

## Case Report

# Prosthetic hip joint infection caused by *Rothia dentocariosa*

Firat Ozan<sup>1</sup>, Eyyüp Sabri Öncel<sup>1</sup>, Fuat Duygulu<sup>1</sup>, İlhami Çelik<sup>2</sup>, Taşkın Altay<sup>3</sup>

<sup>1</sup>Department of Orthopedics and Traumatology, Kayseri Training and Research Hospital, Kayseri, Turkey;

<sup>2</sup>Department of Clinical Microbiology and Infectious Diseases, Kayseri Training and Research Hospital, Kayseri, Turkey; <sup>3</sup>Department of Orthopedics and Traumatology, İzmir Bozyaka Training and Research Hospital, İzmir, Turkey

Received May 12, 2015; Accepted June 26, 2015; Epub July 15, 2015; Published July 30, 2015

**Abstract:** *Rothia dentocariosa* is an aerobic, pleomorphic, catalase-positive, non-motile, gram-positive bacteria that is a part of the normal flora in the oral cavity and respiratory tract. Although it is a rare cause of systemic infection, it may be observed in immunosuppressed individuals. Here we report the case of an 85-year old man who developed prosthetic joint infection that was caused by *R. dentocariosa* after hemiarthroplasty. This is the first case report of a prosthetic hip joint infection caused by *R. dentocariosa* in the literature.

**Keywords:** Hip arthroplasty, infection, *Rothia dentocariosa*, joint, prosthetic, treatment

### Introduction

*Rothia dentocariosa* is an aerobic, pleomorphic, catalase-positive, non-motile, gram positive bacteria that is a part of the normal flora in the oral cavity and respiratory tract [1, 2]. The organism resembles *Nocardia* and *Actinomyces* species but it differs in terms of the cell wall structure and physiology from these bacteria [1, 2]. Although *R. dentocariosa* is commonly associated with dental caries and periodontal disorders, it is rarely reported as a cause of systemic infection [1]. Endocarditis is the most frequent systemic infection caused by *Rothia* species [3]. However, it can be a causative agent in several systemic infections, particularly in immunosuppressed patients [3-5].

Among systemic infections caused by *Rothia* spp. in areas than the oral cavity, prosthetic joint infections were reported in 4 cases [4-10]. Our case is the first report of prosthetic hip joint infection caused by *R. dentocariosa* in the literature.

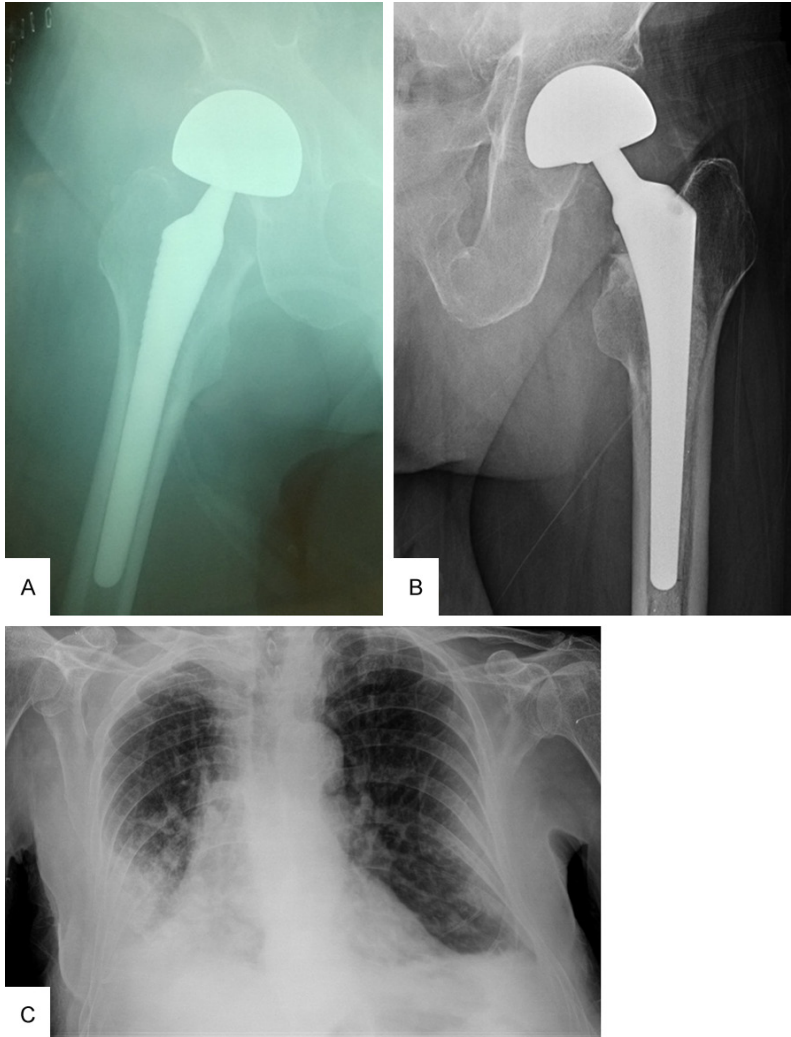
### Case report

An 85-year old man underwent bipolar hemiarthroplasty due to right femoral neck fracture

