Kingella kingae Keratitis

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We present the first two cases of Kingella kingae keratitis in adults. This species is a rare isolate from ophthalmic samples for which final identification was obtained with matrix-assisted laser desorption ionization—time of flight mass spectrometry. One of the patients recovered uneventfully with topical therapy. Results from the second patient cannot be confirmed as he was lost to follow-up.

We present two cases of Kingella kingae keratitis who presented to the Ophthalmology Department of the Fundación Jiménez Díaz—the first in November 2010 and the second in February 2012.

The first case was a 38-year-old woman who presented with redness in the left eye and pain over 2 days. She had no relevant medical history or underlying diseases. The patient had been wearing monthly contact lenses for 5 years. An ophthalmological examination revealed mixed hyperemia and a paracentral corneal infiltrate (1 by 1 mm) in the bottom of the left eye, which was able to be stained with fluorescein.

Following corneal scraping, empirical treatment was started with topical moxifloxacin and tobramycin. Nineteen days after starting treatment, an anterior segment examination revealed no abnormalities.

The second patient was a 45-year-old HIV-positive male who had experienced pain and redness in the left eye for 2 weeks. The patient did not use contact lenses but reported having used Moroccan kohl as eye makeup. An ophthalmological examination using fluorescein staining revealed an inferior peripheral corneal infiltrate (1.5 by 1.5 mm) associated with hyperemia. He was then treated empirically with topical vancomycin and ceftazidime.

Therapy was changed to topical gentamicin and ciprofloxacin when susceptibility results were available. The outcome of the corneal ulcer is unknown, because the patient was lost to follow-up.

Corneal scrapings of both patients were collected and sent to the microbiology service for microscopy and culture using an identical protocol. This protocol consists of direct Gram staining of the sample and plate onto chocolate agar (bioMérieux, Marcy l’Etoile, France) and tryptic soy blood agar (bioMérieux, Marcy l’Etoile, France) and incubating both at 37°C in 5% CO₂. In the first case, Gram staining revealed an absence of microorganisms, but in the second case, Gram-negative coccobacilli were detected. After 72 h (case 1) and 24 h (case 2) of incubation, growth of smooth, mucous, and beta-hemolytic colonies was detected. Both were pure cultures. Gram staining of the colonies showed Gram-negative coccobacilli arranged in pairs or clusters. The isolates had facultative anaerobic respiration, and their growth was increased by a CO₂ atmosphere.

Biochemical tests gave a presumptive identification of the organisms as Kingella kingae. The biochemical characteristics of both K. kingae isolates from the corneal ulcers were the production of acid from glucose and maltose and the fact that the isolates were phosphatase alkaline positive, oxidase positive, and catalase negative (1). The presumptive identification was confirmed by using matrix-assisted laser desorption ionization—time of flight mass spectrometry (MALDI-TOF MS) (Vitek MS; bioMérieux, Marcy l’Etoile, France) (2) and the Myla 3.1.0 software program. Use of MALDI-TOF MS for Kingella identification has been widely reported as having high accuracy (3, 4). The Vitek MS library includes two species of Kingella: Kingella denitrificans and Kingella kingae. Identification of both strains gave 99.9% accuracy.

Antimicrobial susceptibility testing was performed according to the modified Kirby-Bauer disk diffusion method, and the inhibition zone diameter was compared with values established by the European Committee on Antimicrobial Susceptibility Testing (breakpoints designed for systemic therapy) for Haemophilus and other fastidious Gram-negative rods (5). Both isolates were susceptible to aminoglycosides (amikacin, gentamicin), penicillins and related drugs (ampicillin, amoxicillin-clavulanic acid, aztreonam, cefazolin, cefepime, ceftazidime, ceftriaxone, cefuroxime, ertapenem, imipenem, meropenem, penicillin G, and piperacillin-tazobactam), quinolones (ciprofloxacin, levofloxacin), trimethoprim-sulfamethoxazole, and tigecycline.

Bacterial keratitis is defined as a corneal infection and is most commonly found in patients with some type of trauma producing a defect in the ocular surface. The typical clinical course of bacterial keratitis consists of conjunctival edema, reduced vision, pain, redness, photophobia, and discharge. The most common etiologic agents of this infection are Staphylococcus aureus, Streptococcus pneumoniae, and Pseudomonas species (6).

K. kingae is a facultatively anaerobic Gram-negative coccobacillus belonging to the family Neisseriaceae. This species colonizes the throat—but not the nasopharynx—of many children of ages 6 months to 4 years. K. kingae has been reported as a cause of osteo-articular infections, endocarditis, and bacteremia and is considered an emergent agent in children (7).
A MEDLINE search was performed using the following terms: “kingella and keratitis,” “kingella and corneal ulcer,” “kingella eye infection,” “kingella endophthalmitis,” “kingella conjunctivitis,” “kingella eye,” “kingella ophthalmology,” “kingella ophtalmic infection,” “kingella corneal infection,” and “kingella cornea.” Articles’ references were also reviewed for other previous reports. Keratitis due to \textit{K. kingae} has been reported on one previous occasion in an 11-month-old male who was treated with gentamicin and cephalothin (8). Other cases of \textit{K. kingae} ocular diseases have been described: one in an 11-month-old girl with metastatic endophthalmitis who received cefotaxime, gentamicin, and chloramphenicol (9,10) and the other in a 3-year-old male with orbital cellulitis treated with piperacillin and gentamicin (11) (Table 1).

The literature review shows that these organisms are normal inhabitants of the upper respiratory tract, and eye infections are extremely rare (12).

In conclusion, we report the first two cases of corneal ulcer caused by \textit{K. kingae} in adults. These two cases provide evidence supporting the potential of this bacterium to cause eye infection, even in patients without underlying diseases (case 1).

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REFERENCES


### Table 1 Description of patients with eye infections due to \textit{Kingella kingae}

<table>
<thead>
<tr>
<th>Source or reference</th>
<th>Infection</th>
<th>Clinical feature(s)</th>
<th>Age</th>
<th>Sex</th>
<th>Risk factor(s)</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carden et al. (9) and Goutzmanns et al. (10)</td>
<td>Metastatic endophthalmitis</td>
<td>Painful, red eye</td>
<td>11 mo</td>
<td>Female</td>
<td>Intercurrent rhinovirus, respiratory tract infection</td>
<td>Cefotaxime, gentamicin, chloramphenicol</td>
<td>Cured</td>
</tr>
<tr>
<td>Mollee et al. (8)</td>
<td>Keratitis</td>
<td>Red discharging eye</td>
<td>11 mo</td>
<td>Male</td>
<td>NO*</td>
<td>Gentamicin, cephalexin</td>
<td>Cured</td>
</tr>
<tr>
<td>Connell et al. (11)</td>
<td>Orbital cellulitis</td>
<td>Periorbital swelling and drowsiness, fever, nausea, malaise</td>
<td>3 yr</td>
<td>Male</td>
<td>NO</td>
<td>Piperacillin, gentamicin</td>
<td>Cured</td>
</tr>
<tr>
<td>Case 1</td>
<td>Keratitis</td>
<td>Painful, red eye</td>
<td>38 yr</td>
<td>Female</td>
<td>Contact lenses</td>
<td>Moxifloxacin, tobramycin</td>
<td>Cured</td>
</tr>
<tr>
<td>Case 2</td>
<td>Keratitis</td>
<td>Painful, red eye</td>
<td>45 yr</td>
<td>Male</td>
<td>HIV</td>
<td>Gentamicin, ciprofloxacin</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

*NO, not observed.