The Use of Bandage Contact Lenses in Adenoviral Keratoconjunctivitis

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Purpose: To evaluate the safety and efficacy of the use of the bandage contact lenses (BCLs) in adenoviral keratoconjunctivitis-related ocular surface problems.

Methods: Fifteen eyes of 15 consecutive patients presenting at the Ankara University Medical Center, Cornea and Contact Lens Service, and requiring BCL use for adenoviral keratoconjunctivitis-related ocular surface problems were enrolled. Visual acuity, slitlamp examination findings, indication and duration of the BCL use, the total follow-up, and any adjuvant medication were recorded. All patients were followed regarding the success of treatment and adverse effects associated with BCL use.

Results: The average age at the time of presentation was 26.8±15.5 years. The major reasons for BCL use included epithelial defect (7 eyes), filamentous keratopathy (5 eyes), epithelial edema (1 eye), and filamentous keratopathy together with epithelial defect (2 eyes). After the first appearance of conjunctivitis symptoms, the mean time to BCL application was 9.0±3.9 days. The mean duration of contact lens wear was 9.9±6.5 days, and the mean follow-up was 26.4±15.8 days. Preservative-free artificial tears and topical antibiotics were used in all cases. Besides, topical ganciclovir 0.15% gel (8 eyes), topical 0.4% povidone–iodine solution (9 eyes), and topical steroids (11 eyes) were used in various combinations. At the end of the follow-up period, the mean visual acuity improved from 0.23±0.32 logMAR units (~0.6 Snellen line) to 0.01±0.04 logMAR units (~1.0 Snellen line) (P=0.042). No sight-threatening complication related to contact lens wear was encountered.

Conclusion: Adjuvant use of BCLs seems to be safe and effective in the treatment of adenoviral keratoconjunctivitis-related ocular surface problems. Close follow-up and prophylactic use of topical antibiotics are rationalistic for prevention of secondary infections.

Key Words: Adenovirus—Conjunctivitis—Keratoconjunctivitis—Adenoviral conjunctivitis—Epidemic keratoconjunctivitis—Contact lens—Bandage contact lens—Epithelial defect—Filamentous keratopathy.

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A adenoviridae are double-stranded DNA viruses with more than 50 different serological subtypes and 6 distinct subgroups. Generally, adenoviridae involve respiratory and gastrointestinal tracts. Also, many serological subtypes were reported to cause ocular adenoviral infections, which are the most common ocular viral infections. In a study, 62% of acute infective conjunctivitis cases being admitted to the emergency department of a tertiary eye clinic were noted to be caused by adenoviridae. Acute adenoviral conjunctivitis may present as acute follicular conjunctivitis, epidemic keratoconjunctivitis or pharyngoconjunctival fever. The clinical form of the disease varies with serotypes: serotypes 8, 19, and 37 cause epidemic keratoconjunctivitis; serotypes 3, 4, and 7 are most frequently responsible for pharyngoconjunctival fever. Although the most common presentation is follicular conjunctivitis, adenoviral infections may also lead to corneal surface problems such as filamentous keratopathy, epithelial defect, and epithelial edema. Corneal involvement aggravates patient discomfort causing photophobia, foreign body sensation, and pain, and may disturb vision because of subepithelial scarring.

Bandage contact lenses (BCL) have proven to be useful in the management of several ocular surface problems such as bullous keratopathy, filamentary keratitis, persistent epithelial defects, recurrent corneal erosions, dry eye, and lamellar corneal lacerations.

The use of contact lenses in the setting of active ocular surface infection is generally contraindicated with the concern of exacerbation of the infectious process. However, adenoviral keratoconjunctivitis is a disabling ocular surface disease, which, even in the early stages, may be accompanied by corneal epithelial defects or filamentous keratopathy leading to severe pain and photophobia.

The aim of this study was to evaluate the safety and efficacy of the use of the BCLs in adenoviral keratoconjunctivitis-related ocular surface problems.

METHODS

Consecutive patients presenting at our clinic with adenoviral keratoconjunctivitis-related ocular surface problems and requiring BCL use were enrolled in the study. Adenoviral conjunctivitis diagnosis was established on specific features such as eyelid edema, follicular reaction, subconjunctival hemorrhages, periauricular lymphadenopathy, subepithelial infiltrates, and pseudomembrane formation.

Uncorrected visual acuity (UCVA) score, slitlamp examination findings, indication for the BCL application, the total follow-up, and adjuvant medication were recorded. All patients were followed regarding the performance of the contact lens, patient satisfaction, improvement in symptoms and slitlamp biomicroscopy findings, and treatment success. Additionally, any contact lens–related complication such as secondary bacterial keratitis, sterile infiltrates, mucin balls, and peripheral corneal neovascularization were noted.

