



Case Report

Native Joint Septic Arthritis Due to *Rothia mucilaginosa*: A Case Report and Literature Review

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Abstract

Rothia spp. are gram-positive bacteria that are part of the normal human oral and gut microbiome. They mainly cause opportunistic infections in immunocompromised hosts and are associated with periodontal disease. Here, we present a rare case of septic arthritis of a native knee due to *Rothia mucilaginosa* in a 66-year-old, immunocompetent, male patient with osteoarthritis of both knees. Intra-articular corticosteroid injection was identified as most likely source of infection. We discuss the increase of iatrogenic joint infections caused by intra-articular injections or surgical procedures and identify the association of *Rothia mucilaginosa* joint infections with intra-articular corticosteroid injections.

Keywords: Opportunistic joint infections; *Rothia mucilaginosa*; *Rothia spp.*; Septic arthritis; Intra-articular injections

Introduction

Septic arthritis of native joints is a rare condition with high morbidity [1,2]. Without early recognition of infection and timely initiation of antibiotic therapy, septic arthritis can lead to severe joint destruction. Septic arthritis of native, non-prosthetic, joints occurs with an incidence of approximately 2 to 19 cases per 100000 people per year with rising tendency [3-9]. It usually affects elderly people or very young children and previous joint pathology such as rheumatoid arthritis, osteoarthritis and gout predispose to septic arthritis [3-6,8]. Further risk factors are end-stage renal disease, skin disease and intake of prednisone and other immunosuppressive medications [3,4,7,8]. A rise in iatrogenic infections caused by intra-articular injections or surgical procedures has been reported [4,7,9]. The knee is affected in approximately 45% of all septic arthritis cases in adults [3]. The

most frequently isolated causative organisms of septic arthritis are *Staphylococcus aureus* in approximately half of cases followed by other gram-positive bacteria such as streptococci [3,4,7,9,10]. The isolation of opportunistic species from joint infections is rare and occurs mostly in immunocompromised patients [5,11]. Whether the increase in iatrogenic joint infections affects the spectrum of isolated organisms is unknown.

Here, we report the rare case of septic arthritis of a native knee due to *Rothia mucilaginosa* isolated from synovial fluid of an immunocompetent 66-year-old male three days after intra-articular injection of corticosteroids.

Case presentation

A 66-year-old male patient with known osteoarthritis of both knees presented to our emergency room with exacerbation of pain in the left knee. Upon physical examination the left knee was warm, swollen and tender with restricted movement. The patient was afebrile and hemodynamic stable and denied having any chills, shortness of breath or other joint pain. Trauma or injury to the

affected knee was denied. The patient was previously obese with a BMI of 45.8 kg/m² and received bariatric surgery in 2019. At the current presentation the patient had a BMI of 31 kg/m² and was on antihypertensive medication. Additionally, the patient reported a history polymyalgia rheumatica for which he took oral prednisone on an irregular basis. Last prednisone intake was approximately two months before the current presentation. Conventional imaging of the left knee revealed severe osteoarthritis (Figure 1). An osteoarthritis flare-up was suspected and the patient sent home with analgesics.



Figure 1: X-ray of the left knee showing severe osteoarthritis.

The next day the patient returned to our emergency department. This time, a prominent effusion of the left knee with painful range of motion was observed upon clinical examination. Laboratory workup revealed a normal blood count with normal liver and kidney function but a high elevated C-reactive protein of 129 mg/dl.

A diagnostic arthrocentesis of the left knee was performed. The synovial fluid appeared turbid with a total synovial fluid cell count of 101'220 cells/mm³ which of 90.5% were polynucleated cells. Cultures of the joint fluid and blood cultures were sent for evaluation in microbiology. While awaiting culture results, antibiotic treatment with amoxicillin clavulanic acid 2.2 grams intravenously three times a day was initiated. In the meantime, cultures of the joint fluid grew gram-positive cocci and the decision

for surgery the next day was taken. Four days after the initial intra-articular glucocorticoid injection, a knee arthroscopy with lavage was performed. Several tissue probes and synovial joint fluid were sent for culturing. Further differentiation of the joint fluid culture as well tissue resected during arthroscopy revealed growth of *Rothia mucilaginosa*.

A thorough patient history revealed, that the patients presented to the family doctor with exacerbation of pain in both knees three days before initial presentation. The patient received intra-articular corticosteroid injections in both knees and initially reported regress of pain. However, three days after the intra-articular injections, he developed increasing pain of the left knee and presented to our emergency room. No dental pathology was detected upon examination nor reported by the patient.

Antibiotic treatment was switched to amoxicillin and continued for a total of four weeks. Due to pain resistant to intravenous analgesic therapy, the patient received two further arthroscopies with lavage of the left knee joint. No microbial growth was observed in probes resected during the second and third arthroscopy. C-reactive protein decreased and swelling and pain of the left knee diminished the following days. The patient continued to see a physiotherapist and total knee replacement surgery was planned for three to four months after stop of antibiotic therapy.

