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Case Report

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Actinobacillus ureae septic arthritis in a returning traveler from Gambia: A case report and a review of literature

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Abstract

We present, to our knowledge, the second case of a *Actinobacillus ureae* septic arthritis in a returning traveller from The Gambia with a past medical history of monoclonal gammopathy of undetermined significance complicated by a severe polyneuropathy of the lower extremities.

Background

Actinobacillus ureae, formerly known as *Pasteurella ureae* [1], is a non-motile and non-sporing Gram-negative rod [2]. Together with the genera *Haemophilus* it constitutes the family of *Pasteurellaceae* [3]. It is rarely reported as a causative infectious micro-organism in humans [4-6]. *A. ureae* was first isolated in human sputum in three patients with chronic rhinosinusitis [4]. Later, it was also detected in routine sputum testing in patients without any respiratory symptoms and was therefore believed to be a commensal of the respiratory tract [5].

Symptoms may occur in the presence of damage of the upper respiratory tract or bronchial tree or a compromised immune system [5]. Arthritis caused by *A. ureae* is even more rare, as only one single case has been described in the literature [7]. Here, we report the second published case of septic arthritis due to *A. ureae*, with a possibly tropical origin.

Case report

A 67-year-old man presented at the emergency department, twenty-four hours after returning from a fourteen-day holiday to The Gambia. He suffered from a swollen, red and painful left foot, which had started three days before admission. The day before admission the patient also had developed fever up to 39 degrees Celsius. In The Gambia, he had resided in several hotels and resorts. He had received adequate travelling immunization and had used atovaquone/proguanil as malaria prophylaxis. His past medical history revealed a polyneuropathy caused by a monoclonal gammopathy of undetermined significance (MGUS), resulting in frequently occurring wounds on the soles of his feet. In The Gambia, he mentioned to have walked barefoot almost constantly. At presentation, no wounds were noticed at the affected foot, apart from a partially removed nail of the first digit.

His vital signs comprised a body temperature of 39.2 degrees Celsius and a tachycardia of 118/min with a blood pressure of 110/68 mmHg. Physical examination confirmed warmth and swelling of the left foot, mainly located around the ankle as can be seen in figure 1, without evident loss of motion. Laboratory testing revealed elevated inflammation parameters (C-reactive protein of 189.9 mg/L and white blood cell count of 14.5*10^9/L) (Figure 2). No other abnormalities were detected. Blood cultures were taken.

Due to the severity of infection, he was hospitalized to be treated with flucloxacillin 1000 mg four times a day intravenously under the suspicion of a cellulitis. The next day, he had increasing loss of motion of the affected ankle with worsening pain and swelling. Arthritis was confirmed after aspiration of purulent fluid by an ultrasound guided diagnostic synovial puncture. Furthermore, the blood cultures revealed growth of gram-negative rods. At this point the antibiotics were switched to ceftriaxone 2000 mg once a day intravenously.

Both the cultures of blood and synovial aspirate eventually revealed the presence of *A. ureae*, determined by matrix-assisted laser desorption/ionization time-of-flight analyzer (MALDI-TOF, Bruker). An overview of antibiotics susceptibility testing is given in table 1.

Antibiotic regimen was narrowed to benzylpenicillin 1x10^6 IE four times a day intravenously. The infection parameters declined and the body temperature normalized. The pain and loss of motion improved gradually. An arthroscopic irrigation with saline was performed to potentiate bacterial eradication and to restrict intra-articular damage. Repeated scrupulous investigation revealed a wood splinter deep under the skin of the heel of the affected foot, which may potentially have functioned as a portal of entry, although the extracted nail seems to be an alternative legitimate explanation.

The intravenous benzylpenicillin regimen was continued for two weeks. After two weeks, he was discharged from the hospital. Antibiotic treatment was switched to levofloxacin (500mg twice daily) orally for another four weeks. Our patient fully recovered without any sequelae, including normal ankle joint function.

Discussion

To the best of our knowledge, we reported, the second known case of septic arthritis due to *Actinobacillus ureae* in a traveler returning from The Gambia. A Medline search was performed using the terms

