Chryseobacterium indologenes bacteraemia in a diabetic child

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Chryseobacterium indologenes is a non-fermentative Gram-negative bacillus that is a rare pathogen in humans. Its occurrence in diabetic children has not been previously reported. In this report, a case is described of C. indologenes bacteraemia possibly associated with the use of a peripheral venous catheter. A 2-year-old boy with type I diabetes mellitus was admitted due to a coma caused by cerebral oedema and was successfully treated for his neurological condition but presented on the tenth day after admission with fever of 40 °C, agitation, restlessness, lack of appetite, somnolence and fatigue. His pulse rate was 90 min⁻¹ and his respiratory rate was 20 min⁻¹. Laboratory studies revealed a white blood cell count of 4900 mm⁻³ with 67 % neutrophils and 27 % lymphocytes. Two separate blood cultures yielded C. indologenes. Treatment with ceftriaxone was started before the culture results were obtained, and was continued after susceptibility test results were obtained. The patient became afebrile after 48 h, and his general condition improved within 36 h. The infection did not recur. This is believed to be the third case of bacteraemia outside of Asia due to C. indologenes and the first in a diabetic child not otherwise immunocompromised. This case indicates that C. indologenes infection can occur in diabetic children without ventilator or central venous catheter and might be treated with a single agent after in vitro susceptibility tests have been performed.

Introduction

Chryseobacterium indologenes is a non-fermentative Gram-negative bacillus that, although widely distributed in nature, is a rare pathogen in humans (Schreckenberger & von Graevenitz, 1999). Formerly known as Flavobacterium indologenes, this species was once classified as a type strain of
*Flavobacterium* species CDC group IIb. In the last decades it has been phenotypically and genotypically differentiated from other members of this group ([Schreckenberger & von Graevenitz, 1999](#)). Its occurrence in diabetic children has never been reported. In this report, we describe a case with *C. indologenes* bacteraemia possibly associated with the use of a peripheral venous catheter.

## Case report

In January 2003, a 2-year-old boy with type I diabetes mellitus, which had been diagnosed two weeks before, was admitted due to a coma caused by cerebral oedema secondary to inappropriate treatment for ketoacidosis. Height- and weight-for-age z scores were –0.2 and –1, respectively. At hospital admission the child was afebrile. A peripheral venous catheter was inserted into a forearm vein and therapy with insulin, dexamethasone, mannitol and KCl was started. Clinical conditions increasingly improved and dexamethasone was interrupted after 4 days.

On the tenth day, the child presented with fever of 40 °C, agitation, restlessness, lack of appetite, somnolence and fatigue. Physical examination was unremarkable; the pulse rate was 90 min⁻¹ and the respiratory rate was 20 min⁻¹.

Laboratory studies revealed a white blood cell count of 4900 mm⁻³ with 67 % neutrophils, 27 % lymphocytes, 5 % monocytes, a C-reactive protein concentration of 51 mg l⁻¹ and an erythrocyte sedimentation rate of 45 mm h⁻¹. Results of urinalysis were unremarkable. Cultures of peripheral blood, stool, urine and pharyngeal swab were performed. Before the culture results were obtained, the patient began treatment with ceftriaxone (70 mg kg⁻¹) intravenously for 2 days and then intramuscularly. The patient became afebrile after 48 h, and his general condition improved within 36 h.

Laboratory studies performed on the third day of therapy revealed a white blood cell count of 16 800 mm⁻³ with 61 % neutrophils, 34 % lymphocytes and 4 % monocytes, a C-reactive protein concentration of 32 mg l⁻¹ and an erythrocyte sedimentation rate of 41 mm h⁻¹.

About 10 ml of peripheral blood was collected from veins of both forearms and used to inoculate blood culture bottles. Blood cultures were processed by the hospital microbiology laboratory using a standard blood culturing system (BACTEC 9120; Becton Dickinson). Two bottles gave a positive result on the same day, i.e. at day 5 after inoculation. The isolates were oxidase-positive, glucose-nonfermenting Gram-negative rods. Growth on 5 % sheep blood agar (Becton Dickinson) revealed smooth, circular, yellow-pigmented colonies, 1–2 mm in diameter, within 24 h of incubation. The biochemical profiles produced by the API 20NE system (BioMérieux) and Vitek GNI card using the Vitek-2 system (BioMérieux-Vitek) showed that the organism was *C. indologenes* with a probability of 99 %. Both isolates failed to grow at 41 °C, did not produce acid from D-xylose and L-
arabinose, and were negative for aesculin hydrolysis within 4 h of incubation, but positive after 24 h of incubation, indicating that the characteristics of this isolate were compatible with those of C. indologenes.

