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Case report

Rothia aeria vertebral discitis/osteomyelitis in an immunocompetent adult: Case report and literature review

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ABSTRACT

Rothia aeria is a gram-positive, pleomorphic bacteria forming part of human oral microflora usually only causing periodontal and dental infections. We describe the case of a 68-year-old immunocompetent male with lumbar vertebral discitis/osteomyelitis caused by *R. aeria*. A review of the literature demonstrated seventeen cases of non-dental *R. aeria* infection of which only six were in immunocompetent individuals. This is the first reported case of *R. aeria* vertebral discitis/osteomyelitis.

Introduction

Rothia aeria was first described in 2004 after being isolated in the air of a Russian space station [1]. It is one of ten *Rothia* species described, all belonging to the *Micrococcaceae* family. *Rothia* species are ubiquitous, largely colonizing the human oropharynx and airways. They are encapsulated, gram positive, non-acid fast bacteria which are usually described as aerobic, but can also act as facultative anaerobes. *Rothia* species display variable morphology - from coccoid, to bacillary, to filamentous forms - depending on the culture media, often leading to misdiagnosis. *R. aeria* is one of three *Rothia* species which can be pathogenic to humans (with *R. dentocariosa* and *R. mucilaginosa*). However with relatively few virulence factors, it usually only leads to dental and periodontal infections in immunocompetent individuals [2].

Case report

A 68-year-old male presented with 6 months of progressive low back pain described as a constant ache without radiculopathy, paraesthesia, disruption of sphincter control, fevers or night sweats. He reported unintentional weight loss of 5 kg over this time. His only significant medical history was polymyalgia rheumatica, which was treated with 25 mg prednisolone and weaned over 12 months nine years prior. He was not taking other regular medications. The patient was born in regional Australia and grew up on a sheep farm. He had no significant travel history, no occupational risk factors, and no known contact with tuberculosis. He had regular dental reviews; the most recent being six months prior to presentation and did not require intervention at that time. The patient had however undergone a temporary filling procedure approximately 2.5 years prior for a single dental cavity which remained in situ.

On examination the patient was afebrile and appeared well. He had no spinal tenderness and neurological examination was normal. There was no cardiac murmur, and no peripheral stigmata of infective endocarditis. A full blood examination was normal, erythrocyte sedimentation rate 6 mm/h and C-reactive protein 4 mg/L.

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Table 1
Case reports of Rothia aeria infection.

Author	Presentation	Age/Sex	Risk factors
Collarino (2016) [4]	Endocarditis	57 years/male	*Immunocompetent*
Crowe (2014) [5]	Endocarditis	48 years/male	*Immunocompetent*
Falcone (2012) [18]	Neck abscess	19 years/male	Chronic granulomatous disease on glucocorticoids
Hiraiwa (2014) [6]	Endocarditis	63 years/male	Cadaveric renal transplant on tacrolimus and everolimus
Hiyamuta (2010) [12]	Pneumonia	53 years/female	Neurosarcoidosis on glucocorticoids and azathioprine
Holleran (2012) [7]	Endocarditis	48 years/male	*Immunocompetent*
Kim (2014) [8]	Endocarditis	53 years/male	Ankylosing spondylitis on TNF inhibitor
Mahobia (2013) [16]	Prosthetic joint infection	75 years/female	Rheumatoid arthritis on glucocorticoids and methotrexate
Michon (2010) [13]	Bronchitis	66 years/male	Rheumatoid arthritis on TNF inhibitor; diabetes mellitus
Monju (2009) [20]	Sepsis	Neonate/female	Maternal tooth extraction four days prior to delivery
Nicodemo (2014) [9]	Endocarditis	25 years/male	*Immunocompetent*
Saraya (2014) [14]	Pneumonia	80 years/male	Pancreatic cancer; diabetes mellitus; allergic bronchopulmonary aspergillosis on glucocorticoids
Taira (2019) [19]	Tube-ovarian abscess	57 years/female	*Immunocompetent* (however 20 years of intrauterine contraceptive device in situ without medical examination)
Tarumoto (2012) [10]	Endocarditis	40 years/male	*Immunocompetent*
Thiyagarajan (2013) [11]	Endocarditis	61 years/male	*Immunocompetent*
Uni (2015) [15]	Pneumonia	61 years/male	Allogeneic haematopoietic stem cell transplant
Verrall (2010) [17]	Native joint infection	88 years/female	Rheumatoid arthritis on glucocorticoids and methotrexate