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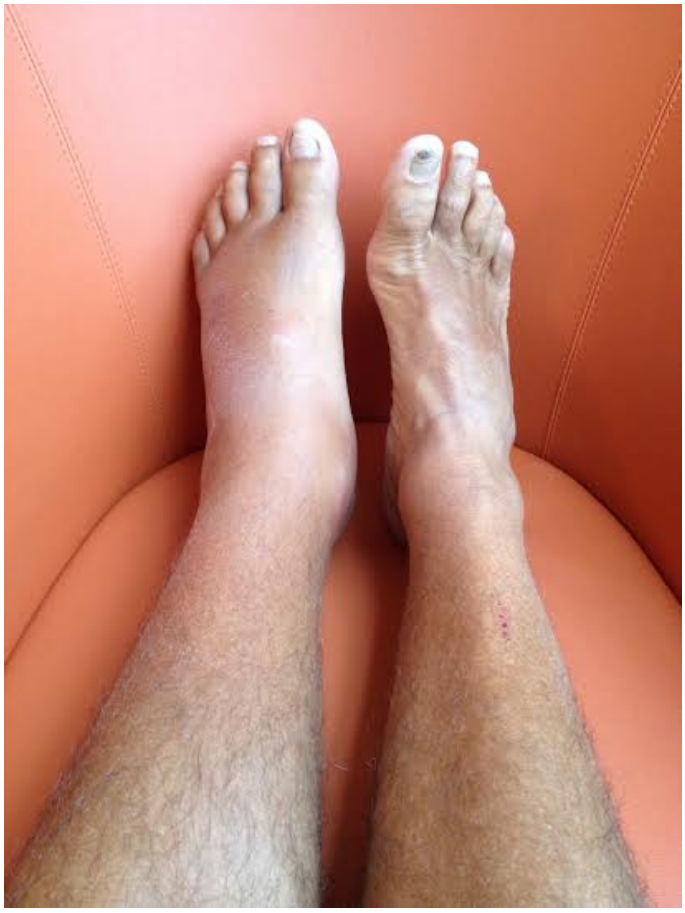

Figure 1. Redness and swelling of the left ankle due to septic arthritis with a damaged first digit's nail

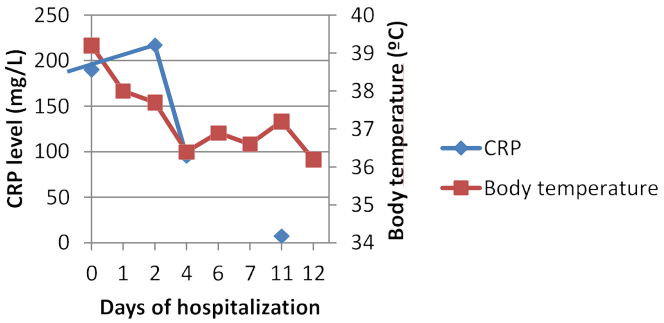

Figure 2. Course of C-reactive protein (CRP) and white blood count (WBC) during hospitalization. Day 0 = day of admission. Antibiotic switches were made on day one from flucloxacillin to ceftriaxone and on day four to benzylpenicillin. Arthroscopic irrigation took place on the fifth day, which can explain the temporary increase in body temperature

Table 1. Antibiotic susceptibility testing.

	MIC (µg/mL)
Penicillin	0.25
Amoxcillin/clavulanate	0.125
Meropenem	0.032
Ceftriaxone	<0.002
Ciprofloxacin	0.032

MIC: Minimum Inhibitory Concentrationa

'*Actinobacillus ureae*', '*Pasteurella ureae*' and 'infection', as this micro-organism is uncommonly recognized as a causative infectious agent in humans [4-6]. Twenty-nine cases of infections caused by *A. ureae* were identified [6-32]. The most frequently reported infection was meningitis. Only one case concerned arthritis [7]. An overview is given in table 2. Interestingly, the case of arthritis of Kaur et al. and our patient both concern *A. ureae* arthritis possibly acquired in Africa. However, no specific associations with the tropics are currently known from literature. Besides, both cases originate from varying demographic locations.

Infections with *A. ureae* seem to be associated with several comorbidities. A substantial part of the meningitis cases was associated with skull fractures or intracranial surgery. Both the current case and the case of arthritis of Kaur et al. concern patients with skin damage. Several patients had a hampered immune system, due to Waldenström's macroglobulinaemia, HIV-positivity and use of immunosuppressive agents. Whether this suggests that disruption of immunity not only predisposes to infection in general, but also to infection with *A. ureae* specifically remains unclear.

The laboratory tests used in this case were CRP, an acute phase protein, and WBC. Both were elevated and in combination with the clinical signs this raised the suspicion of an infection. This was confirmed with bacterial growth in the blood and synovial aspirate cultures.

Routine incubation of the blood and synovial fluid led to rapid identification of the *A. ureae*. Three blood culture sets (two on the day of admission and one on the second day) were incubated and the aerobic bottles became positive within 14 hours (BACTEC, BD). The synovial fluid grew in the blood culture media and not on the directly inoculated agar, but this could be due to the fact that the synovial fluid was collected after antibiotics were started. In conclusion, the *A. ureae* grew within 24 hours on blood agar plates and was identified by the MALDI-TOF.

A. ureae can be adequately treated with beta-lactam antibiotics. Alternative options include tetracyclins, sulfonamids/trimethoprim, macrolids and aminoglycosides, which was confirmed from our antibiotic susceptibility tests.

Additionally, in treating septic arthritis it must be considered to perform joint irrigation as to potentiate bacterial eradication and limit intra-articular damage [33]. In both our and the formerly described case of *A. ureae*, residual damage was not reported.

