CASE REPORT

Bilateral fungal keratitis with ring infiltrates: a rare scenario

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SUMMARY

A 12-year-old boy presented to the emergency department with chief complaints of pain, redness, discharge and diminution of vision in both eyes over the previous 20 days. There was no history of preceding trauma, contact lens use, any eye drop usage or ocular surgery. Systemic history was not significant. Presenting uncorrected visual acuity in his right eye was counting fingers at 1 m and 20/200 in the left eye, with accurate projection of rays in both eyes. Slit lamp biomicroscopy showed the presence of bilateral diffuse conjunctival congestion, corneal ring infiltrates and epithelial defect with corneal oedema. Potassium hydroxide wet mount showed the presence of septate fungal hyphae. The patient was treated with topical 5% natamycin and 1% voriconazole over a period of 6 weeks. Best-corrected visual acuity was 20/600 in the right eye and 20/20 in the left eye at 6-month follow-up.

Figure 2 (A) Potassium hydroxide wet mount showing septate fungal hyphae. (B) Sabouraud dextrose agar showing fungal growth.

Figure 1 (A) Right eye showing 3 mm wide ring infiltration inferiorly encroaching the limbus. (B) Left eye showing 2 mm wide ring infiltrates with a clear space between the limbus and infiltrates. Inferior 1 mm fixed hypopyon is also seen (black arrow).

BACKGROUND

Fungal keratitis is one of the leading causes of blindness in developing countries, where it constitutes almost half of the cases of microbial keratitis.¹ Worldwide, the most common fungal organism is *Aspergillus* species.² The risk factors for fungal keratitis include ocular trauma, ocular surgery, contact lens use, use of topical steroids, various systemic causes such as diabetes mellitus and decreased immunity, among others. In general, a patient with fungal keratitis has fewer symptoms than signs, an insidious onset with prolonged duration of symptoms and typical slit lamp biomicroscopic features including dry-looking ulcer, satellite lesions, feathery margin and fixed hypopyon. Although corneal ring infiltrates are classically seen in a case of *Acanthamoeba* keratitis and it is nearly pathognomonic for it, it can also be present with other microbes. It has been reported to occur very rarely in a case of fungal keratitis.^{13 4} Here we report a rare case of bilateral fungal keratitis with ring infiltrates caused by a single fungal species, which was subsequently cured on medical management.

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Figure 3 (A), (B) At the end of 6 months the right eye showed a diffuse nebulo-macular corneal scar mainly involving the inferior part whereas the left eye showed minimal nebular scarring with a clear visual axis.

CASE PRESENTATION

A 12-year-old boy was brought to the emergency department with chief complaints of diminution of vision, pain, redness and discharge in both eyes for the previous 20 days. He was from a poor socioeconomic background. His personal hygiene was not good and he belonged to a developing state in India with poor access to a healthcare facility. There was no history of preceding trauma, contact lens use, any eye drop usage or ocular surgery. Systemic history was not significant. Various blood investigations including blood sugar, liver and kidney function tests and complete haemogram were within normal limits. Presenting uncorrected visual acuity in his right eye was counting fingers at 1 meter and 20/200 in the left eye, with accurate projection of rays in both eyes.

On slit lamp biomicroscopy, ring infiltrates were seen in the right eye which were 3 mm in width, reaching inferiorly up to the limbus with overlying epithelial defect and surrounding corneal oedema (figure 1A). In the left eye the ring infiltrates were 2 mm in width with a clear area between the limbus and the infiltrates and hypopyon of 1 mm with overlying epithelial defect and surrounding corneal oedema (figure 1B). There was diffuse conjunctival congestion with minimal chemosis in the absence of any features of scleritis in both eyes. Intraocular pressure on non-contact tonometry was 14 mm Hg in the right eye and 12 mm Hg in the left eye. On indirect ophthalmoscopy, fundus was seen hazily in both eyes. B-scan ultrasonography of both eyes was anechoic.

Corneal scraping was performed and sent for direct microscopy (Gram stain, potassium hydroxide (KOH) wet mount), PCR for possible viral aetiology and cultures (blood agar, chocolate agar, *Escherichia coli* plated non-nutrient agar and Sabouraud dextrose agar) and sensitivity. On KOH wet mount, septate fungal hyphae were seen (figure 2A), which were confirmed as *Aspergillus flavus* on Sabouraud dextrose agar media (figure 2B).