In all patients, a silicone hydrogel extended-wear BCL (Balafilcon A, PureVision; Bausch & Lomb, Rochester, NY) with a Dk/t of 101 was placed on the involved eye. The patients were also placed on
TABLE 1. Clinical Follow-Up in Patients With Adenoviral Keratoconjunctivitis Fit with the Bandage Contact Lens (BCL)

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Eye</th>
<th>Indication for CL</th>
<th>Duration of Symptoms Before BCL Application, d</th>
<th>Duration of BCL Wear, d</th>
<th>Pre-BCL UCVA (Snellen Line)</th>
<th>Post-BCL UCVA (Snellen Line)</th>
<th>Total Follow-Up, d</th>
<th>Complication</th>
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<tbody>
<tr>
<td>1</td>
<td>41</td>
<td>OS</td>
<td>Epithelial defect</td>
<td>9</td>
<td>22</td>
<td>20/20</td>
<td>20/20</td>
<td>49</td>
<td>None</td>
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<tr>
<td>2</td>
<td>40</td>
<td>OD</td>
<td>Filamentous keratopathy and epithelial defect</td>
<td>7</td>
<td>7</td>
<td>FFM</td>
<td>FFM</td>
<td>18</td>
<td>None</td>
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<td>OS</td>
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<td>11</td>
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<td>9</td>
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<td>8*</td>
<td>52</td>
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<td>20/20</td>
<td>38</td>
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<td>21</td>
<td>OD</td>
<td>Filamentous keratopathy</td>
<td>7</td>
<td>8</td>
<td>20/20</td>
<td>20/20</td>
<td>15</td>
<td>None</td>
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</table>

*The patient also experienced map-dot-fingerprint dystrophy.

FFM, follow fixation maintenance; UCVA, uncorrected visual acuity.

topical antibiotics twice daily as a prophylaxis against secondary infection. In the epithelial defect group, the patients were followed daily until closure of the epithelial defect. The patients with epithelial edema or filamentous keratopathy were seen the next day and every 3 days, thereafter, as long as the BCL was in place. The treatment goals were pain relief and corneal surface healing.

In eyes with filamentous keratopathy, the BCL was not removed before 7 days to ascertain basal membrane healing, whereas in eyes with epithelial defects, the BCL was removed after closure of the epithelial defect and complete healing of the epithelial irregularities. Among eyes with epithelial defects, the BCL was left in place in only 1 patient for more than 20 days because the patient could not come back for a follow-up examination. This patient was the only one who could not to be seen at regular intervals after day-3 examination.

Patients were instructed to grade severity of pain before and after BCL application at follow-up examinations, using a numeric pain rating scale (0 = no pain; 1 = discomfort; 2 = light pain; 3 = moderate pain; 4 = intense pain; and 5 = severe pain).

All analyses were conducted with SPSS version 15 for Windows (IBM SPSS version 15, IBM, NY). Wilcoxon Signed-Rank Test was performed to analyze the difference in the mean logarithm of the minimum angle of resolution (logMAR), UCVA before BCL application and at the last follow-up examination. The confidence interval (CI) of the infection rate was calculated with binomial (Clopper–Pearson) “exact” method.

RESULTS

Twenty-two eyes of 15 patients with ocular surface problems related to adenoviral keratoconjunctivitis were fit with BCL. Eight patients with unilateral involvement and randomly selected 1 eye of 7 patients with bilateral involvement were included in the study. There were 11 men and 4 women. The mean age of the patients was 26.8 ± 15.5 years (range, 4–52 years) (Table 1). After the first appearance of the symptoms, the mean time to BCL application was 9.0 ± 3.9 days (range, 2–17 days). The mean duration of contact lens wear was 9.9 ± 6.5 days (range, 3–22 days), and the mean follow-up was 26.4 ± 15.8 days (range, 11–58 days).

The indications for BCL fit included epithelial defect (7 eyes), filamentous keratopathy (5 eyes), epithelial edema (1 eye), and filamentous keratopathy together with an epithelial defect (2 eyes) (Figs. 1–4). All patients reported pain and photophobia before BCL application. Pain score questionnaire could not be performed in two patients who were 4 and 6 years old. In the rest of the patients, the pain score on admission was 4 or 5. All patients experienced immediate relief of their symptoms the next day after contact lens fit (score 0–1).

Preservative-free artificial tears and topical antibiotics were used in all cases. Besides, topical ganciclovir 0.15% gel (8 eyes), topical 0.4% povidone–iodine solution (9 eyes), and topical steroids (11 eyes) were used in various combinations.