A. ureae seldom is a causative infectious agent of septic arthritis. Currently available literature might suggest an association with disruption of immunity. We recommend to routinely perform blood or synovial cultures in patient with arthritis, which may sometimes detect uncommon pathogens, for which antibiotic susceptibility guided treatment can be initiated.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Table 2. An overview of literature

Case	Year	Gender Age	Localisation	Relevant history	Antibiotics (AB)	Duration AB	Additional therapy	Outcome
1[7]	2004	F, 59	Arthritis, multifocal	Rheumatoid arthritis treated with anti-TNF-alfa and methotrexate Trip to Kenya Several skin abrasions	IV piperacillin/ tazobactam and ciprofloxacin Oral ciprofloxacin	6 weeks	Wound debridement Articular irrigation Subtotal synovectomy	Survived
2[8]	1968	M, 2	Bacteraemia	Malnutrition	N/A	N/A	N/A	Died
3[9]	1996	M, 65	Bone marrow	Rheumatoid arthritis	IV benzylpenicillin Oral tetracyclin	2 weeks 2 weeks	-	Survived
4[10]	1995	N/A	Bronchitis, chronic	N/A	N/A	N/A	N/A	N/A
5[11]	1981	N/A	Bronchopneumonia	N/A	N/A	N/A	N/A	N/A
6[12]	1981	M, 19	Bronchopneumonia Bacteraemia	Liver cirrhosis	N/A	N/A	N/A	Died
7[13]	1979	F, 2 days	Conjunctivitis	Premature newborn	Ocular chloramphenicol	N/A	Ocular saline	Full recovery
8[14]	2007	F, 4	Conjunctivitis	-	amoxicillin/ clavulanate	5 days	-	Full recovery
9[15]	1993	M, 59	Endocarditis	Previous S. aureus endocarditis Periodontal surgery without AB prophylaxis	IV gentamicin IV piperacillin Oral cefotiam	5 weeks 6 weeks N/A	-	Survived
10[16]	1988	M, 27 months	Otitis media	-	Oral amoxicillin/ clavulanate	10 days	-	Full recovery
11[17,18]	1961	M, 39	Meningitis	-	N/A	N/A	N/A	Survived
12[19]	1966	M, 48	Meningitis	Alcohol abuse Skull fracture	N/A	N/A	N/A	Survived
13[20]	1967	M, 16	Meningitis	-	N/A	N/A	N/A	Died
14[21]	1978	F, 53	Meningitis Bacteraemia	Intracranial surgery	N/A	N/A	N/A	Survived
15[22]	1983	M, 40	Meningitis Endocarditis	Schizophrenia Alcohol abuse Odontal infection	N/A	N/A	N/A	Coma
16[23]	1983	M, 55	Meningitis Bacteraemia	Insulin-dependent diabetes	Ampicillin	N/A	-	Survived Hearing loss
17[24]	1983	M, 54	Meningitis	Previous skull fracture Alcohol abuse	Penicillin	N/A	N/A	Survived
18[25]	1985	M, 6	Meningitis	Previous skull fracture	IV ampicillin and chloramphenicol	N/A	-	Survived
19[26]	1989	M, 52	Meningitis	Previous skull fracture Chronic sinusitis	ampicillin	2 weeks	N/A	Survived
20[18]	1987	M, 26	Meningitis Bacteraemia	Alcohol abuse Two pneumococcal meningitis in history Previous skull fracture	IV cefotaxime and penicillin	8 days	Neurosurgical repair of fistula from lamina cribrosa and nasal cavity	Survived
21[27]	1994	M, 25	Meningitis	HIV-positive Head trauma	IV ceftriaxone switched to IV penicillin	N/A	-	Survived
22[28]	1995	M, 17	Meningitis	Skull fracture Dural tears	IV penicillin and ceftazidime	N/A	Frontal craniotomy with partial debridement left frontal lobe Repair dural tears	Survived Complete neurological recovery
23[29]	2002	M, 22	Meningitis	Previous neurosurgery Skull fracture	IV ceftriaxone	10 days	-	survived
24[17]	2009	M, 75	Meningitis	Waldenström's macroglobulinaemia	IV cefotaxime Oral amoxicillin	15 days 1 week	-	Survived
25[30]	1978	M, 14	Meningo-encephalitis	Previous basal skull fracture Dural tear	IV ampicillin	N/A	-	Survived
26[6]	1989	M, 44	Peritonitis	Alcohol abuse Liver cirrhosis Denver shunt	IV clindamycin IV ampicillin and gentamicin	5 days 10 days	-	Survived
27[31]	1976	M, 47	Pneumonia	Previous alcohol abuse Emphysema Multiple rib fractures	N/A	N/A	-	Died
28[32]	2000	M, 28	Pneumonia	AIDS Hepatitis type C	IV ceftriaxone	10 days	-	Survived
29[17,18]	1984	M, 47	Septicaemia	Alcohol abuse Liver cirrhosis	N/A	N/A	N/A	Died

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