

Extended wear contact lens related bacterial keratitis

Khalid F Tabbara, Hisham F El-Sheikh, Bassam Aabed

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.

(Br J Ophthalmol 2000;84:327-328)

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 was 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

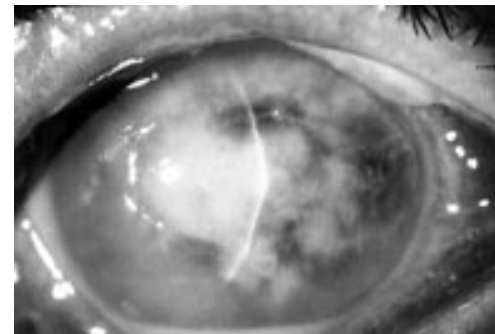


Figure 1 Eye with bacterial keratitis with hypopyon.

The Eye Center and
The Eye Foundation
for Research in
Ophthalmology,
Riyadh, Saudi Arabia
K F Tabbara
H F El-Sheikh
B Aabed

Correspondence to:
K F Tabbara, PO Box
55307, Riyadh 11534,
Saudi Arabia

Accepted for publication
25 October 1999

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

No	Age/ sex	Laterality	Causative organism	BCVA		Final clinical outcome
				Pre	Post	
1	22/M	L	<i>Staphylococcus epidermidis</i>	CF 6'	20/60	Central corneal scar with thinning
2	17/F	R	<i>Pseudomonas aeruginosa</i>	20/400	20/30	Central scar descemetocele
3	20/F	R	<i>Pseudomonas aeruginosa</i>	CF 5'	20/60	Central corneal scar
	38/F	L	<i>Staphylococcus epidermidis</i>	20/20	20/20	Peripheral corneal scar
5	54/M	L	<i>Staphylococcus aureus</i>	20/30	20/20	Clear cornea
6	22/F	L	<i>Pseudomonas aeruginosa</i>	20/100	20/30	Central and peripheral corneal scar
7	43/M	R	<i>Pseudomonas aeruginosa</i>	CF 4'	20/50	Central corneal scar
8	42/M	R	<i>Pseudomonas aeruginosa</i>	CF 6'	20/20	Peripheral corneal scars
		L	<i>Pseudomonas aeruginosa</i>	20/100	20/20	Peripheral scar with vascularisation
9	22/M	R	<i>Pseudomonas aeruginosa</i>	20/200	20/20	Peripheral corneal scars
		L	<i>Pseudomonas aeruginosa</i>	20/100	20/20	
10	27/M	R	<i>Staphylococcus epidermidis</i>	20/100	20/20	Corneal scar
11	17/F	L	<i>Pseudomonas aeruginosa</i>	HM	20/20	Paracentral corneal scar

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

normal tear flushing and from the non-specific humoral immune mechanisms. Microtrauma to the cornea may lead to superficial punctate keratitis.⁵ 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.⁶ 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 combination of ceftazidime 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.⁷ 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.⁸

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.⁹ 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).

The authors do not have any proprietary interest in any of the drugs 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.

This study was supported in part by the Eye Center and the Eye Foundation for Research in Ophthalmology, Riyadh, Saudi Arabia.

- 1 Wong TY, Ng TP, Fong KS, *et al*. Risk factors and clinical outcomes between fungal and bacterial keratitis: a comparative study. *CLAO J* 1997;23:275-81.
- 2 Galentine PG, Cohen EJ, Laibson PR, *et al*. Corneal ulcers associated with contact lens wear. *Arch Ophthalmol* 1984;102:891-4.
- 3 Smith RE, McRae SM. Contact-lenses—convenience and complications. *N Engl J Med* 1989;321:824-6.
- 4 Levy B, McNamara N, Corzine J, *et al*. Prospective trial of daily and extended wear disposable contact lenses. *Cornea* 1997;16:274-6.
- 5 Lawin-Brussel CA, Refojo MF, Leong FL, *et al*. Scanning electron microscopy of the early host inflammatory response in experimental *Pseudomonas* keratitis and contact lens wear. *Cornea* 1995;14:355-9.
- 6 Koch JM, Refojo MF, Hanninen LA, *et al*. Experimental *Pseudomonas aeruginosa* keratitis from extended wear of soft contact lenses. *Arch Ophthalmol* 1990;108:1453-9.
- 7 Schein OD, Glyn RJ, Poggio EC, *et al*. The relative risk of ulcerative keratitis among users of daily-wear and extended-wear soft contact lenses: a case-control study. *N Engl J Med* 1989;321:773-8.
- 8 Dart JK, Badenoch PR. Bacterial adherence to contact lenses. *CLAO J* 1986;12:220-4.
- 9 Vaahtoranta-Lehtonen HH, Lehtonen OP, Peltola O. Contact lens care using chlorhexidine acetate with ethyl-6-O-decanoyl-glycoside: a comparative clinical and bacteriological study. *CLAO J* 1997;23:270-4.