INVESTIGATIONS

1. B-scan ultrasonography: posterior segment was anechoic.
2. Direct microscopy, PCR and culture of corneal scraping: among them, KOH wet mount was positive for septate hyphae which was later confirmed as *Aspergillus flavus* on Sabouraud dextrose agar.

DIFFERENTIAL DIAGNOSIS

1. Acanthamoeba keratitis
2. Bacterial keratitis
3. Viral keratitis

TREATMENT

After confirming a fungal aetiology, the patient was treated with topical antifungal including 5% natamycin and 1% voriconazole 1-hourly for 7 days and then 2-hourly until the infiltrates resolved (6 weeks). This treatment was supplemented with topical moxifloxacin hydrochloride 0.5% three times a day to prevent secondary bacterial infection and with homatropine hydrobromide 2% four times a day to provide cycloplegia.

OUTCOME AND FOLLOW-UP

At 6 months follow-up, the patient's best-corrected visual acuity was 20/600 in the right eye and 20/20 in the left eye. There was no recurrence (figure 3A and B).

DISCUSSION

Leber was the first person to document fungal keratitis in 1879.⁵ Even with the many advances in diagnostic and therapeutic modalities for microbial keratitis, fungal keratitis remains a diagnostic and therapeutic challenge because of its varied clinical presentation, difficulties in growing fungi in culture and poor penetration of topical antifungal drugs. Studies have shown that the incidence of fungal keratitis is low compared with bacterial keratitis in developed countries while, in developing countries, it constitutes almost half of the cases of microbial keratitis.¹⁻⁶ Various risk factors for the development of fungal keratitis include ocular trauma, ocular surgery, contact lens use, use of topical steroid, various systemic causes such as diabetes mellitus, decreased immunity, among others. Although corneal injury, especially with vegetative matter, was found to be the principal risk factor for fungal keratitis, it can also occur without any preceding factors.⁷

Patients with fungal keratitis generally have an insidious onset with unilateral involvement and prolonged duration. In these cases the signs are more pronounced than the symptoms. Slit lamp biomicroscopic features include dry-looking ulcer, satellite lesions, feathery margin and fixed hypopyon. Although corneal ring infiltrates are classically seen in *Acanthamoeba* keratitis and it is nearly pathognomonic for it, it can also be present in other forms of microbial keratitis. In various studies, it has been reported to occur rarely in cases of fungal keratitis.^{1,3,4}

Simultaneous bilateral microbial keratitis is very rarely reported in the literature. Common risk factors include contact lens use, bilateral eye surgery in the same sitting (eg, corneal

Learning points

- Bilateral corneal ring infiltrates are a known entity; the case reported here showed that such a presentation can be due to fungal keratitis which can pose a diagnostic dilemma.
- Even though fungal keratitis generally occurs in the presence of ocular and systemic risk factors, in our case these atypical manifestations occurred in the absence of any identifiable risk factors.
- Cases with unusual presentation need meticulous evaluation to rule out all possible infectious causes, which is crucial for the optimal visual outcome.

refractive surgery), diabetes, use of steroids and other systemic conditions. Among all microbiological agents, fungal aetiology is a rare cause of bilateral simultaneous microbial keratitis. To the best of our knowledge, simultaneous bilateral fungal keratitis presenting as corneal ring infiltrates without any obvious systemic or local preceding factors has not previously been reported.^{8–10}

In summary, bilateral corneal ring infiltrates due to fungal keratitis can cause a diagnostic dilemma. Even though it is very rare to have ring infiltrates in fungal keratitis, a possible fungal aetiology should be ruled out by microbiological investigations. It is crucial to have a proper early diagnosis for the best visual outcome.

Contributors MHC, AP, JU and NS have evaluated the case in detail followed by appropriate medical management with good visual outcome of a rare fungal keratitis. MHC, AP, JU and NS have analysed the educational value of the case critically and wrote the report.

Competing interests None declared.

Patient consent Guardian consent obtained.

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