# Corneal ulcer due to a rare coelomycetes fungus *Chaetomium strumarium*: Case report and global review of *Chaetomium* keratomycosis

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We present a rare case of corneal ulcer caused by a species of a coelomycetes fungus, *Chaetomium strumarium*. This fungal genus is a rare causative agent of keratomycosis, with only a handful of cases reported. The clinical presentation, investigative techniques, and preliminary management of our patient are reported. The cases reported in global literature are also summarized in a tabular form in the discussion.

**Key words:** *Chaetomium strumarium*, coelomycetes, keratitis, keratomycosis

Fungal keratitis is a major cause of corneal ulcers. Here, we report a case of recalcitrant corneal ulcer owing to an unusual coelomycete pathogen *Chaetomium strumarium* and provide a global review of corneal ulcer cases due to members of this genera.

## Case Report

A 65-year-old nondiabetic female presented with pain, redness, watering, and photophobia in the right eye (oculus dexter; OD) for the past 8 days. There was a history of trauma with cashew nut while working at home, following which the ocular symptoms developed. After an immediate consultation with an ophthalmologist, she was prescribed topical moxifloxacin three hourly, natamycin 5% eye drops three hourly, and homatropine 2% twelve hourly. Since there were no signs of relief from these medications after 5 days of treatment, she was referred to our institute for further management.

At presentation, she had a best-corrected visual acuity of 6/60 in OD and 6/36 in oculus sinister (OS). Clinical examination of OD revealed normal eyelids and diffusely congested conjunctiva. Slit lamp biomicroscopy of the cornea revealed an ulcer (1.4 mm × 1.2 mm) in the paracentral zone at 8 clock hours. The ulcer had a brownish pigmented plaque on the surface, with surrounding stromal infiltrate (4.8 mm × 2.5 mm) involving anterior two-third stroma with feathery extensions. Descemet's membrane folds and a faint immune ring were also seen [Fig. 1]. Anterior chamber did not have any hypopyon. Lens was cataractous. Based on the above findings, a presumptive clinical diagnosis of fungal keratitis in OD was made. Examination of OS was unremarkable apart from the cataractous lens.

Multiple scrapings were taken from the surface of the corneal lesion using a 15 number scalpel blade after topical anesthesia, for 10% potassium hydroxide (KOH) mount and Grams-staining. Scrapings were taken to inoculate blood agar (BA) and sabouraud dextrose agar (SDA) plates and transported to the mycology laboratory for microscopy and fungal culture setup.

Corneal scrapings revealed abundant, thin, slender, hyaline, septate, branching, filamentous hyphae suggestive of keratomycosis on 10% KOH wet mount [Fig. 2] and Gram-stain smears. Both the BA and SDA cultures showed expanding fungal colonies following 4 days of incubation. Lactophenol cotton blue tease mount revealed septate, phaeoid hyphae but lacked sporulation. Subcultures were performed to ensure purity and induction of sporulation. Following 2 weeks of incubation, the microchamber agar spot slide culture revealed a few pyriform cleistothecial

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structures with characteristic long, undulate, unbranched hair-like pointed setae, which was identified as *C. strumarium* [Fig. 3]. The ascospores were smooth walled, aseptate, brown pigmented, and liberated in masses. Antifungal susceptibility was attempted following Clinical and Laboratory Standards Institute M38-A2. The minimum inhibitory concentration (μg/ml) for amphotericin, itraconazole, and ketoconazole at 48 h and 72 h was found to be 0.5/1.16, 0.04/1, and 0.1/0.8, respectively.

The patient was prescribed oral ketoconazole 200 mg two times, topical natamycin 5% one hourly, fluconazole 0.2% one hourly, moxifloxacin one hourly, timolol maleate 0.5% twelve hourly, and atropine sulfate 1% eight hourly. After 5 days, she had improved symptomatically and clinically. Conjunctival congestion and corneal infiltrate had reduced.

However, after 2 weeks, she had symptomatically and clinically worsened again. As she was not responding to medical management alone, she was advised therapeutic keratoplasty and was later lost to follow-up. A telephonic review revealed she had not undergone any surgical procedure but had continued the topical and oral medication for 3 months. She presently continued to have decreased vision but was relieved of pain in the eye.

## Discussion

Fungal keratitis is a common cause of corneal ulcers in developing nations, accounting for 44% of corneal ulcers in South India. Fungi are opportunistic in the eye since they rarely infect healthy, intact ocular tissues. Fungal keratitis due to coelomycetes fungi is only occasionally reported.

