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.

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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 the 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 keratitis. 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 responded to vancomycin. Patients with staphylococcal infections were treated with a fortified antibiotics. Patients with staphylococcal keratitis were treated with a fortified cefazidime and tobramycin. None of the patients received topical steroids during the antibiotic therapy. Recently, several studies have created concern for public health with respect to extended wearing schedules of lenses and led to the recommendation by the US Food and Drug Administration that lenses approved for extended wear should not be worn for more than 1 week. The results of controlled studies indicate a fourfold to 15-fold increase in risk when lenses are worn overnight, rather than on a daily basis. Corneal hypoxia may occur during overnight wear and surface antigens may build up on lenses.

This report illustrates the potential serious side effects of extended use of contact lenses. Although correction of refractive error with contact lenses is considered to be safe and effective, the poor handling of contact lenses, lack of personal hygiene, and extended wear of contact lenses, may lead to bacterial keratitis and visual loss. Dispensing of contact lenses should be performed by trained contact lens practitioners under ophthalmologist supervision. Public education is important in the prevention of this complication. In Saudi Arabia, over the counter dispensing of contact lenses should be prohibited. Proper contact lens handling and disinfection should be followed. Recent progress in the use of a daily wear disposable contact lenses with good oxygen transmissibility and surface modifications for inhibition of bacterial adherence may provide ocular surface friendly contact lenses.

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).

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### Table 1 Clinical findings and visual outcome among 13 eyes of 11 patients with bacterial keratitis

<table>
<thead>
<tr>
<th>No</th>
<th>Age/sex</th>
<th>Laterality</th>
<th>Causative organism</th>
<th>Pre</th>
<th>Post</th>
<th>Final clinical outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22/M</td>
<td>L</td>
<td>Staphylococcus epidermidis</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>Staphylococcus aureus</td>
<td>20/400</td>
<td>20/30</td>
<td>Central scar descemetocele</td>
</tr>
<tr>
<td>3</td>
<td>20/F</td>
<td>R</td>
<td>Pseudomonas aeruginosa</td>
<td>CF' 5'</td>
<td>20/60</td>
<td>Central and peripheral corneal scar</td>
</tr>
<tr>
<td>4</td>
<td>38/F</td>
<td>L</td>
<td>Staphylococcus epidermidis</td>
<td>20/20</td>
<td>20/20</td>
<td>Peripheral corneal scar</td>
</tr>
<tr>
<td>5</td>
<td>54/M</td>
<td>L</td>
<td>Staphylococcus aureus</td>
<td>20/30</td>
<td>20/20</td>
<td>Clear cornea</td>
</tr>
<tr>
<td>6</td>
<td>22/F</td>
<td>L</td>
<td>Pseudomonas aeruginosa</td>
<td>20/100</td>
<td>20/30</td>
<td>Central and peripheral corneal scar</td>
</tr>
<tr>
<td>7</td>
<td>43/M</td>
<td>R</td>
<td>Pseudomonas aeruginosa</td>
<td>CF' 4'</td>
<td>20/50</td>
<td>Central corneal scar</td>
</tr>
<tr>
<td>8</td>
<td>42/M</td>
<td>R</td>
<td>Pseudomonas aeruginosa</td>
<td>CF' 6'</td>
<td>20/20</td>
<td>Peripheral corneal scars</td>
</tr>
<tr>
<td>9</td>
<td>22/M</td>
<td>R</td>
<td>Pseudomonas aeruginosa</td>
<td>20/100</td>
<td>20/20</td>
<td>Peripheral corneal scars</td>
</tr>
<tr>
<td>10</td>
<td>27/M</td>
<td>R</td>
<td>Staphylococcus epidermidis</td>
<td>20/100</td>
<td>20/20</td>
<td>Corneal scar</td>
</tr>
<tr>
<td>11</td>
<td>17/F</td>
<td>L</td>
<td>Pseudomonas aeruginosa</td>
<td>HM</td>
<td>20/20</td>
<td>Paracentral corneal scar</td>
</tr>
</tbody>
</table>

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