resulting from a fall. Swelling in the right lower extremity, pain during rest, erythema at the incision site and drainage developed 2 weeks after surgery. The laboratory evaluations revealed the following results: C-reactive protein (CRP), 178 mg/L; erythrocyte sedimentation rate (ESR), 90 mm/h; white blood cell (WBC),  $7.79 \times 10^3/\mu\text{L}$ .

Samples obtained from the incision site were inoculated on 5% blood agar and eosin methylene blue agar, followed by incubation at 37°C for 24 h. Gram-positive bacilli were observed on gram staining of the colony growing in blood agar on the day 2. *R. dentocariosa* was identified by using the BD Phoenix™ automated bacterial system (Becton Dickinson, USA). Based on the sensitivity tests using the disc diffusion method, it was determined that the isolate was sensitive to erythromycin, vancomycin, ceftriaxone and clindamycin. Antibiotic treatment with vancomycin (30 mg/kg; twice daily) was initiated on the basis of the result of the sensitivity test.

The patient had a history of chronic obstructive pulmonary disease, previous surgery for benign prostate hyperplasia, appendectomy and cataract surgery. He also underwent bipolar hemiar-



**Figure 1.** Radiographs of the patient. A. Right hip radiograph. B. Left hip radiograph. C. Heterogeneously increased density and volume loss on chest radiograph.

throplasty due to left femoral neck fracture resulting from a fall 7 years ago. He underwent tooth extraction 4 months before fracture of the right hip. In addition, lung cancer was detected during preoperative evaluations for right hip fracture (**Figure 1**).

Debridement and two-stage surgery were planned because of the prosthesis infection. However, antibiotic therapy and vacuum-assisted wound closure (VAC) therapy were selected for the treatment of the patient due to poor general health status and refusal of surgery by the patient. On the first month of therapy, CRP, ESR and WBC were found to be 8.43 mg/L, 27 mm/h and  $8.41 \times 10^3/\mu\text{L}$ , respectively. However, the patient died 2 months after hemiar-

throplasty due to his deteriorating general condition.

### Discussion

A majority of total hip arthroplasty infections are caused by gram-positive bacteria with the most common causative agents being *Staphylococcus aureus* and *Staphylococcus epidermidis* [11]. Immunosuppression, long-term urinary catheterization, diabetes mellitus, rheumatoid disorders, alcoholism, corticosteroid therapy, malignancy, intravenous drug abuse and surgical interventions are predisposing factors for opportunistic infections [8, 12, 13].

*R. dentocariosa* is a saprophytic bacterium observed in the normal oropharyngeal flora of humans [1]. It mainly causes nosocomial or auto-hematogenous infections. It is a causative agent in cases of immune disorders or the presence of implants [4-10].

*R. dentocariosa* grows better in aerobic conditions as compared to anaerobic conditions [1, 2]. It is a slow growing organism with an optimum growth temperature of 37°C. Young colonies appear creamy, resembling those of *Corynebacterium* and *Staphylococcus*. Mature colonies have rough, highly convoluted surfaces. The growth rate, lack of partial acid-fastness, absence of aerial mycelium and fermentation of sugars distinguish *Rothia* from *Nocardia* [1, 2].

Overall, seven joint infections caused by *Rothia* spp. have been reported till date [4-10]. Of these, 4 were prosthetic joint infections (3 prosthetic knee and 1 prosthetic hip infection) (**Table 1**) [4-6, 10], while 3 were native joint infections (2 native knee and 1 native shoulder infection) [7-9]. The causative agent of the

**Table 1.** Reported cases of *Rothia* genus prosthetic joint infections

Reference	Species	Prosthetic joint	Treatment	Outcome
Mahobia et al. [6]	<i>R. aeria</i>	Knee	Hardware removed, ceftriaxone + teicoplanin	Successful
Trivedi et al. [5]	<i>Rothia</i> species (not known)	Knee	Hardware removed, ertapenem + moxycillin-clavulanate	Successful
Michels et al. [10]	<i>R. mucilaginoso</i>	Hip	Hardware removed, vancomycin	Successful
Klingler et al. [4]	<i>R. dentocariosa</i>	Knee	Cefazolin + amoxicillin-clavulanate	Successful

prosthetic hip infection was *R. mucilaginoso* [10]. Our case is the first report of a prosthetic hip infection caused by *R. dentocariosa* in the literature. It was reported that implants were removed and antibiotic therapy was successful in 3 prosthetic joint infections [5, 6, 10]. In one case with prosthetic knee infection, the patient was successfully treated with antibiotics while preserving the implants [4].

