

Case Report

Corneal Perforation Self-Healing with an Iris Plug in the Cornea

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Keywords

Corneal ulcer · Iris plug · AS-OCT

Abstract

Keratitis treatment outcome is usually dependent on the targeted treatment of the cause. We want to present a small corneal ulcer of unidentified origin that progressed into corneal melting and resulted in corneal perforation. The patient had a widespread antibacterial and fungal treatment and an ophthalmological follow-up with slit-lamp examination and AS-OCT. The spontaneous iris plug in the cornea helped to solve the anterior chamber collapse and made permanent anatomical changes in the anterior part. A 45-week follow-up found a hyperdense stromal corneal scar with 556- μ m-wide stable iris-cornea contact and BCVA of 0.8. As a result, an iris plug in the cornea after corneal perforation can have a positive effect on healing and lead to good visual outcome.

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Introduction

Severe corneal infection typically starts as keratitis that can develop into a corneal ulcer [1]. To have a targeted treatment, corneal scraping and infectious organism identification must be done [2]. Unidentified origin of the corneal infection makes it more challenging to treat and can lead to corneal blindness. In a negative ulcer dynamic with corneal melting and subsequent perforation, urgent intervention to restore normal eye anatomy is required.

Case Report

The 29-year-old Caucasian woman with mild pain, photophobia, and decreased vision in the right eye presented to the emergency department. The patient had been observed in the outpatient department because of keratitis and treated with a combination of topical corticosteroids and antibiotics for 4 weeks but showed no clinical improvement. This young woman is a soft contact lens daily user and has no systemic diseases. The patient mentioned that there had been diagnostic corneal scraping, but no pathogenic cause had been identified.

On presentation day, her best-corrected visual acuity (BCVA) in the right eye was 0.4 (Snellen chart). Slit-lamp examination revealed conjunctival injection and paracentral, round corneal opacification with very mild dot-like fluorescein staining. Anterior segment optical coherence tomography (AS-OCT) showed a 135- μm -deep and 184- μm -wide corneal defect with a 167- μm -deep infiltration zone (Fig. 1). The corneal thickness in the affected area was 600 μm and filamental endothelial sediment was noticeable. Corneal scraping and contact lens case were sent for microbiological investigation. Laboratory investigation revealed complete blood count, blood biochemical parameters, and erythrocyte sedimentation rate within normal ranges. In addition, serological results showed negative test results for rheumatoid factor, anti-cyclic citrullinated protein, and anti-neutrophil cytoplasmic antibody screen. C-reactive protein level was normal.

Topical treatment of hourly doses of 0.5% levofloxacin, 0.01% cyclopentolate twice a day and tobramycin ointment 4 times per day was administered. Additional systemic treatment of cefazolin and fluconazole (4 mg/kg) was prescribed.

Repeated corneal scraping was performed on day 6. The microbiology laboratory did not identify any aerobic/anaerobic bacterial or fungal culture growth on either of the samples. Because of slowly progressing corneal melting and no improvement, on day 14 fluconazole solution was changed to peroral voriconazole 200 mg twice a day.

On day 21 spontaneous corneal perforation occurred. AS-OCT revealed a narrow perforation channel to the collapsed anterior chamber. To resume anterior chamber volume, the eye was secured with a soft contact lens. On day 23 the anterior chamber was at normal volume, but the iris was stuck in the perforation site. Hyperdense paracentral structure at the perforation place was visualized with AS-OCT. Slowly, conjunctival reaction, pain, and discomfort reduced. On day 29 the contact lens was removed and sent for microbiological examination. The laboratory did not identify any aerobic/anaerobic bacterial or fungal culture growth.

On week 5 the slit-lamp examination showed iris connection with corneal tissues and radial iris vessel ingrown in the cornea from the iris plug area. The anterior chamber depth was stable. On week 11 under hyperdense stroma was 556- μm -wide stable iris-cornea contact (Fig. 2). The patient had no ocular complaints and BCVA was 0.7. Intraocular pressure was 18 mm Hg (rebound tonometry).

