

## Case Report

# Temporary Myopic Shift in a Patient with Multiple Parallel-Line Endotheliitis

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## Keywords

Multiple parallel-line endotheliitis · Myopic shift · Endotheliitis · Corneal endothelium · Keratic precipitates

## Abstract

Here, we report the case of a patient with multiple parallel-line endotheliitis with myopic shift, which has not been previously reported. A 36-year-old man visited our clinic with blurred vision in his left eye. A slit lamp examination revealed an interesting pattern of multiple parallel lines of keratic precipitates, along with subtle corneal edema. The spherical equivalents measured in the right and left eyes were  $-9.25$  and  $-11.875$  diopter, respectively, with the left eye showing more myopic progression. On specular microscopy, endothelial cell loss was found in the left eye. After administration of a weak topical steroid, keratic precipitates and corneal edema resolved completely within 2 days. The myopic shift in his left eye recovered to  $-10.0$  diopters. Multiple parallel-line endotheliitis can be easily treated with a weak topical steroid in a short period. A temporary myopic shift may occur, which in this case resolved upon disease recovery. However, corneal endothelial cell loss is inevitable; therefore, careful monitoring is needed.

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## Introduction

Endotheliitis, or inflammation of the corneal endothelium, is characterized by corneal edema, keratic precipitates, and mild anterior chamber reaction [1]. It is categorized into four types: linear, sectoral, disciform, and diffuse [1]. Endotheliitis causes significant corneal edema, with keratic precipitates in the edematous area.

A rare form of endotheliitis is characterized by a relatively clear cornea and multiple interesting horizontal lines of keratic precipitates. Multiple parallel-line endotheliitis was first

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reported by Hori et al. [2]. They reported three cases of striking multiple parallel dotted lines of keratic precipitates, clear corneas, and very slight anterior chamber reactions. Later, Oxley et al. [3] reported another case of multiple parallel-line endotheliitis with corneal edema. They defined the condition as a form of endotheliitis with multiple parallel lines of keratic precipitates, with or without corneal edema, in the absence of significant inflammation. This type of endotheliitis, known as multiple parallel-line endotheliitis, was observed in this case, along with a temporary myopic shift.

### Case Presentation

A 36-year-old man presented with an acute painless decrease in vision in his left eye. He noticed blurred vision on awakening. He denied having any ocular trauma or having undergone any surgeries. There was no history of ocular diseases, such as herpes keratitis, uveitis, or underlying systemic diseases. He had no history of coronavirus disease-19 vaccination or infection. On examination, the uncorrected distance visual acuity in both eyes was 20/630, and the corrected distance visual acuity with his glasses was 20/20 in the right eye and 20/50 in the left. Before his left eye was affected, the patient reported having the same corrected distance visual acuity in both eyes. The spherical equivalent measured with an autorefractor in his right and left eye was  $-9.25$  and  $-11.875$  diopter, respectively; the spherical equivalent of his glasses was  $-8.75$  and  $-9.125$  diopter. When corrected with diopter measured with an autorefractor, visual acuity in the left eye was fully corrected to 20/20. In the right and left eyes, the mean keratometry was 45.00 and 46.25 diopters and the intraocular pressure was 11 and 12 mm Hg, respectively.

