Extended wear contact lens related bacterial keratitis

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Abstract
Aims—To report the clinical findings and visual outcome of patients with extended wear contact lens (EWCL) related bacterial keratitis.

Methods—11 cases with EWCL related bacterial keratitis were included. Corneal scrapings were obtained for cytology and cultures.

Results—Nine patients had unilateral bacterial keratitis and two patients showed bilateral involvement. Corneal scrapings revealed Pseudomonas aeruginosa in seven patients, Staphylococcus aureus coagulase positive in one patient, and Staphylococcus epidermidis in three patients.

Conclusion—EWCLs may be associated with bacterial keratitis and may result in visual loss. Dispensing contact lenses by optometrists should be performed in consultation with ophthalmologists.

Several factors may compromise the defence mechanisms of the ocular surface leading to corneal infection. Deficiency in tears, local corneal trauma, obstruction of the nasolacrimal duct, the use of contact lenses, and immunodeficiency may lead to bacterial keratitis.1

The number of patients wearing contact lenses has increased over the past few decades and contact lenses became a major predisposing factor for microbial keratitis, contributing to more than 30% in some published studies.2

Microtrauma of the cornea may occur with the use of contact lenses allowing bacteria to adhere to the surface of the cornea. Bacteria may also adhere to debris and to the soft contact lens. In addition, the prolonged use of extended wear contact lenses can lead to localised hypoxia of the cornea resulting in epithelial oedema and punctate keratits. Patients using soft contact lenses are at greater risk than with other types of lenses.3

We report 11 cases of bacterial keratitis that were seen at the eye centre in Riyadh, Saudi Arabia. The main purpose of this paper is to report the clinical findings and visual outcome in patients with extended wear contact lens (EWCL) related bacterial keratitis.

Patients and methods
A total of 11 cases with history of pain, redness, photophobia, and loss of vision of few days duration were examined during the period of December 1996 to December 1998 at the Eye Center, Riyadh, Saudi Arabia. Each patient underwent complete ophthalmological examination. All patients had used EWCLs (Acuvue, Johnson & Johnson), and wore the contact lenses continuously for minimum period of 1 week as instructed by their optician. None of the patients were aware of the potential risks of eye infections with contact lenses. In three patients, contact lenses were used for a period extending from 2 weeks to 2 months. Corneal scrapings were obtained from the corneal ulcer of each patient for Gram staining, Giemsa staining, and bacterial cultures.

Results
There were 11 patients (six males and five females) with bacterial keratitis following the use of EWCLs. The age range was 17–54 years with a mean age of 30.7 years. None of the patients had ocular surface disorder and none of them used topical corticosteroids. Two patients had bilateral keratitis with hypopyon (Fig 1). The corneal scrapings from seven patients grew Pseudomonas aeruginosa (two had bilateral corneal ulcers) and from four patients the culture showed Staphylococcus species. One had Staphylococcus aureus and three had Staphylococcus epidermidis. At the time of presentation, the visual acuity varied from hand movement vision to 20/20. Visual acuity following treatment improved in all cases. Five (38.5%) eyes out of 13 developed visual impairment with loss of one or more lines of their best corrected visual acuity (BCVA) and eight eyes (61.5%) regained 20/20 vision after therapy. Table 1 demonstrates the clinical findings and visual outcome among 13 eyes of 11 patients with bacterial keratitis.

Discussion
The use of EWCLs, the harshness of the climate in Saudi Arabia, and improper care in the handling of contact lenses may have contributed to the occurrence of bacterial keratitis among our patients. Sleeping with the contact lenses may cause hypoxia, epithelial oedema, and superficial punctate keratitis which may predispose to corneal infection.4 Contact lenses may compromise the ocular surface by depriving the corneal epithelium of...
normal tear flushing and from the non-specific humoral immune mechanisms. Microtrauma to the cornea may lead to superficial punctate keratitis. Minute epithelial defects may allow adhesions of the bacterial surface to the cornea establishing the infection. All our patients used EWCLs and were instructed to sleep with their contact lenses and to exchange them once a week for new ones. Despite extensive and aggressive use of topical and subconjunctival antibiotics, five (38.5%) eyes out of 13 developed visual impairment, and eight eyes (61.5%) regained their BCVA of 20/20 vision in the affected eye. *Pseudomonas aeruginosa* was the most commonly encountered causative agent in this group of patients. *Pseudomonas* species is an organism that can cause destruction of the cornea in a few days. Fortunately, infection in our patients was discovered early and treated promptly with appropriate antibiotics. Patients with staphylococcal infections have a more indolent course of the disease, but responded to vancomycin. Patients with *Pseudomonas* keratitis were treated with a fortified surface friendly contact lenses.

None of the patients received topical steroids or materials used in this study. They acknowledge the help and support of the administrator of the Eye Center, Mrs. Najwa Tabbara, and the outstanding secretarial assistance of Vangie Ontoria.

The harshness of the weather in Saudi Arabia and the potential risk of bacterial keratitis among soft contact lens wearers may favour alternative refractive surgery procedures such as laser in situ keratomileusis (LASIK).

<table>
<thead>
<tr>
<th>No</th>
<th>Age/sex</th>
<th>Latarity</th>
<th>Causative organism</th>
<th>Pre CF</th>
<th>Post CF</th>
<th>Final clinical outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22/M</td>
<td>L</td>
<td><em>Staphylococcus aureus</em></td>
<td>CF 6'</td>
<td>20/60</td>
<td>Central corneal scar with thinning</td>
</tr>
<tr>
<td>2</td>
<td>17/F</td>
<td>R</td>
<td><em>Pseudomonas aeruginosa</em></td>
<td>CF 5'</td>
<td>20/30</td>
<td>Central scar descemetocele</td>
</tr>
<tr>
<td>3</td>
<td>20/F</td>
<td>R</td>
<td><em>Pseudomonas aeruginosa</em></td>
<td>CF 5'</td>
<td>20/30</td>
<td>Central corneal scar</td>
</tr>
<tr>
<td>4</td>
<td>38/F</td>
<td>L</td>
<td><em>Staphylococcus aureus</em></td>
<td>CF 5'</td>
<td>20/20</td>
<td>Peripheral corneal scar</td>
</tr>
<tr>
<td>5</td>
<td>54/M</td>
<td>L</td>
<td><em>Staphylococcus aureus</em></td>
<td>CF 4'</td>
<td>20/50</td>
<td>Central corneal scar</td>
</tr>
<tr>
<td>6</td>
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<td>Peripheral corneal scar</td>
</tr>
<tr>
<td>7</td>
<td>43/M</td>
<td>R</td>
<td><em>Pseudomonas aeruginosa</em></td>
<td>CF 6'</td>
<td>20/20</td>
<td>Peripheral corneal scars</td>
</tr>
<tr>
<td>8</td>
<td>42/M</td>
<td>R</td>
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<td>20/20</td>
<td>Peripheral corneal scars</td>
</tr>
<tr>
<td>9</td>
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<td>Peripheral corneal scars</td>
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<tr>
<td>10</td>
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<td>L</td>
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<td>CF 6'</td>
<td>20/20</td>
<td>Paracentral corneal scar</td>
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<tr>
<td>11</td>
<td>17/F</td>
<td>L</td>
<td><em>Pseudomonas aeruginosa</em></td>
<td>CF 6'</td>
<td>20/20</td>
<td>Paracentral corneal scar</td>
</tr>
</tbody>
</table>

BCVA = best corrected visual acuity; CF = counting fingers; HM = hand movement.

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