Systemic tablet voriconazole treatment took 6 weeks but systemic cefazolin took only 2 weeks in total. Topical treatment consisted of 23 weeks of 0.5% levofloxacin, 0.01% cyclopentolate twice a day, and tobramycin ointment 4 times per day.

On week 45 the patient had no complaints. Slit-lamp examination revealed a clear, bright, and smooth corneal surface with paracentral sharp edge opacification. Empty blood vessels from the iris surrounded corneal opacification. Due to the iris plug, the pupil was mildly reacting to the light, but it was round and central. The anterior chamber had an irregular angle from 40 to 20° (Fig. 3). BCVA was 0.8 with correction of $-2.25 \text{ Dsph } -1.25 \text{ Dcyl } \times 15$. As this correction was not compatible with comfort for binocular vision, the patient does not use astigmatism correction. Still, with correction of -2.5 Dsph monocular visual acuity was 0.7.

Intraocular pressure was 19 mm Hg. AS-OCT showed a paracentral hyperdense stromal corneal scar that was 3,404- μm -wide at the endothelial side but 1,334- μm -wide at the epithelial side. There was also 556- μm -wide stable iris-cornea contact.

Discussion

We present a complicated and challenging keratitis case with secondary anatomical anterior chamber changes yet with good visual outcome.

The first challenge was unknown initial objective clinical findings and their dynamic. This did not allow critical evaluation of keratitis progression and possible causes. In this case report there was only a patient statement of negative initial corneal scraping examination and subjective symptom worsening. This can lead to misinterpretation of objective findings and possible complications.

A common challenge in keratitis treatment is an unknown infectious agent. Even repeated corneal scraping and contact lens container examination did not give a laboratorial answer in this case. As Thomas et al. [3] found in their research, certain clinical findings can suggest a specific pathogen, and it can be very challenging to distinguish fungal keratitis as it is often confused with other causes of inflammatory keratitis. In this case, due to objective findings of white colour, raised profile, dry structure, filamental endothelial sediment, and clinical worsening on steroid treatment, the patient was prescribed additional antifungal medication. Herretes et al. [4] summarized possible topical corticosteroid therapy negative effects, still reminding that it can be a potential negative outcome of the progressive infection. It should be noted that central ulceration is a risk factor for poor outcome and possible perforation. Until now authors have not been sure whether in this case it was an initial infectious agent or a complication due to possible adverse effect related to adjunctive steroid treatment.

Unexpected corneal perforation was an urgent issue. Due to lack of material, surgical management was not possible. Loya-Garcia et al. [5] provide research advice to solve this kind of emergency as soon as possible, in order to delay further necessary procedures and earn some time. As the size of perforation was small, a simple bandage contact lens was sufficient to reconstitute the globe. Unexpectedly, no further manipulations were necessary for recovery.

Despite these challenges, the patient's cornea healed and had a good vision recovery. The authors believe that a strong iris plug into the cornea resulted in noticeable healing improvement. The iris plug is a mechanical closure for corneal ulcer and secures the anterior globe structure. Kobayashi et al. [6] presented a 2-week follow-up of iris incarceration as an additional procedure to surgical management of corneal ulcers. After manipulation the patient showed good visual outcome as a result of minimal residual scarring and related astigmatism. The same minimal scarring was noticeable with a spontaneous iris plug. However, the authors believe that the iris plays more than just a mechanical closure role in corneal healing. An iris plug gives blood supply to the avascular paracentral part of the cornea. This local blood vessel ingrown from the iris leads to rapid healing of the cornea. The authors believe that in this case removing the iris plug at its formation stage would not result in good visual acuity. As the 45-week follow up reveals, blood vessels become inactive after corneal healing. Apparently, with this patient the corneal ulcer healed, and scar formation pressed blood vessels from the iris causing their closure, and they became inactive in the cornea.