Discussion

We present a rare case of septic arthritis with *Rothia mucilaginosa* in a non-prosthetic knee after intra-articular injections of corticosteroids. *Rothia* species (*R. mucilaginosa*, *R. dentocariosa*, *R. aerea*, *R. nasimurium*, and *R. amarae*) are aerobic or facultative anaerobic gram-positive, coagulase-negative cocci-bacilli occurring as part of the normal human oral and upper respiratory tract microbiome. *Rothia spp.* infections rarely occur in healthy humans and are mostly reported in immunocompromised hosts [12-16]. Invasive *Rothia* species infections have been reported in immunocompromised patients with endocarditis [17], meningitis [18,19], pneumonia [20], endophthalmitis [21,22], peritonitis [23,24] and prosthetic device infections [25-29].

Rothia species are seldom isolated from prosthetic joint infections or native joints. In the literature, ten cases of *Rothia species* associated infections of prosthetic [25-30] or native joint [31-34] were identified (Table 1). Most patients were immunocompromised and several patients suffered from periodontal disease or had undergone dental procedures prior to presenting with septic arthritis (Table 1). The causative agent was *Rothia mucilaginosa* in four reports [27,29,31,33]. In contrast, we report a case of septic arthritis with *Rothia mucilaginosa* in a patient with osteoarthritis as risk factor but without a known immunosuppressing condition. However, the patient received an intra-articular injection of corticosteroids in the affected knee

three days before start of symptoms due to pain related to osteoarthritis. The patient did not present with symptoms of bacteremia such as fever or chills and blood culture remained sterile. Hence, a systemic infection with *Rothia mucilaginosa* and secondary septic arthritis seems unlikely and the intra-articular injection three days before presentation was identified as source of infection.

<i>Rothia species</i>	Affected Joint	Immunosuppression/ Co-morbidities	Dental/periodontal disease	Recent Intra-articular injection or joint surgery in the affected joint	First author
<i>Rothia mucilaginosa</i>	Prosthetic knee	Diabetes	No	Total joint arthroplasty 3 months prior to presentation	Schermerhorn <i>et al.</i> [29]
<i>Rothia mucilaginosa</i>	Native knee	Severe bilateral osteoarthritis	Yes	Intra-articular injection with corticosteroids 3 days prior to presentation	Daoub <i>et al.</i> [31]
<i>Rothia mucilaginosa</i>	Native knee	Rheumatoid arthritis, daily prednisone therapy	Unknown	Intra-articular injections with corticosteroids 2 and 6 days and 12 weeks prior to presentation. Radiation synovectomy of the right knee 6 months prior	Kaasch <i>et al.</i> [33]
<i>Rothia mucilaginosa</i>	Prosthetic hip	No immunosuppression	Yes	No	Michels <i>et al.</i> [27]
<i>Rothia aeria</i>	Prosthetic knee	Rheumatoid arthritis, weekly methotrexate 12.5 mg, daily prednisolone 7.5 mg, chronic kidney disease, asthma, hypertension	Yes	No	Mahobia <i>et al.</i> [25]
<i>Rothia aeria</i>	Prosthetic shoulders	Rheumatoid arthritis, weekly methotrexate 12.5 mg, prednisone 2 mg and hydrocortisone 10 mg daily	Yes	No	Verrall <i>et al.</i> [34]
<i>Rothia dentocariosa</i>	Native knee	Rheumatoid arthritis, etanercept 25 mg twice weekly, oxaprozin	Yes	Meniscectomy and synovectomy 9 months prior	Favero <i>et al.</i> [32]
<i>Rothia dentocariosa</i>	Prosthetic knee	HIV infection	Yes (2 dental extractions 5 months prior to admission without prophylactic antibiotics)	No	Klinger <i>et al.</i> [28]
<i>Rothia dentocariosa</i>	Prosthetic hip	Chronic obstructive pulmonary disease, lung cancer	Tooth extraction 4 months before fracture of the right hip	Hemiarthroplasty due to right femoral neck fracture two weeks prior	Ozan <i>et al.</i> [30]
<i>Rothia spp.</i>	Prosthetic knee	Rheumatoid arthritis (no medical therapy)	Yes	No	Trivedi <i>et al.</i> [26]

Table 1: Previously reported cases of septic arthritis due to *Rothia* species.

