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Case Report

Human bacterial arthritis caused by *Streptococcus zooepidemicus*: report of a case

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SUMMARY

Septic arthritis caused by *Streptococcus zooepidemicus* is a rare event in humans. Of the four cases reported in the literature, only two patients had direct animal contact, and the portal of entry remained unclear in all cases. We report herein the case of a patient who suffered a purulent arthritis of the left shoulder caused by *S. zooepidemicus*, successfully treated in our department. A diagnostic FDG-PET-CT scan ruled out other foci of infection, but detected a hyperkeratotic plantar chronic soft tissue lesion of the left foot, acquired in a paragliding accident 10 years earlier. The fact that the patient habitually took care of his horses barefoot in boots, identifies the cutaneous portal of entry as most likely. To our knowledge this is the first report of a septic arthritis caused by *S. zooepidemicus* where a cutaneous entry route is described.

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Introduction

Severe infections with group C streptococci are common in domestic animals but are thought to be rare in humans. However, a broad spectrum of infections caused by these organisms has been described, including septicemia, pneumonia, meningitis, endocarditis, pericarditis, intra-abdominal infections, urinary infections,^{1–3} and a small number of infections of the musculoskeletal system with joint infections and osteomyelitis.^{3,4} While *Streptococcus equisimilis* causes most of the cases of arthritis in humans, infections with *Streptococcus zooepidemicus* represent only 1.4% of all infections with group C streptococci,⁵ and a purulent arthritis caused by *S. zooepidemicus* has only been reported in four cases. In these cases, the skin and the respiratory tract were the suspected portals of entry, but only two of the four patients had direct contact with animals.^{1,6,7}

We report the case of a patient who suffered a purulent arthritis of the left shoulder caused by *S. zooepidemicus*, who was successfully treated in our department. The patient suffered of a chronic soft tissue lesion on the sole of his left foot acquired in a paragliding accident in 1998, which proved to be the only additional site of infection and most likely represents the portal of entry, since the patient commonly took care of his horses barefoot in boots. To our knowledge this is the first reported case of a hematogenous infection of a large joint with *S. zooepidemicus* where the portal of entry could be identified.

Case report

A 60-year-old Caucasian male was transferred to our department in September 2008 from a neighboring hospital, with a 2-day history of pain of the left shoulder with pseudoparalysis and swelling. The patient complained of fever and night sweats. His past medical history revealed a paragliding accident in 1998, where he suffered a fracture of the left calcaneus with a hyperkeratotic plantar chronic soft tissue lesion of his left foot (Figure 1), consecutively leading to an arthrodesis of the talocalcaneal joint. Additionally he suffered fractures of the lumbar spine (third and fourth vertebral body) resulting in a non-reversible cauda equina syndrome and a chronic pain syndrome. A worsening of the cauda equina syndrome and increasing pain in his lower limbs had been the reason for admission to the neighboring hospital three weeks before his transfer to the Trauma Center Murnau. His recent medical history did not reveal any trauma, operation, injections, or skin lesions in or around the left shoulder.

On physical examination his shoulder was tender, warm, erythematous, and immobilized. His temperature was 37.8 °C, white blood cell count (WBC) was $13 \times 10^9/l$, and C-reactive protein (CRP) was 37.6 mg/dl; no systolic murmur could be observed and a chest X-ray and roentgenogram of the left shoulder disclosed no pathologic changes. The patient did not present neurological symptoms, neck stiffness, abdominal pain, signs of spondylodiscitis, or swelling of other joints. He was taken to the operating room immediately, where an arthroscopic debridement and lavage of the glenohumeral joint yielded a small amount of purulent material; intra-operatively the synovia

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Figure 1. Hyperkeratotic plantar chronic soft tissue lesion of a patient with septic arthritis of the left shoulder, most likely representing the route of entry of *Streptococcus zooepidemicus*.

appeared only moderately infected. Arthroscopic treatment was repeated on days 2 and 5. Histology revealed only a mild arthritis. Culture of the material yielded in the first two surgical procedures identified *S. zooepidemicus*, which was serologically and biochemically confirmed (Pro-Lab Diagnostics, Richmond Hill, Canada and Vitek 2, bioMerieux, Craaponne, France). The third arthroscopic operation yielded sterile material. Antibiotic treatment was started on day 1 with intravenous amoxicillin and clavulanic acid (2000 mg + 200 mg) and continued after receiving the resistogram. The strain only proved resistant against tetracycline. The patient's condition improved steadily, fever disappeared on day 2, the WBC reached normal levels on day 5, CRP decreased continuously reaching 9.2 mg/dl on day 14, and

the antibiotic treatment was stopped on day 12. An echocardiogram revealed no pathologic result and a magnetic resonance image of the spine showed an unchanged status of the lumbar spine with no signs of spondylodiscitis. Ultrasonographic examination of the abdomen demonstrated no pathological finding, endoscopy revealed a gastroesophageal reflux disease (GERD), and the patient was sent to the dentist where a dental focus could be ruled out. The hyperkeratotic lesion of the left foot was treated conservatively.

