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Case report

Capnocytophaga canimorsus — An underestimated cause of periprosthetic joint infection?

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ABSTRACT

Background: Periprosthetic joint infection (PJI) is a major clinical problem in orthopedic surgery. *Capnocytophaga canimorsus* (*C. canimorsus*) is an unusual and hardly detectable bacterium. A review of the literature indicates that *C. canimorsus* affects mainly immunocompromised patients. It has not been reported to cause periprosthetic joint infections in immunocompetent patients so far. This case report aims to raise awareness of *C. canimorsus* in orthopedic surgery with special regard to joint arthroplasty.

Methods: We report a case of a 54-year-old immunocompetent patient with a late infection after total knee arthroplasty caused by *C. canimorsus*. The patient underwent two-stage revision with prosthesis explantation, implantation of an antibiotic-impregnated static spacer, intravenous antimicrobial therapy for four weeks with cefuroxime followed by oral antimicrobial therapy with ciprofloxacin for further two weeks and secondary revision total knee arthroplasty.

Results: In the present case, we could demonstrate that adequate treatment of *C. canimorsus* was capable to successfully treat periprosthetic joint infection caused by *C. canimorsus* in an immunocompetent patient.

Conclusion: We feel that *C. canimorsus* has to be taken into account as a potential pathogen causing periprosthetic joint infection – regardless of the immunological status of the patient and especially when the detection of a pathogen does not succeed.

1. Introduction

Infection of a prosthetic joint is a severe complication of joint arthroplasty [1]. Periprosthetic joint infections (PJI) are estimated to occur in up to two percent of primary total knee arthroplasties (TKA) and total hip arthroplasties (THA) [2,3]. One of the leading causes of early revisions after TKA is infections, causing approximately 25% of revisions within the first two years after primary implantation and approximately eight percent of revisions after this early postoperative period [4]. Approximately 15% of all revision THA procedures in the United States are due to PJI [5]. The most common pathogens for infections after TKA are *Staphylococcus* and *Streptococcus* species (spp.) [2,3,6,7]. The diagnosis of PJI is more challenging, when cultures taken from within the joint (e.g. by aspiration of the joint or intraoperatively) fail to show bacterial growth, although serum levels of infectious markers are elevated,

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and the joint shows clear clinical and radiological signs of infection. Such culture-negative PJI can be observed in seven percent of cases [8].

We report this case of an immunocompetent patient with PJI caused by *Capnocytophaga canimorsus* (*C. canimorsus*) after knee joint arthroplasty. We focus on this unusual pathogen in order to elucidate the question, if *C. canimorsus* has to be considered a relevant pathogen in orthopedic surgery of immunocompetent patients.

2. Case report

A 54-year-old male patient presented to our department with pain in his right knee for one year. The trauma history was negative. The patient had undergone TKA due to osteoarthritis three years before at his local hospital. After primary implantation he did well, but approximately two years after surgery he had sudden progressive pain and swelling in his operated right knee. After exclusion of a deep vein thrombosis (DVT), the symptoms were first attributed to a ruptured baker cyst by the colleagues of the local hospital. Despite conservative treatment, the pain persisted. Approximately one year later he presented to our clinic. His past medical and family history were uneventful. The patient was immunocompetent, no corticosteroids were taken at the date of admission or at any time in the past. An exposure to dogs, cats or other domestic animals was credibly denied.

On first admission, a palm-sized erythema, localized hyperthermia, and tenderness on palpation over the antero-medial lower leg were present for five weeks. The scar itself did not show any signs of inflammation. Further physical examination revealed a limping gait and a limited range of motion from 0° extension to 100° flexion with slight tensional pain, no intraarticular effusion. Clinically, no signs of a DVT were evident. No fever or chills were detected. Blood samples showed an elevated level of C-reactive protein (19.8 mg/l), and a white blood cell count of 8.1/μl. X-rays of the affected joint exhibited the suspicion of a loosened tibial component of the prosthesis due to an osteolytic area at the medial tibial plateau, while the femoral component did not show any radiological signs of loosening (Figure 1). A three-phase bone scintigraphy (technetium) showed an increased uptake at the medial tibial plateau, highly suspicious for infection (Figure 2).

While joint fluid analysis by preoperative puncture of the affected joint is regularly performed in our clinic in order to evaluate a possible joint infection (including white blood cell count and direct microbiological assessment by Gram staining), we did not perform a puncture in the case reported, because present diagnostic results already revealed clear signs of PJI. From our perspective, a preoperative joint fluid analysis would not have revealed any additional information in this specific situation, while taking into account the usual risks of such interventions.

The patient underwent a two-stage revision surgery. At the first stage, the infected prosthesis was explanted, and meticulous debridement of all infected, necrotic, and ischemic tissue and bone parts as well as pulsatile lavage with five liters of Ringer solution was performed. The osteolytic area of the proximal medial tibia revealed intraoperatively the presence of pus. Tissue samples from five different locations (osteolytic area of the proximal medial tibia, infrapatellar fat pad, superior recessus, lateral aspect of the tibia, dorsal capsule) were taken during surgery and sent for further microbiological and histopathological examination. A gentamicin–vancomycin-loaded (1 g gentamicin + 4 g vancomycin / 80 g bone cement) static spacer was implanted (Figure 3).

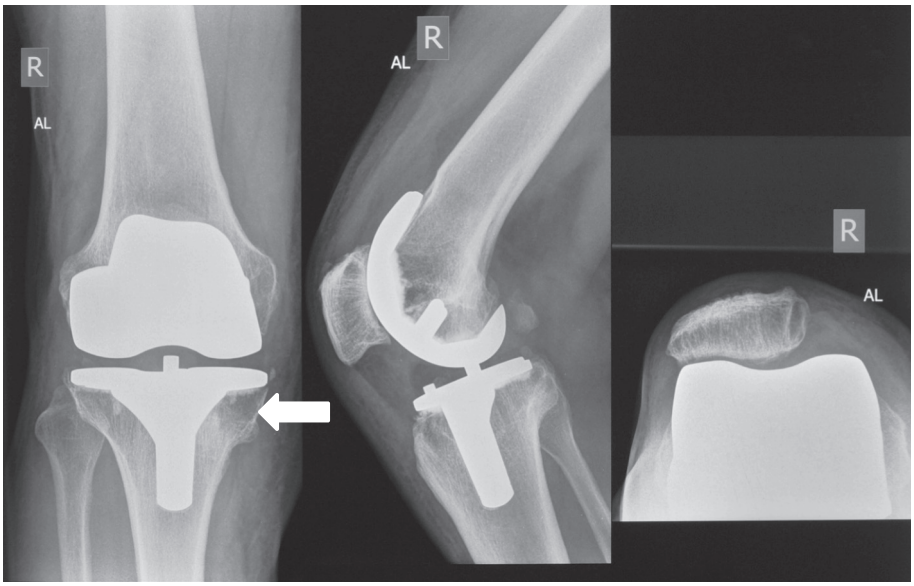

Figure 1. Preoperative X-rays. Preoperative X-ray images of the right knee in anterior–posterior (left side), lateral (middle), and tangential view of the patella (right side) reveal a circumscribed area of osteolysis at the medial tibial plateau ("arrow") with secondary loosening of the tibial component of the prosthesis. The femoral component does not show any signs of loosening.

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