Coelomycetes fungi are an emerging group involved in human disease.[1] *C. strumarium*, a coelomycete, is ubiquitous and worldwide in its ecological distribution. The genus *Chaetomium* belongs to order Sordariales. They are soil fungi and are encountered on decaying plants, compost, and straw materials. It is also known as a soft-rot fungus and commonly affects softwood and hardwood timber. The spore concentrations in outdoor air are not very high owing to the formation of enclosed ascomata fruiting bodies. They can also be found indoors, thriving on wood, rock, and cellulose materials.

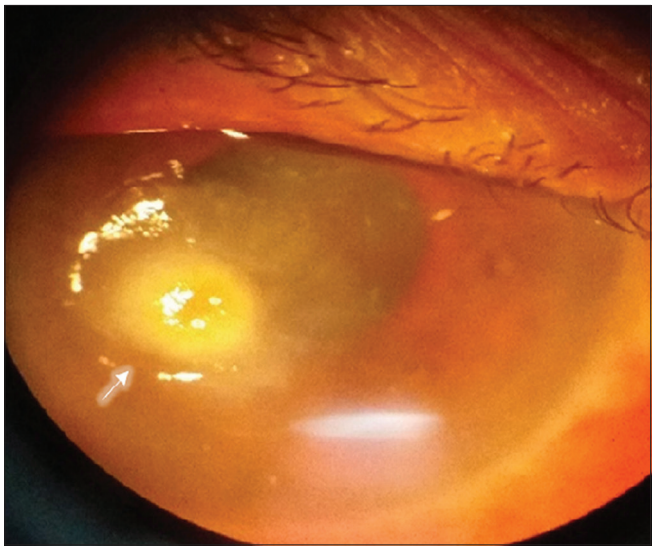

**Figure 1:** On presentation, the corneal ulcer of the right eye (1.4 mm × 1.2 mm) with brownish pigmented plaque; note the stromal infiltrate (4.8 mm × 2.5 mm) in the paracentral zone of cornea involving anterior two-third stroma with surrounding feathery margins

Although *Chaetomium* species are rarely associated with human infections, there are reports of infections involving individuals with weak immune systems. *Chaetomium* species has been reported to cause fatal systemic infections in patients with acute leukemia[2] and renal transplant patients.[3] It is also known to cause brain abscesses in drug addicts[4] and to contaminate peritoneal dialysis fluid.[5]

*Chaetomium* species is an uncommon etiological agent when it comes to causing keratitis in humans. A global review of the literature with search words "*Chaetomium*" and "Keratitis" reveals only three reported cases of *Chaetomium* keratomycosis [Table 1].[6-9] Two cases were identified by ITS sequencing to *Chaetomium*-like species (nonsporulating), *Chaetomium atrobrunneum* and yet another morphologically as *Chaetomium* spp. *Chaetomium globosum* has also been reported as a causative agent in <1% cases of fungal keratitis in a series from North India.[9]

The clinical presentation in our patient initially resembled other described *Chaetomium keratitis* cases, with a slow-growing lesion with a dry surface. The presence of a brownish pigmented plaque on the surface was probably a feature differing from other reports. The other major difference in our case was the response to treatment. All other reported cases in literature have responded well to topical and systemic antifungal drugs. In our case, despite the initial response to topical natamycin, fluconazole and susceptibility-proven systemic ketoconazole, and the absence of systemic or local immunosuppression or secondary glaucoma, the lesion began to worsen after the 1st week of therapy. This could be attributed to the lack of drug penetration into the cornea as repeated epithelial debridement was not performed after the 1st week since the patient wanted treatment on an outpatient basis. The lack of compliance from the patient in using the medication could be another factor, as monitoring the same on outpatient basis was not possible.

The lack of sporulation structures makes their morphological identification difficult. The formation and development of reproductive structures are slow. The nonsporulation and slow formation of ascomata fruiting bodies make the routine identification a diagnostic challenge. Recently, Kindo *et al*. had recommended banana peel culture for eliciting the characteristic cleistothecial features for identification.[10] Further, there is no recommended antifungal testing methods or management strategies with antifungal agents for keratomycosis owing to *Chaetomium* available.

