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Short Research Communication

Acute Mono-Arthritis of the Knee: A Case Report of Infection with *Parvimonas Micra* and Concomitant Pseudogout

Martijn Dietvorst[1]✉, Ramon Roerdink[2], Alexander C.A.P. Leenders[2], Menno A. Kiel[3], L. Paul A. Bom[2]

1. Maastricht University, Maastricht, The Netherlands;
2. Jeroen Bosch general hospital, 's-Hertogenbosch, The Netherlands;
3. Erasmus Medical Centre, Rotterdam, The Netherlands.

✉ Corresponding author: martijndietvorst@gmail.com

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Abstract

Parvimonas micra is a rare pathogen for septic arthritis and is known for its subacute onset. We report a case of acute arthritis of the knee caused by *P. micra* and pseudogout. Initially, calcium pyrophosphate crystals were found in the knee, which were successfully treated with a steroid injection. Only anaerobic cultures became positive. A 16S rRNA PCR-analysis was necessary to identify *P. micra* as causative agent, a method which is never described before in similar cases. The infection was treated with clindamycin for 6 weeks. This is the third case report of a septic arthritis caused by *P. micra* and the second which also reports concomitant pseudogout.

Key words: septic arthritis, knee, acute mono-arthritis, Parvimonas micra, pseudogout, CPPD.

Introduction

Infection with *Parvimonas micra,* also known as *Peptostreptococcus micros* and *Micromonas micra*, is a rare cause of septic arthritis.[1] *P. micra* is a fastidious, anaerobic Gram-positive coccus, which is normally found in human dental and gastrointestinal flora.[2] Infections with *P. micra* in joints, bone or intervertebral disc are known for their subacute onset and atypical clinical presentation.[1,2,3] Only two cases of septic arthritis with *P. micra* have been described before.[1,4] Due to problems in culturing and identifying anaerobic strains, prevalence of *P. micra* may be underreported as a pathogen for bone and joint infections, as is mentioned in previous case reports.[1,5,6] We used a 16S rRNA PCR-analysis for identifying *P. micra*. This method has not been reported before as an identification tool for septic arthritis caused by *P. micra*.

Case

A 68-year-old woman presented at the emergency department with a three-day history of severe progressive pain of the right knee that had begun after an audible painful click upon standing from a sitting position. Her past medical history revealed a communitive tibial plateau fracture of the other knee five years ago, treated conservatively.

At presentation, the patient was not able to stand on her right leg. Body temperature was 37,2 °C. The day before it was 38,2 °C. The right knee was swollen and warm, but no redness could be seen. Palpation was painful at the lateral joint space. Flexion/extension of the knee was 60-5-0 degrees. Blood examination showed a C-reactive protein (CRP) level of 169mg/l and leucocytes of $7.3x10^9$/l. X-ray studies of the right knee revealed osteoarthritis of the medial compartment with some loose bodies. The differential diagnosis consisted of a septic arthritis, crystal-induced arthritis and reactive arthritis. Due to the risk of a potential septic arthritis, an arthroscopic lavage was performed.

Joint fluid obtained during arthroscopy was yellowish and opaque, no crystals were visible. It was sent to the laboratory for analysis. Visually, diffuse grade 1-2 osteoarthritis and small degenerative lesions of the medial and lateral menisci were found.

Analysis of the joint fluid revealed calcium pyrophosphate crystals. Because diagnosis of a septic arthritis was not ruled out, it was decided to treat the patient with flucloxacillin intravenously until culture results were known. Despite treatment, the pain of the knee increased and an arthrocentesis was performed which showed sanguine synovial fluid, in contrast to the yellow fluid obtained during arthroscopy. It was decided to perform a re-arthroscopy with lavage, although cultures of the previous arthroscopy were negative. Joint fluid was sanguine again and sent for analysis. In an attempt to reduce the inflammatory response, corticosteroids were injected into the joint which resulted in a decrease in pain and CRP. After five days, the direct anaerobic cultures became positive with Gram-positive cocci, as well as the inoculated fastidious antibiotic neutralization FAN bottle. Multiple colony-forming units were found, so contamination of the culture was unlikely. Conventional techniques, including matrix assisted laser desorption/ionisation time-of-flight (MALDI TOF) analysis, were not able to identify the bacterial genus or species. Finally, 16S ribosomal RNA PCR-sequencing within the microbiological laboratory confirmed *P. micra* as the causative agent. Cultures for aerobic bacteria and fungi remained negative, as well as the cultures of the second lavage. This might be due to the flucloxacillin, which was started six days before the second lavage. No susceptibility test was performed, because of the universal susceptibility of *P. micra* to penicillin and clindamycin. It was advised to start treatment with clindamycin 600mg orally three times a day for six weeks. Further investigation of the origin of the infection was done by the oral maxillofacial surgeon, who did not find an infection in the oral region.