Surgical procedures and intraarticular injections are increasingly recognized as iatrogenic causes of septic arthritis [4,7,9,35]. Two studies in Iceland between 1990 and 2017 showed a significant increase in incidence of iatrogenic joint infections following arthroscopic procedures in adults from 9/100000 per year in 1990–2002 to 25/100000 per year in 2003–2017 [7,9]. Kennedy *et al.* (2015) identified in 42 of 248 (16.9%) patients with confirmed septic arthritis an iatrogenic cause of infection. In both studies, the most frequently identified bacterial species was *Staphylococcus aureus* [4,7]. However, the causative specimens of iatrogenic infections was not further specified in these studies.

Interestingly, two other case reports describe septic arthritis of native knee joints with *Rothia mucilaginosa* after intra-articular injections with corticosteroids and local anesthetics [31,33]. Kaasch *et al.* (2011) reports septic arthritis with *Rothia mucilaginosa* in a native knee of a female patient with rheumatoid arthritis on daily prednisone therapy and intra-articular injections with corticosteroids and local anesthetics into the affected knee at two and six days and 12 weeks prior to admission for septic arthritis of the knee [33]. Daoub *et al.* report the case of a 58-year-old woman with serial corticosteroid and local anesthetic intra-articular injections due to osteoarthritis, who was subsequently diagnosed with *Rothia mucilaginosa* septic arthritis of the right knee [31].

Conclusion

In addition to hematogenous spread of *Rothia species* after dental procedures or periodontal disease, we identified direct inoculation of joints as relevant cause of septic arthritis due to *Rothia mucilaginosa*.

Our case report highlights the importance of proper aseptic technique during intra-articular injections.

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Conflicts of interest

Alessa Fischer, Isabel Akers, Roberto Buonomano and Daniel Baunach declare they have no conflicts of interest that might be relevant to the contents of this manuscript.

Compliance with Ethics Guidelines

The patient described in this case report provided consent for publication.

References

1. Abram SGF, Alvand A, Judge A, Beard DJ, Price AJ (2020) Mortality and adverse joint outcomes following septic arthritis of the native knee: a longitudinal cohort study of patients receiving arthroscopic washout. *Lancet Infect Dis* 20:341-349.
2. Ferrand J, El Samad Y, Brunschweiler B, Grados F, Dehamchia-Rehailia N, et al., (2016) Morbimortality in adult patients with septic arthritis: a three-year hospital-based study. *BMC Infect Dis*. 16:239.
3. Ross JJ (2017) Septic Arthritis of Native Joints. *Infect Dis Clin North Am* 31(2):203-218.
4. Kennedy N, Chambers ST, Nolan I, Gallagher K, Werno A, et al., (2015) Native Joint Septic Arthritis: Epidemiology, Clinical Features, and Microbiological Causes in a New Zealand Population. *J Rheumatol* 42:2392-2397.
5. McBride S, Mowbray J, Caughey W, Wong E, Luey C, et al., (2020) Epidemiology, Management, and Outcomes of Large and Small Native Joint Septic Arthritis in Adults. *Clin Infect Dis* 70:271-279.
6. Rutherford AI, Subesinghe S, Bharucha T, Ibrahim F, Kleymann A, et al., (2016) A population study of the reported incidence of native joint septic arthritis in the United Kingdom between 1998 and 2013. *Rheumatology* 55:2176-2180.
7. Geirsson AJ, Statkevicius S, Vikingsson A (2008) Septic arthritis in Iceland 1990-2002: increasing incidence due to iatrogenic infections. *Ann Rheum Dis* 67:638-643.
8. Couderc M, Bart G, Coiffier G, Godot S, Seror R, et al., (2020) 2020 French recommendations on the management of septic arthritis in an adult native joint. *Joint Bone Spine* 87:538-547.
9. Gunnlaugsdóttir SL, Erlendsdóttir H, Helgason KO, Geirsson AJ, Thors V, et al., (2022) Native joint infections in Iceland 2003–2017: an increase in postarthroscopic infections. *Ann Rheum Dis* 81:132-139.
10. Richebé P, Coiffier G, Guggenbuhl P, Mulleman D, Couderc M, et al., (2022) Management and outcome of native joint septic arthritis: a nationwide survey in French rheumatology departments, 2016–2017. *Ann Rheum Dis* annrheumdis-2022-222143.
11. Dubost JJ, Couderc M, Tatar Z, Tournadre A, Lopez J, et al., (2014) Three-decade trends in the distribution of organisms causing septic arthritis in native joints: Single-center study of 374 cases. *Joint Bone Spine* 81:438-440.
12. Abidi MZ, Ledebner N, Banerjee A, Hari P (2016) Morbidity and mortality attributable to *Rothia* bacteremia in neutropenic and nonneutropenic patients. *Diagn Microbiol Infect Dis* 85:116-120.
13. Ramanan P, Barreto JN, Osmon DR, Toshi PK (2014) *Rothia* Bacteremia: a 10-Year Experience at Mayo Clinic, Rochester, Minnesota. *J Clin Microbiol* 52:3184-3189.
14. Poyer F, Friesenbichler W, Hutter C, Pichler H, Dworzak M, et al., (2019) *Rothia mucilaginosa* bacteremia: A 10-year experience of a pediatric tertiary care cancer center. *Pediatr Blood Cancer* 66:e27691.
15. Getzenberg RB, Hijano DR, Hakim H, Dallas RH, Ferrolino JA, et al., (2021) *Rothia mucilaginosa* Infections in Pediatric Cancer Patients. *J Pediatr Infect Dis Soc* 10:341-344.