Magnetic resonance imaging demonstrated marked, diffuse T2 hyperintense marrow edema involving the L1 and L2 vertebral bodies, with corresponding T1 marrow hypointensity. There was almost complete collapse of the intervening intervertebral L1/L2 disc, which was T2 hyperintense. There was destruction of the corresponding endplates, lentiform T1 and T2 intermediate signal lesion deep to the anterior longitudinal ligament at L1 and no epidural abscess/collection. These findings were consistent with L1–2 discitis-osteomyelitis. Numerous sets of blood cultures were negative on prolonged incubation (10 days). The patient underwent a laminectomy and open biopsy of the L1–2 disc. The disc material was abnormal, with a pale, mucoid material, rather than frank pus. Histopathology demonstrated matured granulation tissue with a mild acute inflammatory infiltrate without granulomas. Periodic acid-Schiff and Ziehl-Neelsen stains were negative for fungi and acid-fast bacilli. In enriched broth, cultures and 16srRNA sequencing from the disc identified five colonies of an anaeorbic gram positive rod, provisionally identified as an *Actinomyces* species, but later confirmed to be *Rothia aeria*. Serology for *Brucella*, *Cryptococcus* and *Bartonella* was negative. Polymerase chain reaction for *Coxiella burnetii* was also negative. The patient underwent an oral orthopantomogram which demonstrated a small periapical dental lucency corresponding to the temporary filling. This tooth was subsequently extracted.

The patient was empirically treated with IV benzylpenicillin 1.8 g (3 million U) every 4 hours, and vancomycin for seven days after the surgical biopsy, the latter was ceased after identification of the isolate. He completed 42 days of benzylpenicillin followed by oral amoxicillin 1 g thrice daily for a total duration for 6 months. He improved within six weeks of antibacterial therapy, with complete resolution of pain and was able to return to regular exercise and his pre-morbid level of function.

Discussion

We present the first published case of *R. aeria* causing discitis/osteomyelitis. A review of the literature demonstrated no reports of *R. aeria* causing discitis or osteomyelitis. There was however a single case of spondylodiscitis caused by *R. dentocarisoa* in an immunocompetent person [3]. *R. dentocarisoa* and *R. mucilaginosa* were more commonly reported than *R. aeria*. A recent systematic review [2] summarized 51 cases of infection caused by *Rothia* species, and reported that *R. aeria* and *R. dentocarisoa* more commonly cause infective endocarditis, while *R. mucilaginosa* is more likely to cause extra-cardiac infection. In the systematic review Franconieri and colleagues postulated that the low frequency of *R. aeria* may be in part due to the fact it has only recently been described, and may have previously been incorrectly identified as *R. dentocariosa* or other species.

Our review of the literature revealed seventeen case reports of non-dental infection caused by *R. aeria* (Table 1). The most common manifestations of *R. aeria* infection were endocarditis noted in eight cases [4–11] and respiratory tract infection noted in four cases [12–15]. Joint infection [16,17], skin abscess [18] and tubal-ovarian abscess [19] caused by *R. aeria* were less commonly described. Only six reported cases were in immunocompetent patients [4,5,7,9–11], all of which manifested as endocarditis.

This is the first described case of *R. aeria* discitis/osteomyelitis to our knowledge and is only one of a few cases of non-dental infection caused by this microorganism – especially in immunocompetent patients. The diagnosis of *R. aeria* infection may be difficult not only because it is rare, but because of its fastidious, slow-growing nature, its pleomorphism, as well as the fact that biochemical markers of inflammation are often not elevated.

CRediT authorship contribution statement

All authors were involved in the patients care.

J Sewell primarily wrote this case report and performed the literature review. She coordinated this patients' care and initiated writing the report.

R Sathish significantly contributed to writing the case report and performing the literature review. He was primarily responsible for referencing.

R Chin significantly contributed to writing the report and provided guidance and supervision with her background in Infectious Diseases. She also edited the report.

G A Davis significantly contributed to writing the report and provided guidance and supervision with his background in Neurosurgery. He also edited the report.

D Seneviratne Epa confirmed details of the case and edited the report.

M Lewicki confirmed details of the case and edited the report.

L Amos confirmed details of the case and edited the report.

E Teh confirmed details of the case and edited the report.

L Popp confirmed details of the case and edited the report.

J Jaw confirmed details of the case and edited the report.

Conflict of Interest Statement

The authors declare they have no conflicts of interest.

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Consent

Verbal and written consent has been provided by the patient to the publication of this case report.

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