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Corneal Ulcer-Infiltrate Associated with Soft Contact Lens Use following Penetrating Keratoplasty*

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ABSTRACT

A review of 100 patients who underwent penetrating keratoplasty revealed 47 who required therapeutic soft contact lenses in the early postoperative period. Twelve corneal ulcer-infiltrates, 11 of which were culture positive, occurred during soft contact lens wear (23% incidence of this complication in contact lens fitted eyes). The most common offending organism was coagulase-negative staphylococcus. The only statistically significant risk factor for infection if a lens was used was the presence of a persistent epithelial defect ($p = 0.03$). Factors which could not be statistically correlated with corneal ulcer-infiltrate included keratoconjunctivitis sicca, the type of contact lens, the method of donor cornea preservation, lens hygiene, antibiotic and steroid usage, the presence of blepharitis, preoperative bacterial keratitis, and the history of a previously failed penetrating keratoplasty.

INTRODUCTION

Soft contact lenses have been used following penetrating keratoplasty for comfort, visual acuity, the treatment and prevention of persistent epithelial defects, and to promote epithelialization of the graft. This has been reported to be relatively safe, with few complications noted.[1,2] It was our clinical impression that our rate of complications was significant. For this reason a retrospective study was undertaken to evaluate the incidence of complications associated with therapeutic soft lens use following keratoplasty.

MATERIALS AND METHODS

We performed a retrospective analysis of the records of 102 consecutive unselected patients who underwent penetrating keratoplasty at the University of Minnesota from February 1980 through April 1981. Two patients were lost to follow-up, leaving 100 patients. The minimum follow-up was 5 months, with a range of 5–21 months. The use of a contact lens, indications for its use, management of complications, and the associated diagnosis (dry eyes, blepharitis, etc.) were noted. The presence of a dry eye was determined either by the recorded assessment of dry eye or the use of frequent artificial tears. The presence of blepharitis was determined by the clinician's assessment. A Chi square with Yates correction and an unpaired two-tailed Student t-test were used for statistical analysis.

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RESULTS

Forty-seven of 100 eyes were treated with therapeutic extended wear soft contact lenses postoperatively. The indications for penetrating keratoplasty for these patients as well as for those who did not receive a soft contact lens are displayed in Table 1. Eleven of these 47 eyes developed corneal ulcers or infiltrates while wearing the soft contact lens. Their preoperative diagnoses are also noted in Table 1. One eye developed a second ulcer after an extended wear soft contact lens was refitted. Only one of the 53 patients who had never worn a soft contact lens developed an ulcer or infiltrate.

The main indication for use of a therapeutic lens was persistent epithelial defect, 33 eyes. (A persistent epithelial defect was defined as failure to epithelialize the graft after 5 days.) Other indications included comfort, 10 eyes; wound slippage, three eyes; and visual rehabilitation, two eyes. The lens was placed an average of 5 days postoperatively in the group which developed ulcers and 5.5 days postoperatively in the group which did not.

The ulcers occurred as early as 10 days and as late as 20 weeks following initiation of soft contact lens therapy. On the average they occurred 8.7 weeks following placement of the soft contact lens. Eight of the infections were corneal ulcers or infiltrates (Fig. 1), two were stitch abscesses associated with wound dehiscence (Fig. 2), and one eye presented with wound descemetocele and endophthalmitis which led to enucleation.

TABLE 1
Preoperative Diagnosis

	Number of Patients	Number of Patients Using Soft Contact Lens	Ulcers Associated with Soft Lens Use
Aphakic bullous keratopathy	25	13	3
Keratoconus	19	7	0
Fuchs' dystrophy	15	7	1
Herpes simplex	11	5	2
Interstitial keratitis	8	2	0
Stromal dystrophy	6	3	0
Chemical burn	5	5	3
Trauma	4	2	0
Trachoma	2	2	1
Perforation	1	1	1
Miscellaneous	4	0	0
Total	100	47	11

Figure 1. Corneal graft showing ulceration and stromal infiltration.

All but two patients were on antibiotics, and all but one patient on topical steroids. The majority of patients had topical steroids administered 4 times/day. The frequency of administration within the soft contact lens wearers was not statistically different between the group which developed ulcers and that which did not.

The most common organism isolated on culture was coagulase negative staphylococcus, occurring in eight of 12 ulcers. In one case, a mixed infection of coagulase negative staphylococcus and streptococcus was present. Bacterial cultures from the three remaining ulcers were reported as staphylococcus aureus, proprionobacterium acnes, and no growth.

Of the six ulcers in which sensitivities were available, three organisms were resistant to the antibiotic the patient was receiving and one organism was intermediately sensitive (Table 2). The remaining patients were on antibiotics to which the organism was sensitive.