Discussion

This case shows the diagnostic challenge of arthritis of the knee. Acute mono-arthritis without deviating vital parameters, crystals in synovial fluid analysis and negative aerobic cultures did not rule out a septic arthritis. The patient was treated with flucloxacillin without clinical improvement. Intra-articular injection with corticosteroids decreased pain and improved function. It was likely the acute arthritis was caused by the pseudogout crystals. However, anaerobic cultures revealed a *P. micra* which is mainly known for causing subacute infections of the spine and joints.[1,7]

P. micra was a super-imposed infection in a pseudogout arthritis. It is possible that *P. micra* and pseudogout are related. Multiple case reports describe the coexistence of septic arthritis and crystal-induced arthritis, mostly gout. [6] Two cases of *P. micra* arthritis have been reported before. One of these published studies concerning a septic arthritis caused by *P. micra* also describes pseudogout crystals in the joint fluid.[1] Several factors of an urate crystal-induced arthritis (gout) have been described as being favourable for bacteria to cause a septic arthritis: reduction of local pH caused by the influx of neutrophils and the production of lactic acid, articular damage caused by lysosomal enzymes and the formation of the crystals, resulting in the deposition of more endotoxins and an increase in local temperature.[6,8] Moreover, circulating bacteria can access inflamed joints more easily due to synovial inflammation.[6,8,9]

One of the case reports [Riesbeck 1999] describes septic arthritis as the first presentation of a multiple myeloma, which has been described in other cases as well. [4,10] In patients with multiple myeloma, susceptibility to infections is increased by major immunological defects in the humoral system and joint infections are mainly caused by streptococcal bacteria (*S. pneumoniae, E. faecalis* and group C streptococci). [10]

As of today, cases of septic arthritis caused by *P. micra* have only been described in patients with underlying crystal-induced arthritis or multiple myeloma, with both conditions presumably resulting in an increased susceptibility to bacterial joint infections. [1,4,6,10] Also, in both earlier published cases, dental problems were described. One patient reported a minor dental treatment two months before the onset of the arthritis, the other patient showed poor dental hygiene. [1,4]. In our case no dental problems were found by a maxillofacial surgeon, nor had the patient recently undergone dental procedures.

In this case report, anaerobic cultures showed growth of *P. micra*, which could only be identified by 16S ribosomal RNA PCR-sequencing. This method has not been reported before as an identification tool for joint infections. Previous reports describe the difficulty to culture *P. micra* and due to this difficulty, it is possible that these bacteria are underreported as causative pathogen for bone and joint infections. [1,5] Direct 16S ribosomal RNA PCR-sequencing of bacterial DNA in joint fluid might be a viable diagnostic option in these cases.

Conclusion

Septic arthritis caused by *P. micra* has only been

described before in patients with pseudogout crystals or in patients with underlying multiple myeloma. This case report is the third case report describing septic arthritis caused by *P. micra*. This anaerobic gram positive coccus is known for causing periodontal infections and is difficult to culture and identify. 16S ribosomal RNA sequencing can be used to identify *P. micra*, which might be an underreported causative pathogen in joint infections.

Abbreviations

PCR: polymerase chain reaction; CRP: C-reactive protein; MALDI TOF: matrix assisted laser desorption/ionisation time-of-flight analyse; FAN: fastidious antibiotic neutralization.

Competing Interests

The authors do not have any conflict of interest.

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