CASE REPORT

A novel case of *Raoultella planticola* osteomyelitis and epidural abscess

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SUMMARY

A spinal epidural abscess is the collection of pus in the epidural space, and is a potentially life-threatening condition that requires early detection and prompt management. Almost two-thirds of cases are caused by *Staphylococcus aureus*, followed by Gram-negative bacilli which account for approximately 16% of cases. *Raoultella planticola* is an emerging pathogen, and is an extremely rare cause of invasive infection in humans. It has been reported to cause urinary tract infections, pneumonia, bacteraemia, cholangitis, cholecystitis, conjunctivitis and soft tissue infections. We report the first case, to our knowledge, of *R. planticola* osteomyelitis and spinal epidural abscess.

BACKGROUND

Raoultella planticola is an aerobic, encapsulated, non-motile, Gram-negative rod belonging to the Enterobacteriaceae family, which is an exceedingly rare cause of invasive infection in humans. *R. planticola* is found in water, soil and foliage and has been reported to cause opportunistic infections in immunocompromised individuals, such as those with malignancies, chronic kidney disease, diabetes and in solid organ transplant recipients.^{1 2} Oftentimes mistaken for *Klebsiella*, *R. planticola* is an emerging pathogen in medical literature. We present the first case, to our knowledge, of an epidural abscess and osteomyelitis secondary to *R. planticola*.

CASE PRESENTATION

A 63-year-old man with prior medical history of diabetes mellitus, hypertension and hyperlipidaemia presented to the emergency department with complaints of severe back pain for 2 weeks that acutely worsened over 1 day. The pain was associated with bilateral lower extremity weakness as well as urinary retention for 2 days. He denied any trauma, intravenous drug abuse or injections. He denied any fever, chills, nausea, vomiting, bowel incontinence or saddle anaesthesia. On examination, vital signs were found to be within normal limits. Physical examination revealed suprapubic fullness, bilateral lower extremity weakness (3/5) with decreased sensation and increased bilateral patellar deep tendon reflexes. He had an upgoing plantar reflex on the right. The rest of the physical examination was grossly unremarkable.

INVESTIGATIONS

Initial blood work was remarkable for a white blood cell count of 22 200 with 91% neutrophils, blood urea nitrogen of 53 with a creatinine of 3.37

(baseline creatinine 0.6). The non-contrast MRI of cervical, thoracic and lumbar spine suggested spinal cord compression, discitis at the level of T7-T8 and associated osteomyelitis with an epidural abscess (figures 1 and 2). Initial blood cultures reported growth of *Klebsiella oxytoca* in aerobic and anaerobic cultures within 48 hours, which was later amended to *R. planticola*. A CT-guided drainage of the epidural abscess was performed which also grew *R. planticola*. An extensive work-up was performed to determine the source of the infection and included a transoesophageal echocardiogram to rule out infective endocarditis, a colonoscopy, an upper endoscopy, urinalysis, a CT scan of the brain, thorax, abdomen and pelvis. The work-up did not reveal an alternative source of infection.

TREATMENT

Patient underwent emergent decompression, laminectomy from T5-T10 and evacuation of the abscess. The patient subsequently experienced acute deterioration in lower extremity weakness and required two repeat abscess drainage procedures with cultures once again resulting in *R. planticola*. The patient was treated with piperacillin-tazobactam for 6 weeks followed by oral levofloxacin for 2 weeks, with improvement in his symptoms.

OUTCOME AND FOLLOW-UP

The patient underwent a T5-T10 posterior percutaneous spinal fusion. He tolerated the procedure well and was discharged to acute inpatient physical rehabilitation.

DISCUSSION

A spinal epidural abscess is the collection of pus between the dura mater and the spine, and is a potentially life-threatening condition that requires early detection and prompt management. *Staphylococcus aureus* is the most common bacterial pathogen accounting for more than two-thirds of cases. Approximately 16% are caused by Gram-negative bacteria, and to our knowledge there has been no reported case of epidural abscess caused by *R. planticola*.³ In 60% of cases of spinal epidural abscesses, the majority of which are caused by a staphylococcal infection, there was an associated bacteraemia, though it is unknown if the abscess causes the bacteraemia or whether the bacteraemia is responsible for abscess formation.³

R. planticola is an aerobic, encapsulated, oxidase negative, non-motile, Gram-negative rod belonging

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Figure 1 MRI imaging of the thoracic spine without contrast (sagittal section) showing destruction of T7-T8 endplates, along with a posterior bulge resulting in compression of the thoracic cord (red arrow). (A) T1-weighted sequence showing decreased signal in T7-T8 vertebral bodies. (B) T2-weighted sequence showing increased signal (yellow arrow). There is extensive para spinal soft tissue swelling which might be due to phlegmon and/or abscess.

to the Enterobacteriaceae family.¹ It is named after the French bacteriologist Didier Raoult.¹ This bacteria was initially labelled *Klebsiella planticola* but was later renamed as *R. planticola* in 2001 based on 16S rDNA and rpoB gene sequencing.^{1 4-6} It naturally inhabits water, soil and plants.^{1 2} It is a rare cause of infection in humans and causes opportunistic infections mainly in immunocompromised patients with malignancy, solid organ transplant recipients, chronic kidney disease and diabetes mellitus.⁴ Risk factors for *R. planticola* infection include invasive medical procedures, trauma with contaminated soils, water or food in patients with immunosuppression and significant comorbidities.^{4 7 8} It has been found to colonise the gastrointestinal tract and to cause urinary tract infections (eg, cystitis, prostatitis), as well as pneumonia, bacteraemia, cholangitis, cholecystitis, conjunctivitis and soft tissue infections.^{2 6 9 10} *R. planticola* has also been implicated in scombroid poisoning because of the ability of bacteria to convert histidine into histamine, found in seafoods.¹¹ There is one reported case of liver abscess, but, to our knowledge, this is the first reported case of spinal epidural abscess and osteomyelitis caused by *R. planticola*.⁵

Figure 2 MRI imaging of the thoracic spine without contrast (axial view). (A) T2-weighted sequence showing loss of CSF signal at the level of T8 vertebrae (yellow arrow). (B) T2-weighted sequence showing normal CSF signal at the level of T10 vertebrae (red arrow). CSF, cerebrospinal fluid.

R. planticola is sensitive to most of the penicillins (except ampicillin), cephalosporins and carbapenems.^{4 6} Carbapenem resistance to *R. planticola* is emerging due to the production of carbapenemases, including class A β -lactamase (KPC), class B metal- β -lactamase (IMP-8, NDM-1) and class D β -lactamase (OXA-48).¹²⁻¹⁴ A multidrug-resistant strain of *R. planticola* is also emerging.

The true incidence of *R. planticola* is likely under-reported because of previous misidentification of *R. planticola* as *Klebsiella* species, which has been associated with severe infections in the hospitalised and immunocompromised patient.^{4 5}

Learning points

- The importance of identifying *Raoultella planticola* correctly, as it has been commonly misclassified as *Klebsiella*. Misidentification and inappropriate treatment may lead to significant morbidity and mortality.
- Understand the basic microbiology, epidemiology and risk factors of the clinically uncommon bacteria.
- Raise awareness of the different types of infection these bacteria may cause.
- The management and treatment options for *R. planticola*.

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