There are several options for the treatment of joint arthroplasty infections including antibiotic therapy, debridement and sparing prosthesis, single-stage revision, two-stage revision and resection arthroplasty [13, 14]. For the selection of optimal treatment, it is essential to assess patient-related variables and expectations of both the patient and the clinician during therapy. We scheduled a two-stage revision surgery but antibiotic therapy with VAC therapy was initiated because of poor general status and refusal of surgery by the patient and his relatives. *R. dentocariosa* is usually susceptible to several antibiotics including aminoglycosides, tetracycline, vancomycin, penicillin, ampicillin, erythromycin, imipenem, rifampicin, ceftriaxone and cefazolin [4-10]. In our patient, vancomycin was selected for antibiotic therapy. It was observed that CRP and ESR returned to near-normal values without drainage being performed at the incision site in the first month of antibiotic therapy.

Dental diseases are considered to be a risk factor for *R. dentocariosa* infections [7]. Antibiotic prophylaxis prior to dental procedures should be considered for patients undergoing high-risk procedures in the first 2 years following joint replacement and in patients who have chronic diseases [6, 7]. Our patient underwent tooth extraction 4 months before hip fracture. No antibiotic prophylaxis was administered before or after tooth extraction. However, we think that the presence of immunosuppressive conditions such as lung cancer is the most important factor underlying prosthetic joint infection.

Although *R. dentocariosa* is a rare causative agent of infection in humans, it should be kept in mind that it could be a pathogen after joint replacement in patients with chronic pulmonary disorders, particularly in immunosuppressed patients.

**Disclosure of conflict of interest**

None.

**Address correspondence to:** Dr. Firat Ozan, Department of Orthopedics and Traumatology, Kayseri Training and Research Hospital, Sanayi Mah. Atatürk Bulvarı Hastane Cad., Kocasinan, Kayseri 38010, Turkey. Tel: +90 352 336 88 84; Fax: +90 352 320 73 13; E-mail: firatozan9@gmail.com

**References**

- [1] Von Graevenitz A. *Rothia dentocariosa*: taxonomy and differential diagnosis. Clin Microbiol Infect 2004; 10: 399-402.
- [2] Brown JM, Georg LK, Waters LC. Laboratory identification of *Rothia dentocariosa* and its occurrence in human clinical materials. Appl Microbiol 1969; 17: 150-156.
- [3] Shakoor S, Fasih N, Jabeen K, Jamil B. *Rothia dentocariosa* endocarditis with mitral valve prolapse: case report and brief review. Infection 2011; 39: 177-179.
- [4] Klingler ET, Verma P, Harris A. Infection of a total knee arthroplasty with *Rothia dentocariosa*: brief report and review of the literature. Infect Dis Clin Pract 2005; 13: 195-199.
- [5] Trivedi MN, Malhotra P. *Rothia* prosthetic knee joint infection. J Microbiol Immunol Infect 2013; 25: 243-245.
- [6] Mahobia N, Chaudhary P, Kamat Y. *Rothia* prosthetic knee joint infection: report and mini-review. New Microbes New Infect 2013; 1: 2-5.
- [7] Verrall AJ, Robinson PC, Tan CE, Mackie WG, Blackmore TK. *Rothia aeria* as a cause of sepsis in a native joint. J Clin Microbiol 2010; 48: 2648-2650.
- [8] Favero M, Raffeiner B, Cecchin D, Schiavon F. Septic arthritis caused by *Rothia dentocariosa* in a patient with rheumatoid arthritis receiving etanercept therapy. J Rheumatol 2009; 36: 2846-2847.

*Rothia dentocariosa*

- [9] Kaasch AJ, Saxler G, Seifert H. Septic arthritis due to *Rothia mucilaginosa*. *Infection* 2011; 39: 81-82.
- [10] Michels F, Colaert J, Gheysen F, Scheerlinck T. Late prosthetic joint infection due to *Rothia mucilaginosa*. *Acta Orthop Belg* 2007; 73: 263-267.
- [11] Garvin KL, Hanssen AD. Infection after total hip arthroplasty: past, present and future. *J Bone Joint Surg Am* 1995; 77: 1576-1588.
- [12] Lee IK, Liu JW. Clinical characteristics and risk factors for mortality in *Morganella morganii* bacteremia. *J Microbiol Immunol Infect* 2006; 39: 328-334.
- [13] Trampuz A, Zimmerli W. Prosthetic joint infections: update in diagnosis and treatment. *Swiss Med Wkly* 2005; 135: 243-251.
- [14] Widmer AF. New developments in diagnosis and treatment of infection in orthopedic implants. *Clin Infect Dis* 2001; 33: 94-106.