions:
NG, EP and ADV wrote the paper. NG, EP, ADV, SMM and RA gave clinical assistance to the case. VF, SB and GM revised the paper. All authors read and approved the final manuscript.

Patient consent:
Informed consent was obtained from the patient for publication of this Case report.

Conflict of Interest:
The Author(s) declare(s) that they have no conflict of interest.

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