In conclusion, the authors would like to point out that this is an unpredictable case of an iris plug with mild local iris blood vessel ingrown in the cornea. This anatomical change had a positive effect on corneal healing.

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Statement of Ethics

The authors state that this case report was conducted according to good clinical practice and have no ethical conflicts to disclose. The patient provided written informed consent for the publication of this case report.

Conflict of Interest Statement

The authors have no financial disclosures and no commercial or proprietary interest in any materials discussed in this report.

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Author Contributions

Liene Muceniece: data collection, patient follow-up, and manuscript preparation. Inesa Markevica: patient follow-up and data collection, Guna Laganovska: data and manuscript review.

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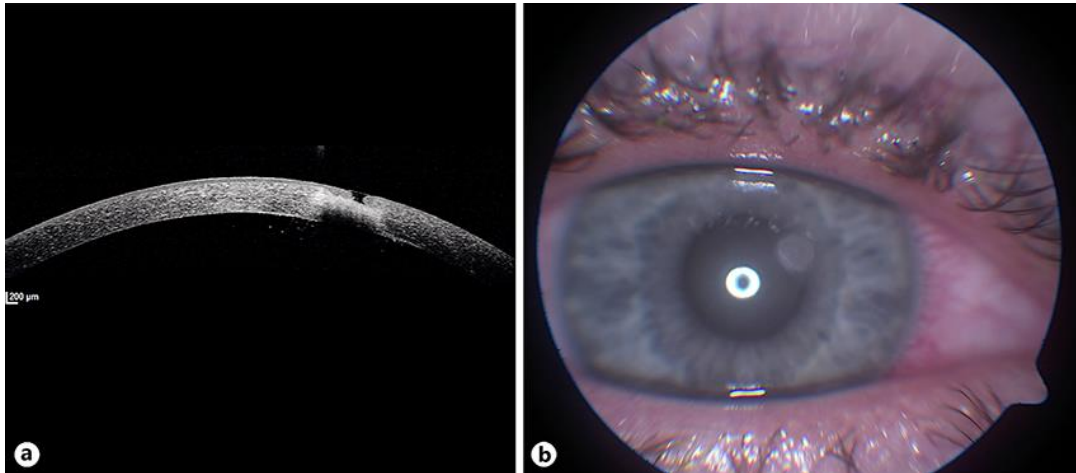


Fig. 1. Presenting day. **a** Corneal ulcer visualised with anterior segment optical coherence tomography. **b** Anterior segment photograph showing conjunctival injection and paracentral, round corneal opacification.



Fig. 2. **a** Corneal perforation on day 21 with collapsed anterior chamber and perforation tunnel (marked with arrowheads). **b** Iris plug in the corneal perforation site (week 11 follow-up).

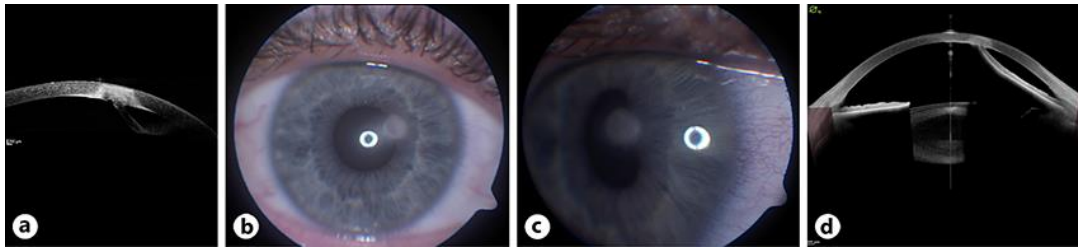


Fig. 3. Week 45 follow-up. **a** AS-OCT showing a corneal scar and iris-cornea contact. **b** Anterior segment photography reveals a paracentral defect with a clear smooth corneal surface. **c** Anterior segment photography from the left side to visualise anterior chamber changes due to iris-cornea contact. **d** Anterior chamber anatomical changes 24 weeks after the corneal perforation.