## Conclusion

We report a case of a corneal ulcer caused by an unusual pathogenic species, *C. strumarium*. Although this fungus has a low pathogenicity, its presence in a wide variety of substrates in tropical environments predisposes one to human keratomycosis following trivial injury as was seen in this case. This case generates an awareness among ophthalmologists and

**Table 1: Global review of keratomycosis cases due to members of the genus *Chaetomium***

| Etiological agent | Patient age (years) | Gender | Site of involvement | Location | Clinical presentation | History, mode of injury | Management | Outcome | Reference |
|---|---|---|---|---|---|---|---|---|---|
| *Chaetomium*-like species (nonsporulating) | 39 | Female | Right eye | USA | Corneal infiltrate with feathery borders | Piece of wire | Topical fluconazole and natamycin | Complete resolution, 6 weeks | Vinod Mootha *et al.*[6] |
| *Chaetomium* spp. | 65 | Male | Right eye | India | Pain, redness, irritation, watering, and photophobia | Vegetable matter (hay) | Topical natamycin, cyclopentolate | Complete resolution, 4 weeks | Kaliamurthy *et al.*[7] |
| *Chaetomium atrobrunneum* | 44 | Male | Left eye | India | Pain, redness, watering, and photophobia | No history of injury with foreign body, contact lens use, or ocular surgery | Topical natamycin, oral ketoconazole | Complete resolution, 2 weeks | Balne *et al.*[8] |
| *Chaetomium globosum* | Not specified | Not specified | Not specified | North India | Not specified | Not specified | Not specified | Not specified | Ghosh *et al.*[9] |
| *Chaetomium strumarium* | 65 | Female | Right eye | India | Pain, redness, watering, and photophobia | Cashew nut material | Oral ketoconazole Topical natamycin, fluconazole | Hypopyon | Present case |

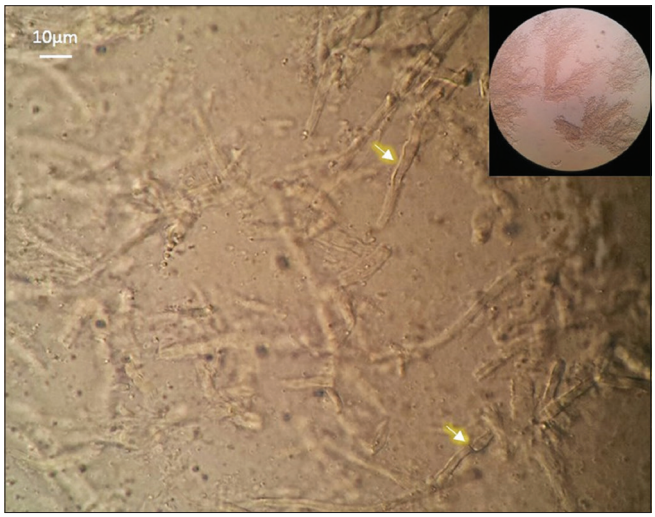


**Figure 2:** Ten percent potassium hydroxide mount of the scraping from corneal ulcer revealing abundant, thin, slender, hyaline, septate filamentous fungi (×400). Note the inset image showing numerous fungal elements (×150)

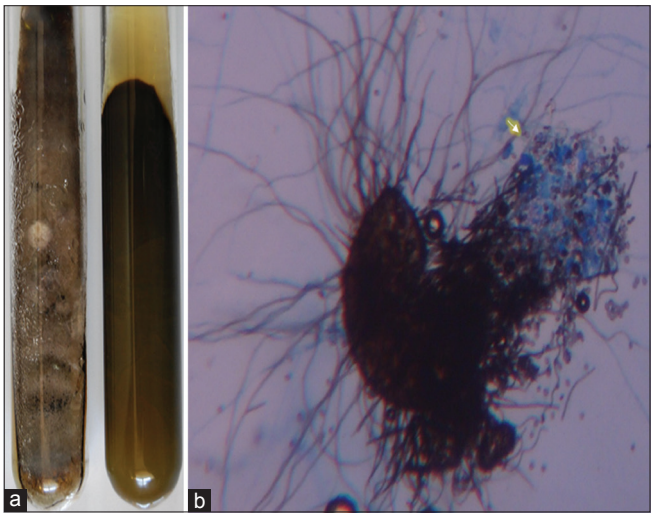


**Figure 3:** (a) Obverse colony morphology of *Chaetomium strumarium* on sabouraud dextrose agar after 2 weeks of incubation at 25°C with raised, spreading, olivaceous gray to brownish black, velvety texture with reverse black pigmentation. (b) Slide culture mount in lactophenol cotton blue mountant showing microscopic morphology of *Chaetomium strumarium* with pyriform ascomatal structures bearing long, undulate, unbranched, pointed setae. Upon crushing the structures, smooth walled, aseptate, lenticular, brown to hyaline pigmented ascospores are liberated in masses

diagnostic laboratories regarding the prompt identification and management of *Chaetomium*-associated keratomycosis.

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### Conflicts of interest

There are no conflicts of interest.

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