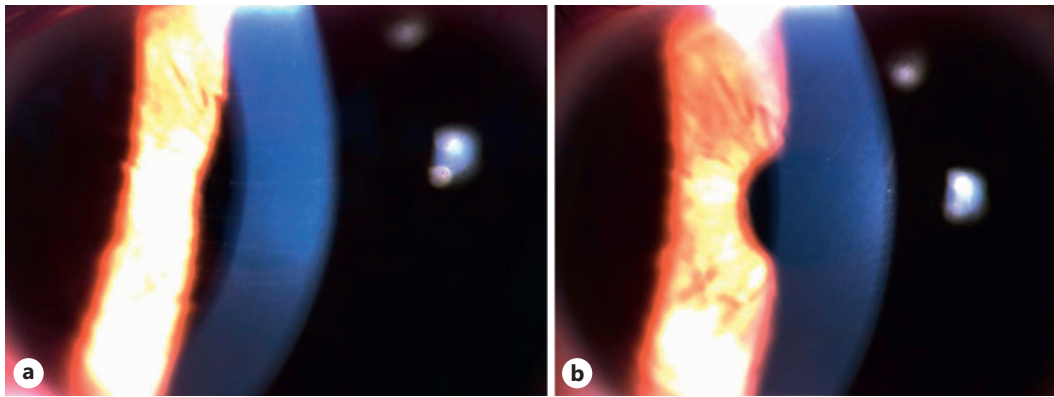
Slit lamp examination revealed multiple horizontal dotted endothelial lines of keratic precipitate and subtle corneal edema in the left eye (shown in Fig. 1a). Corneal staining was not observed on fluorescein examination. The anterior chamber was deep, with no signs of inflammation. There were no abnormalities in the lens or fundus. Specular microscopy measurements revealed that corneal endothelial cell density was lower in the left eye (2,902 and 2,280 cells/mm<sup>2</sup> in the right and left eyes, respectively), and corneal thickness was higher in the left eye (478 and 546  $\mu\text{m}$  in the right and left eye, respectively) (shown in Fig. 2).

The patient was prescribed 0.1% fluorometholone and 5% hypertonic sodium chloride eye drops, each four times a day, and was followed up 2 days later. The corrected distance visual acuity with his glasses improved from 20/50 to 20/20 in his left eye, and myopia reduced from  $-11.875$  to  $-10.00$  diopter. The mean keratometry decreased from 46.25 to 45.25 diopter. Slit lamp examination revealed that the keratic precipitate lines had disappeared (shown in Fig. 1b), and the corneal edema had decreased from 546 to 471  $\mu\text{m}$ .

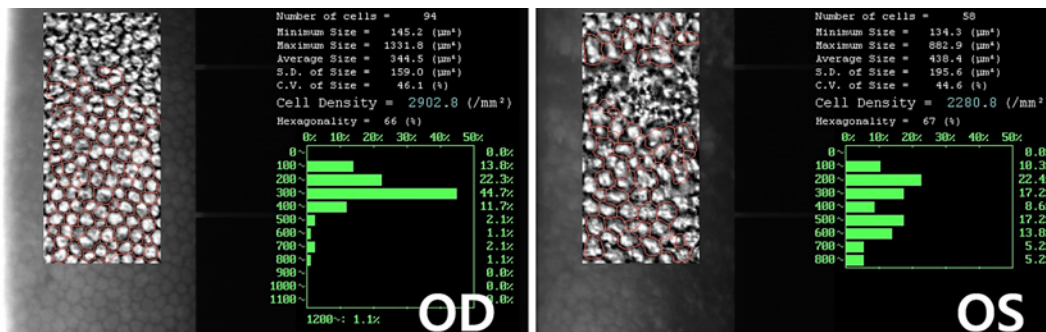
### Discussion

We report a case of a patient with multiple parallel-line keratitis, which is characterized by multiple lines of keratic precipitates and a relatively clear cornea with myopic shift. The lesions in this case rapidly subsided within 2 days of using topical steroid eye drops. Similarly, other cases also reported rapid recovery after using topical steroids [2–4]. In another case, corneal edema and keratic precipitates spontaneously resolved without eye drops within 1 week [5]. Hence, multiple parallel-line endotheliitis appears to be an immunologic disease.

A possible association of herpes virus with multiple parallel-line endotheliitis has been proposed [1]. Oxley et al. [3] identified positive immunoglobulin G and immunoglobulin M titers for herpes simplex virus (HSV) in blood samples and suggested an association with HSV. However, other studies suggest the relationship with herpes virus/HSV is questionable. Hori



**Fig. 1.** **a** Multiple parallel lines of keratic precipitates with subtle corneal edema. **b** Completely resolved corneal edema with no visible keratic precipitates within 2 days after treatment.



**Fig. 2.** Specular microscopic image showing decreased corneal endothelial cell count in the affected left eye.

et al. [2] and Hamilton et al. [4] performed reverse transcriptase polymerase chain reactions in the aqueous humor of patients with endotheliitis patients to test for HSV-1, varicella zoster virus, and cytomegalovirus and obtained negative results. Le Piane et al. [5] performed in vivo confocal microscopy in five cases. They were unable to identify typical signs of corneal inflammation, such as pseudoguttata or infiltration of inflammatory cells into the endothelial layer (typically observed in herpetic endotheliitis). They concluded that a herpetic cause of multiple parallel-line endotheliitis was doubtful [5]. In all reported cases of multiple parallel-line endotheliitis, the inflammation resolved without antiviral agents [2–5]. Taken together, the relationship between herpes virus and multiple parallel-line endotheliitis is questionable. Further studies investigating multiple factors from blood, aqueous humor of the anterior chamber, and corneal epithelial cells could help discern possible causes of the disease.