Antibiotic susceptibility was determined using the Vitek system (BioMérieux-Vitek) on the basis of standard criteria. The isolates were susceptible to ceftriaxone (MIC, 8 µg ml⁻¹), cefepime, cefpirome, ciprofloxacin, pefloxacin, piperacillin-tazobactam and trimethoprim-sulfamethoxazole, and resistant to amikacin, aztreonam and isepamicin (MIC, 64 µg ml⁻¹), gentamicin, tobramycin, imipenem, meropenem and colistin (MIC, >16 µg ml⁻¹), ceftazidime (MIC, 32 µg ml⁻¹), netilmicin (MIC, >32 µg ml⁻¹), piperacillin, ticarcillin and ticarcillin-clavulanic acid (MIC, >128 µg ml⁻¹).

Once C. indologenes was identified (4 days after onset of fever), ceftriaxone was continued for another 6 days. The peripheral venous catheter was removed on day 2 after the beginning of treatment, before the notification of positive blood cultures. There was no external evidence for a line infection and culture of the catheter tip was not performed. Cultures from urine, stool and pharyngeal swab were negative. Cultures of surfaces and water supplies were negative for C. indologenes. Clinical conditions improved further.

Laboratory studies performed on the seventh day of therapy revealed a white blood cell count of 14 900 mm⁻³ with 39 % neutrophils, 53 % lymphocytes and 4 % monocytes, a C-reactive protein concentration of 4 mg l⁻¹ and an erythrocyte sedimentation rate of 16 mm h⁻¹. Blood culture was negative.

Discussion

Chryseobacterium species are aerobic, motile Gram-negative rods that can be found in soil, plants, foodstuffs and water sources despite adequate chlorination (Hoque et al., 2001). Although widely distributed in nature, C. indologenes is a rare pathogen in humans and is not normally present in the human microflora (Schreckenberger & von Graevenitz, 1999). However, this organism can thrive in aqueous environments and can cause bacteraemias, wound sepsis, and ventilator-associated pneumonia by virtue of its ability to contaminate and persist in fluid-containing apparatuses (Hsueh et al., 1996a).

Chryseobacterium infections are most commonly seen in immunocompromised patients and/or patients that have received long-term broad-spectrum antibiotics. Most cases have been reported from Taiwan. To date, in the English literature there are 38 cases of bacteraemia (12 of them occurring in a hospital outbreak), and most of the infections were detected in hospitalized patients with severe underlying diseases who had indwelling devices implanted (Green & Nolan, 2001;
Our patient was diabetic and had not received long-term broad-spectrum antibiotics. We were not able to trace the source of infection since culture of the catheter tip was not performed, there was no external evidence for a line infection, and cultures of surfaces and water supplies were negative for *C. indologenes*. He became afebrile after 48 h of the administration of empirical therapy with ceftriaxone. Although the large majority of *C. indologenes* are resistant to ceftriaxone, the particular strain we isolated was sensitive (MIC, 8 µg ml\(^{-1}\)). The patient appeared to respond rapidly to ceftriaxone; however, we cannot exclude the possibility that clinical improvement was also related to removal of the catheter.

*Chryseobacterium meningosepticum* is the most pathogenic member of the genus; it is an agent of neonatal meningitis with mortality rates of up to 57% and is involved to a lesser extent in cases of pneumonia and bacterial sepsis in neonates and adults (Bloch et al., 1997). On the contrary, the clinical significance of *C. indologenes* has not been fully established yet because this bacterium has not been frequently recovered from clinical specimens. Infection with *C. indologenes* has been associated with high mortality, but it is difficult, in general, to assess the relative contribution to mortality of the underlying conditions of the patients.

To the best of our knowledge, this is the third case of bacteraemia outside of Asia due to *C. indologenes*, and the first to occur in a diabetic child not otherwise immunocompromised.

**Table 1.** Clinical characteristics, treatment and outcome for four children with bacteraemia caused by *C. indologenes*

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<th>Characteristics</th>
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<td>Clinical characteristics</td>
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Our case indicates that *C. indologenes* infection can occur in diabetic children without ventilator or
central venous catheter and might be treated with a single agent after in vitro susceptibility tests have been performed.

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References


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