16. Shaeer K, Addisu A, Nanjappa S, Greene J (2017) Epidemiologic Evaluation of *Rothia* Bacteremia-A Single Cancer Center Three Year Experience. *Open Forum Infect Dis* 4: S555-S555.
17. Haddad S, Saade Y, Ramlawi B, Kreidieh B, Gilbert B, et al., (2021) Native valve endocarditis complicated by abscess formation caused by *Rothia mucilaginosa*. *IDCases* 26:e01348.
18. Clauwaert M, Druwé P, Depuydt P (2019) Meningitis in a patient with neutropenia due to *Rothia mucilaginosa*: a case report. *J Med Case Reports* 13:84.
19. Ochi F, Nakamura R, Miyawaki R, Moritani K, Murakami S, et al., (2021) *Rothia mucilaginosa* Meningitis in a Child with Myelodysplastic Syndromes. *Case Rep Pediatr* 2021:1-4.
20. Maraki S, Papadakis IS (2015) *Rothia mucilaginosa* pneumonia: a literature review. *Infect Dis* 47:125-129.
21. Song YY, Ahn M, Cho NC, You IC (2017) A Case of *Rothia mucilaginosa* Keratitis in South Korea. *Korean J Ophthalmol* 31:460-461.
22. Lam H, Khundkar T, Koozekanani D, Nazari HK (2022) *Rothia Mucilaginosa* Endophthalmitis Associated With iStent Inject Implantation. *J Glaucoma* 31: e37-e40.
23. Kim BG, Cho AY, Kim SS, Lee SH, Shin HS, et al., (2015) A case of peritoneal dialysis-associated peritonitis by *Rothia mucilaginosa*. *Kidney Res Clin Pract* 34:185-187.
24. Cielo AB, Ullian ME (2013) Peritonitis from *Rothia mucilaginosa* in a chronic peritoneal dialysis patient. *Clin Kidney J* 6:552-553.
25. Mahobia N, Chaudhary P, Kamat Y (2013) *Rothia* prosthetic knee joint infection: report and mini-review. *New Microbes New Infect* 1:2-5.
26. Trivedi MN, Malhotra P (2015) *Rothia* prosthetic knee joint infection. *J Microbiol Immunol Infect* 48:453-455.
27. Michels F, Colaert J, Gheysen F, Scheerlinck T (2007) Late prosthetic joint infection due to *Rothia mucilaginosa*. *Acta Orthop Belg* 73:263-267.
28. Klingler ET, Verma P, Harris A (2005) Infection of a Total Knee Arthroplasty With *Rothia dentocariosa*: Brief Report and Review of the Literature. *Infect Dis Clin Pract* 13:195-199.
29. Schermerhorn JT, Colantonio DF, Larson DT, McGill RJ (2021) A Case of Periprosthetic Joint Infection Because of *Rothia Mucilaginosa*. *Mil Med* 2021:usab203.
30. Ozan F, Öncel ES, Duygulu F, Çelik İ, Altay T (2015) Prosthetic hip joint infection caused by *Rothia dentocariosa*. *Int J Clin Exp Med* 8:11628-11631.
31. Daoub A, Ansari H, Orfanos G, Barnett A (2021) *Rothia mucilaginosa* : a case of septic arthritis in a native knee and review of the literature. *BMJ Case Rep* 14:e237015.
32. Favero M, Raffeiner B, Cecchin D, Schiavon F (2009) Septic Arthritis Caused by *Rothia dentocariosa* in a Patient with Rheumatoid Arthritis Receiving Etanercept Therapy. *J Rheumatol* 36:2846-2847.
33. Kaasch AJ, Saxler G, Seifert H (2011) Septic arthritis due to *Rothia mucilaginosa*. *Infection* 39:81-82.
34. Verrall AJ, Robinson PC, Tan CE, Mackie WG, Blackmore TK (2010) *Rothia aeria* as a Cause of Sepsis in a Native Joint. *J Clin Microbiol* 48:2648-2650.
35. Holland C, Jaeger L, Smentkowski U, Weber B, Otto C (2012) Septic and aseptic complications of corticosteroid injections: an assessment of 278 cases reviewed by expert commissions and mediation boards from 2005 to 2009. *Dtsch Arztebl Int* 109:425-430.