In all cases, the patients were healthy and without any systemic diseases, and intraocular pressure measurements were within the normal limits [2–5]. The corneal endothelial cell counts were lower than normal in all patients [2–5]. In the current case, the corneal endothelial cell density and hexagonality were both lower in the affected eye (shown in Fig. 2). Through in vivo confocal microscopy, Le Piane et al. [5] found hyperreflective material protruding between the endothelial cells and spot-like holes with neighboring polygonal deposits resembling dislodged endothelial cells. They hypothesized that mechanical trauma could be the possible cause of this phenomenon. Their theory was that trauma caused endothelial cells to detach, causing surrounding cells to migrate into the empty space and cause multiple lines to disappear. This mechanism could

explain the decrease of endothelial cells in all these cases. They were unable to precisely correlate multiple parallel-line endotheliitis to mechanical trauma caused by activities, such as patients rubbing their eyes or sleeping on their stomachs. Further research is needed to determine the exact mechanism of endothelial cell loss.

In the current case, a temporary myopic shift was observed. There have been no previous reports on the co-occurrence of changes in refraction. We hypothesize that the possible causes of this myopic shift could be: steepening of the anterior cornea, flattening of the posterior cornea, or lenticular accommodation. The patient's anterior cornea was approximately 1 diopter steeper when the disease was active and became flatter after resolution. Some studies reported that the anterior corneal curvature flattened after a decrease in corneal edema in Descemet membrane endothelial keratoplasty (DMEK) [6, 7]. Similarly, corneal edema can steepen the anterior cornea, resulting in a myopic shift. Another hypothesis is a change in the posterior corneal curvature. In some studies, a hyperopic shift was found after DMEK, which was proposed to be induced by a steepening of the posterior corneal curvature after a decrease in corneal edema [8, 9]. Loreck et al. [10] described a diurnal change in posterior corneal curvature in Fuchs endothelial corneal dystrophy. When the cornea was edematous in the morning, the posterior corneal curvature flattened and a myopic shift occurred. When the corneal edema resolved later in the afternoon, the posterior curvature was steepened, and the refraction changed to a hyperopic direction. Unfortunately, we were unable to measure the topography before resolving the condition. Evaluation of the posterior corneal surface in the affected eye would have been helpful in evaluating the myopic shift. Another possible hypothesis for this occurrence is lenticular accommodation. Because our patient is young enough to have the ability to have accommodation, the effort to see clearly can yield accommodation. In this case, a cycloplegic test could aid in evaluating the possibility of a myopic shift. However, it is less likely that a myopic shift is due to an anterior transposition of the lens with choroidal inflammation. This is because there were no signs of anterior or posterior inflammation or shallowing of the anterior chamber.

In conclusion, multiple parallel-line endotheliitis is a rare form of endotheliitis with an interesting pattern of keratic precipitates and rapid resolution. However, after an episode, endothelial cell count may decrease. A myopic shift may also be observed, which can be resolved with improvement in the disease. The CARE Checklist has been completed by the authors for this case report, attached as supplementary material (for all online suppl. material, see [www.karger.com/doi/10.1159/000529095](http://www.karger.com/doi/10.1159/000529095)).

### Statement of Ethics

Ethical approval is not required for this study in accordance with local or national guidelines. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images.

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### Conflict of Interest Statement

The authors declare that there is no conflict of interest.

### Author Contributions

J.H.L., Y.A., and M.-J.K.: study concept and design; Y.A. and M.-J.K.: data collection; J.H.L., Y.A., J.M.P., J.H., and M.-J.K.: data analysis and interpretation; J.H.L. and M.-J.K.: writing the manuscript; J.H.L., J.H., and M.-J.K.: critical revision of the manuscript; M.-J.K.: study supervision.

### Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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