Infections after PRK Could Have a Happy Ending: A Series of Three Cases

Infektionen nach PRK mit „Happy End“: 3 Fallberichte

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Schlüsselwörter
- fotorefraktive Keratektomie
- PRK
- Komplikation
- infektiöse Keratitis
- Verbandskontaktlinse

Key words
- photorefractive keratectomy
- PRK
- complication
- infectious keratitis
- bandage contact lens

Zusammenfassung

Hintergrund: Die infektiöse Keratitis nach PRK bleibt eine seltene, aber gefürchtete Komplikation.
Anamnese und Befund: Die Krankengeschichten von 3 männlichen Patienten, welche nach komplikationsloser PRK wegen Myopie und Astigmatismus, eine infektiöse Keratitis präsentierten, wurden retrospektive aufgearbeitet. Die PRK war mit einem Wavelight Allegretto Excimer Laser durchgeführt worden. Die postoperative Behandlung war wie folgt: Verbandskontaktlinse während 5 Tagen, topische Antibiotika, Ketorolac und künstliche Tränen.
Therapie und Verlauf: Die Keratitis präsentierte sich 2 – 4 Tage postoperativ. In einem Fall war die Kultur negativ (Fall 1). In je einem Fall war sie positiv für Streptococcus pneumoniae (Fall 2) und Staphylococcus aureus (Fall 3). Der bestmögliche, mit Brillen korrigierte Visus nach Behandlung betrug 1,0 (Fall 1), 0,9 (Fall 2) und 0,3 (0,8 mit dem stenopischen Loch) (Fall 3).
Schlussfolgerungen: Postoperative Breitbandantibiotika sind nach PRK unumgänglich, um eine infektiöse Keratits zu verhindern. Leider sind aber resistente Keime immer häufiger. Der postoperative Gebrauch einer Verbandskontaktlinse ist ein Risikofaktor für eine Infektion. Basierend auf unseren Fallberichten schlagen wir vor, den postoperativen Gebrauch einer Verbandskontaktlinse auf 2 Tage zu limitieren, auch wenn die Hornhaut noch nicht verheilt ist.

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Abstract

Background: Infectious keratitis after PRK remains a rare but potentially devastating complication.
History and Signs: Medical records of 3 male patients with infectious keratitis after uneventful PRK for myopia and astigmatism were reviewed retrospectively. PRK was performed using the Wavelight Allegretto excimer laser. Postoperative care included a bandage contact lens (BCL) for 5 days, topical antibiotics, ketorolac, and artificial tears.
Therapy and Outcome: Keratitis presented 2 – 4 days postoperatively. In one case, each culture was negative (case 1), and was positive for Streptococcus pneumoniae (case 2) and Staphylococcus aureus (case 3). Final BSCVA (best spectacle corrected visual acuity) after intensive antibiotic treatment and removal of BCL were 1.0 (case 1), 0.9 (case 2) and 0.3 correctable to 0.8 with pinhole (case 3).
Conclusions: Postoperative broad-spectrum antibiotics are mandatory after PRK to prevent infectious keratitis. However, resistant organisms are more and more common. The presence of a bandage soft contact lens after surgery is an unfavourable element that may increase risk of infection. Based on our case series, we suggest limiting soft contact lens wear during the two postoperative days even if the corneal ulceration is not healed.

Background

Although laser in situ keratomileusis (LASIK) has become the most prevalent form of refractive surgery, photorefractive keratectomy (PRK) remains a common procedure. Infectious keratitis is one of the major vision-threatening complications of PRK. The purpose of this study is to report 3 cases of infectious keratitis after PRK, to elucidate risk factors and propose a modification in post-operative care that may reduce the risk of this potentially devastating complication.

Fig. 1 Patient 1: **a** 7 days after PRK; **b** 2 months after PRK; **c** 3,5 months after PRK.

Fig. 2 Patient 2: **a** 4 days after PRK; **b** 10 days after PRK; **c** 11 months after PRK.

Table 1 Summary of cases of infectious keratitis after PRK.

patient	day of presentation	prophylactic treatment	culture	topical treatment
1	4	ofloxacin	negative	cefazoline/ceftazidime
2	4	ofloxacin	Streptococcus pneumoniae	cefazoline/ofloxacin, chloramphenicol
3	3	polymyxin B-neomycin	Staphylococcus aureus	cefazoline/ofloxacin

Materials and Methods

The charts of three patients who developed infectious keratitis after PRK were retrospectively analysed. The following data were obtained: pre and post-operative refraction values, initial postoperative medication, time to keratitis, culture results, treatment and course, length of follow-up, best spectacle corrected visual acuity (BSCVA) and possible risk factors.

Results

All patients were given a therapeutic bandage contact lens (BCL) (Night & Day, CIBA Vision Corporation, Duluth, GA 30097 USA; material: lotrafilcon A, water content: 24%, 157 Dk/t) for 5 days and prophylactic topical antibiotics 4 times daily (ofloxacin in cases 1 and 2, polymyxin B-neomycin in case 3) in addition to ketorolac and artificial tears. The three cases are summarized in **Table 1** and discussed in more detail below.

Case 1

A 43-year-old male patient with well-controlled non-insulin dependent diabetes underwent uneventful PRK for myopia and astigmatism (−1.25 −0.5×100°) on his right eye. Preoperative BSCVA was 1.2. After PRK, he was placed on ofloxacin drops, ketorolac and artificial tears. On postoperative day 2, routine examination revealed a small, peripheral, stromal infiltrate (**Fig. 1**). A smear for culture was done. Despite intensified treatment with ofloxacin, the stromal infiltrate enlarged and new more central lesions were observed by day 4. No cell/flare was seen in the anterior chamber and vision was 0.1. At that moment BCL was removed, ketorolac stopped, and ofloxacin substituted by ceftazidime and cefazoline on an hourly basis.

