Case report

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

J. Sewell\(^{a,b,\ast}\), R. Sathish\(^{a,c}\), D. Seneviratne Epa\(^{a,d}\), M. Lewicki\(^{a,b}\), L. Amos\(^{a,e}\), E. Teh\(^{a}\), L. Popp\(^{f}\), J. Jaw\(^{a,e}\), G.A. Davis\(^{a}\), R. Chin\(^{a,g}\)

\(^{a}\) Cabrini Health, Malvern, Victoria, Australia
\(^{b}\) Alfred Health, Melbourne, Victoria, Australia
\(^{c}\) Central Clinical School, Monash University, Clayton, Victoria, Australia
\(^{d}\) St Vincent’s Hospital, Melbourne, Victoria, Australia
\(^{e}\) Monash Health, Clayton, Victoria, Australia
\(^{f}\) Poath Rd Clinic, Hughesdale, Victoria, Australia
\(^{g}\) Victorian Infectious Diseases Service, Royal Melbourne Hospital, Melbourne Health, Parkville, Australia

**A B S T R A C T**

*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.

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**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 coccoïd, 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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\(^{\ast}\) Corresponding author.
E-mail address: julessewell@gmail.com (J. Sewell).
Magnetic resonance imaging demonstrated marked, diffuse T2 hyperintense marrow edema involving the L1 and L2 vertebral bodies, with corresponding T1 narrow 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 anaerobic 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 Coxsiella burnettii 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 spondylo-discitis caused by *R. dentocariosa* in an immunocompetent person [3]. *R. dentocariosa* 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. dentocariosa* more commonly cause infective endocarditis, while *R. mucilaginosa* is more likely to cause extra-cardiac infection. In the systematic review Franconié 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.

| 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 | Neurosarcoïdosis on glucocorticoids and azathioprine |
| Hollera (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] | Septis | Neonate/female | Maternal tooth extraction four days prior to delivery |
| Nicodem (2014) [9] | Endocarditis | 59 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 |
| Thuyagaraj (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 |

**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.

**I 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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