FIG. 1. Slitlamp biomicroscopy photographs of a 22-year-old patient with an epithelial defect on the right eye due to adenoviral keratoconjunctivitis. (A) Shows 2.5x2 mm epithelial defect before contact lens fit. (B) Shows the same eye 1 day after contact lens fit.
Excluding 1 patient (patient 1) who could not return for daily follow-up examinations, in 6 patients with corneal epithelial defects, time to complete closure of epithelial defect was 2 days in 50.0%, 3 days 33.3%, and 4 days in 16.7%. The mean time to complete epithelization was 2.7±0.8 days. In these 6 patient eyes, the mean duration of contact lens wear was 4.7±2.0 days. In all patient eyes with filamentous keratopathy (n=7, with or without epithelial defect), the filaments disappeared the next day after BCL fit. However, the BCL was left in place longer to ascertain basal membrane healing, and in those patient eyes, the mean duration of the BCL wear was 11.1±4.7 days.

Uncorrected visual acuity was evaluated in all cases (except for a 4-year-old child). The mean UCVA improved from 0.23±0.32 logMAR units (~0.6 Snellen line) to 0.01±0.04 logMAR units (~1.0 Snellen line) (P=0.042). Among 9 (64.3%) of the 14 eyes for which UCVA could be measured, the UCVA was 20/20 or 20/25, and no improvement was measured after BCL wear. Among the 5 eyes (35.7%) with UCVA worse than 20/25 before placement of the BCL, all eyes obtained 20/20 after BCL removal.

No sight-threatening and/or unwanted effects due to contact lens wear were encountered. During BCL use, no patient eye (0.0%) developed secondary infection (95% CI: 0.0%–21.8%). No patient eye lost any vision because of contact lens wear.

**DISCUSSION**

This is the first case series to report the therapeutic use of silicon hydrogel BCL in adenovirus-related corneal surface problems. The main causes of the BCL applications were epithelial defect, filamentous keratopathy, and epithelial edema or any combination thereof. The treatment goals of pain relief and promotion of epithelial healing were successfully achieved in all patients at the end of the follow-up period.

Bandage contact lenses have a variety of therapeutic indications such as bullous keratopathy, filamentary keratitis, persistent epithelial defects, epithelial erosions, abrasions, postoperative care of corneal transplantation and laser refractive surgery, dry eye, and trauma in daily practice.8–12 Silicone hydrogel contact lenses are particularly preferred in therapeutic indications because of their high oxygen permeability, and therefore, suitability for extended wear. Bandage contact lenses cover the exposed corneal nerve endings and protect the cornea from frictional forces of the lids providing immediate relief of pain. However, the post-lens tear film acts as a uniform interface under which the epithelial cells can migrate easily, thus the epithelial defects or filamentous keratopathy heal. Patching may also be a management strategy to prevent pain in epithelial defects; however, this approach interferes with binocular vision and is uncomfortable for the patient compared with BCL. In our study, the contact lenses were well tolerated, and pain relief was almost immediate, right after contact lens fit.

The typical corneal involvement due to adenovirus infections is diffuse epithelial keratopathy, which is followed by the appearance of subepithelial corneal infiltrates persisting for months because of an immune reaction to viral antigens.13 Mostly, the ocular surface disease is self-limited and does not require BCL application. However, sometimes integrity of the corneal epithelium is severely disturbed, epithelial defects or filaments develop leading to intense pain. Moreover, mostly the involvement is bilateral, increasing the morbidity of the situation.

To our knowledge, this is the first large-scale study, reporting the use of BCL in the management of various ocular surface problems.
secondary to adenoviral infections in the literature. Generally, the risk of secondary infection is the main concern about BCL use in adenoviral keratoconjunctivitis. Corneal superinfections in acute viral conjunctivitis are not uncommon. Moreover, it is well documented that extended wear of contact lenses is associated with a higher risk of microbial keratitis. Nevertheless, we did not encounter any microbial keratitis or contact lens-related sterile infiltrates in any patient eye in our study. However, the upper limit of the CI of the infection rate was 21.8%, so ophthalmologist should always be cautious about the risk of secondary infection during the use of BCL. Saini et al. treated 74 patients with therapeutic silicone hydrogel contact lenses for ocular surface disease and reported microbial keratitis in 2.9% of patient eyes. In another study, where lotrafilcon A contact lenses were used for therapeutic purposes, Kanpolat and Ucakhan reported no case of microbial keratitis. We believe that, in the setting of adenoviral keratoconjunctivitis, the use of prophylactic antibiotics and close follow-up may help prevent development of secondary infections.

In conclusion, the use of BCL in the treatment of adenoviral keratoconjunctivitis-related ocular surface problems seems to be safe and effective in alleviation of pain and improvement of ocular surface problems such as epithelial defects and filamentous keratopathy with no unwanted side effects. The prophylactic use of topical antibiotics and close monitoring of the patients are beneficial to prevent secondary infections.

REFERENCES