At day 5, clinical picture was worse and the patient was hospitalised. Cefazoline and ceftazidime drops were continued hourly. The culture and smear came back negative. Finally the epithelial defect healed and the infiltrate diminished progressively. Topical corticosteroids were used in order to diminish cicatrisation. About 10 months after surgery, BSCVA was 1.0 (−0.25 −1.25×0°) (**Fig. 1**).

Case 2

A 34-year-old male patient had uneventful PRK for myopia and astigmatism (−2.5 −0.75×180°) on his left eye. Medical history included asthma treated with sporadically inhaled corticosteroids. After PRK, he was placed on ofloxacin drops, ketorolac, and artificial tears. On postoperative day 4, he presented with a central epithelial defect, a 2-mm paracentral infiltrate with diffuse corneal edema, an anterior uveitis and a small hypopyon (**Fig. 2**). The patient was hospitalised and intensive topical

Fig. 3 Patient 3: **a** 4 days after PRK; **b** 11 days after PRK; **c** 8 months after PRK.

treatment with cefazoline/ofloxacin was initiated. Ketorolac was discontinued. As corneal culture came back positive for Streptococcus pneumonia resistant to ofloxacin, this antibiotic was discontinued and replaced by chloramphenicol. Additionally the patient received intravenous ceftriaxone during the hospitalisation and a topical corticosteroid treatment was started on postoperative day 8. Evolution with this treatment was favourable. Four and a half months postoperatively his BSCVA was 0.9 (+ 0.75 – 1 × 175°) (**Fig. 2**).

Case 3

A 30-year-old male patient had uneventful PRK for myopia and astigmatism (– 2.5 – 0.5 × 30°) on his left eye. His medical history was unremarkable except that one week prior to PRK he received vaccination against yellow fever and hepatitis A. After PRK, he was placed on polymyxin B-neomycin drops and ketorolac. On postoperative day 2, two small peripheral infiltrates were noted. Despite increasing the frequency of ofloxacin drops, the infiltrates became larger by day 3 (**Fig. 3**). No inflammation was noted in the anterior chamber. Smear and culture were positive for Staphylococcus aureus resistant to polymyxin B. The patient was hospitalised and received intensive local treatment with cefazoline and ofloxacin with favourable evolution. Topical corticosteroids 5 times per day were introduced at day 6. About 9 months postoperatively, his BSCVA was 0.3 correctable to 0.8 with stenopic hole (**Fig. 3**).

Discussion

In spite of a large epithelial defect after PRK, infectious keratitis remains rare. The risk has been reported between 0.01% and 0.8% [1 – 3]. It occurs usually within the first postoperative week [2, 4, 5]. Gram-positive organisms are the most common pathogens [1, 2, 6]. Our data confirm these findings.

During the postoperative days, tobramycin and gentamycin as well as polymyxin B-trimethoprim are not a treatment of choice, because of their poor activity against Streptococcus species [6]. Fluoroquinolones seem to be a good choice for postoperative prophylactic treatment, as they offer a broad-spectrum coverage against Gram-positive and Gram-negative organisms with excellent tissue penetration and solubility [7] but as illustrated by our second case, resistance is possible. Staphylococcus and Streptococcus species show a growing antibiotic resistance to fluoroquinolones and MRSA has become a more and more prevalent problem [5]. Health-care workers need special attention, as they are at increased risk for severe infectious keratitis including more resistant organisms [6]. We stopped the use of polymyxin B-neomycin after the incidence described in case 3 and increased the frequency of instillation of ofloxacin from 4 to 6 times daily.

Predisposing risk factors for infectious keratitis include breakdown of the barrier function of the corneal epithelium and the use of a BCL on an extended-wear basis, especially when manipulated by patients with poor contact lens hygiene [6]. Its use has been questioned [4] but is commonly accepted during the first 5 postoperative days in order to reduce postoperative discomfort and encourage rapid wound healing. All our patients had received a BCL and to our knowledge none of these patients manipulated the contact lens by themselves, but accidental manipulation, as described by Donnenfeld et al., is possible [6].

Poor treatment compliance during the postoperative days could also be an important risk factor to infection after PRK.

In our case series, infiltrates appeared between post-op days 2 – 4. After the last case of infectious keratitis after PRK in our clinic (case 2) which occurred in April 2008, we have limited the use of BCL to 2 days postoperatively even in the presence of an epithelial defect. Although patients may experience more pain and epithelial healing could be slowed down, we believe that this measure is useful to reduce the infectious risk significantly and is, if clear information is given, accepted by the patient.

We are aware that BCLs are used widely and that our case series cannot demonstrate the necessity to remove it 2 days after surgery to prevent infection after PRK; only a prospective study comparing a group with BCL for 2 days with a group with BCL for 4 days may give us the final answer.

Despite the potentially devastating clinical situation after infectious keratitis, our patients had a rather favourable recovery mainly due to careful follow-up, rapid detection of keratitis, prompt removal of BCL, hospitalisation to ensure compliance, appropriate modification of antibiotics using culture results, and judicious use of high doses of local corticosteroid therapy to reduce late scar formation.

In conclusion, infectious corneal ulceration is an uncommon but sight-threatening PRK complication. As bandage contact lens wear is a major risk factor, we propose limiting its use to the first 2 postoperative days even if the epithelial defect is not healed yet. Since we have limited the BCL wear to 2 days, no other postoperative infectious keratitis has been reported in our clinic. However, this strategy exposes our patients to experience more pain during days 3 to 4 after surgery.

Conflicts of Interest: None

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