On day 15 an increase in CRP was observed. Upon further questioning the patient admitted increasing night sweats and malaise, denied shoulder pain, and did not show clinical signs of empyema. To rule out other foci of infection an ^{18}F -fluorodeoxyglucose positron emission computed tomography (FDG-PET-CT) scan was performed on day 18. The PET-CT scan revealed an empyema of the left shoulder with high FDG uptake of the glenohumeral joint and adjacent lymph nodes, as well as a soft tissue infection of the plantar lesion without involvement of the calcaneus. No other hot spot was observed (Figure 2).

As a consequence, surgical treatment was continued and an anterior arthrotomy of the left shoulder, debridement and lavage with application of gentamicin collagen sponges was performed on days 20, 23, 26 and 31. Again, *S. zooepidemicus* could be identified as the cause of infection in the first two operations. No resistance against antibiotics had developed, so antibiotic therapy with amoxicillin/clavulanic acid was continued until day 38. The patient was discharged on day 41 with no local signs of infection, a regular WBC, CRP at 1.1 mg/dl, no fever, and no night sweats. Interestingly, the symptoms of his cauda equina syndrome had ceased as well. He was seen at our outpatient clinic 6 weeks after discharge, was healthy and without signs of recurrence.

Discussion

Human infection with *S. zooepidemicus* is uncommon, representing only 1.4% of infections with group C streptococci.⁵ Severe infections including meningitis, epidemic post-infectious glomerulonephritis, endocarditis, pneumonia, pericarditis, septic arthritis, and osteomyelitis have been reported.^{1–4} However, it has been suggested that among group C streptococci, *S. zooepidemicus* causes a higher proportion of aggressive infections.^{5,6} As described in all four cases of septic arthritis caused by *S. zooepidemicus*, our patient presented with severe signs of infection with an extremely high CRP of almost 40 mg/dl, general malaise, night sweats, and fever. Interestingly, the strong clinical symptoms and the course of

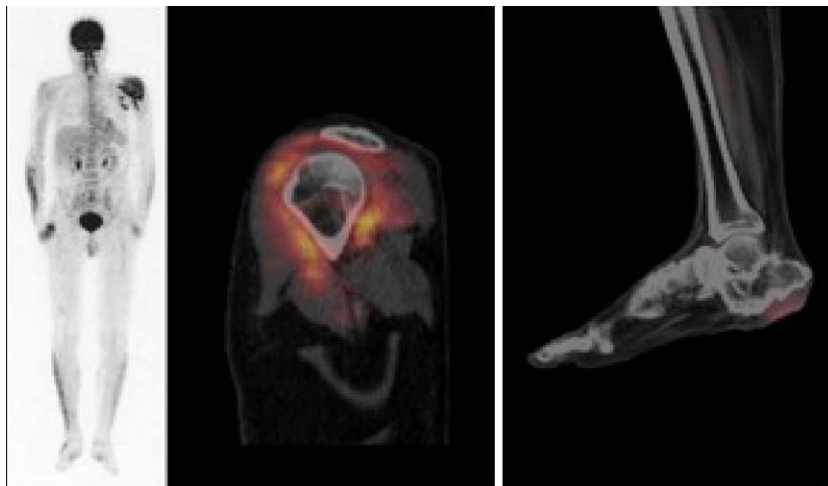


Figure 2. FDG-PET-CT scan of a patient with septic arthritis caused by *Streptococcus zooepidemicus*. Note the high FDG uptake in the left shoulder, as well as an increased uptake in the plantar soft tissue lesion. No other hotspot was observed.

disease did not correlate with the intra-operative and histological findings, with only a small amount of purulent aspirate and a mild to moderate arthritis. As our patient represents only the fifth published case of septic arthritis due to *S. zooepidemicus*, the suggestions for treatment do not differ from the generally accepted treatment of septic arthritis of the large joints. However, an aggressive antibiotic and surgical treatment appears to be necessary, since all described cases of arthritis share the features of a severe disease.

Outbreaks caused by the ingestion of unpasteurized milk and cheese have been described, usually leading to meningitis, endocarditis, multifocal sepsis, and epidemic post-infectious glomerulonephritis. In many of these cases the infection could be traced to an animal source.^{8,9} Of the four published cases of septic arthritis caused by *S. zooepidemicus*, only two patients had direct contact with animals; one patient was a horse trainer¹⁰ and the second case was a gardener who collected fresh horse manure without having direct animal contact.⁷ However, in both cases the route of entry remained unclear and the respiratory tract or a cutaneous route was considered as most likely. Further history of our patient revealed that he habitually took care of his horses barefoot in his boots, and given the fact that he suffered a chronic lesion on the sole of his left foot, the cutaneous route of infection appears most likely. This theory is supported by the results of the FDG-PET-CT scan for which a high accuracy in the detection of chronic osteomyelitis and soft tissue infections has been described.¹¹ A possible explanation why *S. zooepidemicus* could not be detected in a swab of the plantar lesion is that intravenous antibiotic treatment had already been given for 6 days when the swab was taken. The authors are aware that an infection through the respiratory tract cannot be ruled out, but for the first time our case describes the most likely route of entry.

In summary, *S. zooepidemicus* is a very rare cause of septic arthritis in humans and has been described in only five cases, but can lead to severe and resistant infections. It must be suspected in patients who have had direct contact with animals, especially horses, and our report supports the theory of a cutaneous route of entry.

Conflict of interest: The authors state that there are no conflicts of interest in regard to this work. No funding was used for the study.

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