The frequency of lens removal was also evaluated. The group which developed ulcers had the lens removed and replaced approximately once

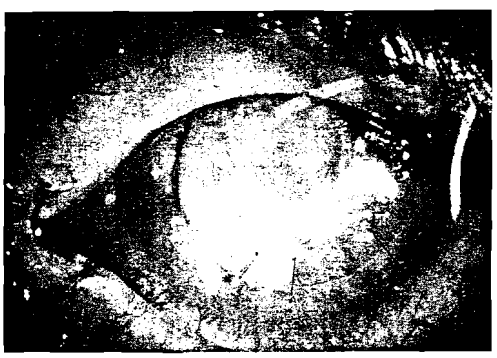

Figure 2. Corneal graft with suture abscess and wound dehiscence.

TABLE 2
Ulcer Organism Sensitivities

Patient	Antibiotic	Sensitive	Inter-mediate	Resistant
1	G	NA		NA
2	G	NA		NA
3	G	NA		NA
4	G	K,S,E,CL,T	M	G,C,P
5	—	P		NA
6	C	NA		NA
7	C	C,K,S,M	T	P,G,CL
8	G	NA		NA
9	G	K,S	M	G,C,P,E,CL,T
10	C	NA		NA
11	G	K,S		G,C,CL,E,M,P,T
12	G	K,S,T,CL	G	P,E,M

NA = not available; G = gentamycin; C = chloramphenicol; K = cephalosporin; S = sulfa; P = penicillin; CL = clindamycin; T = tetracycline; M = methicillin; E = erythromycin.

every 2 weeks (0.6 times/week), while the group without ulcer complications had the lens handled an average of once a week (1.0/week). Two patients, who did not develop ulcers, cleaned their lenses daily. They were extremely different from the rest of the 53 patients and these two were therefore not included in the statistical analysis. They handled their lenses 546 and 210 times. The average duration of lens wear was 8.75 weeks for the group with ulcers and 11.0 weeks for the group without ulcers. The average time of placement for the lens was 5 days postoperatively for both groups. The type of contact lens used was also analyzed (Table 3). Bandage lenses included Bausch and Lomb plano T^R, $U\text{-}3^R$, $O\ r^R$, and $C\ 3^R$ lenses. The method of corneal preservation for the donor tissue used in transplantation is also displayed in Table 3. (The high incidence of ulcers in the fresh tissue group is biased by the tendency to use fresh tissue in eyes with the most severe ocular surface disease.)

Finally, various external diseases which place bacteria in close contact with the contact lens and cornea, decrease the natural defenses of the eye against bacteria, or imply an immunologically compromised eye, were evaluated as risk factors. These included dry eyes, persistent epithelial defect, history of failed penetrating keratoplasty, blepharitis, and preoperative bacterial keratitis (Table 3.)

TABLE 3
Risk Factor Analysis Among Patients Wearing Soft Contact Lenses

Risk Factor	Number of Ulcer-Infiltrates Occurring in Total Number of Patients with Risk Factor (Percent = Incidence Rate)	p-Value
Bandage lens wear	9/39 (23%)	—
Aphakic lens wear	3/9 (33%)	NS
Organ culture cornea	8/36 (22%)	—
Fresh cornea	3/7 (43%)	—
MK cornea	0/3 (0%)	NS
Dry eyes	11/36 (31%)	—
No dry eyes	0/11 (0%)	0.09
Persistent epithelial defect	11/33 (33%)	—
No epithelial defect	0/15 (0%)	0.03
History of failed PK	5/10 (50%)	—
No history of failed PK	6/37 (16%)	0.08
Blepharitis	2/5 (40%)	—
No blepharitis	9/42 (21%)	NS
Preop bacterial keratitis	2/4 (50%)	—
No preop bacterial keratitis	9/43 (21%)	NS

PK = penetrating keratoplasty.

DISCUSSION

This review of 47 patients who were treated with soft contact lenses following penetrating keratoplasty revealed that 23% developed corneal ulcers or infiltrates. Since this is a retrospective analysis, inadequacies are inherently present. The presence of risk factors could be determined only by the clinician's subjective evaluation, and only the data recorded could be assessed. Given these limitations, various factors were analyzed to determine possible trends.

The patients were not controlled by age, indication for penetrating keratoplasty, and the presence of pre-existing diseases (dry eyes, etc.) in determining which patients received soft contact lenses. The incidence of corneal ulceration and infiltration in a matched group without any soft lens use is unavailable. Therefore, from this data the contact lens itself cannot be statistically defined as a risk factor for infection.

The presence of a persistent epithelial defect was statistically associated with an increased risk of corneal ulceration or infiltration. Few bacteria are able to penetrate an intact corneal epithelium and the presence of an epithelial defect appears to place the cornea at greater risk for infection.

The presence of dry eyes was not a statistically significant risk factor ($p = 0.09$) by itself in this analysis. The criteria for diagnosis of dry eyes is