RESEARCH PAPER | Medical Science | Volume : 5 | Issue : 4 | April 2015 | ISSN - 2249-555X

Keratitis by Fusarium solani in an immunocompetent male: Case Report and Review of literature

KEYWORDS

Dr Manaswini Das	Dr U Vivekananda	Dr U Sreenivasa Rao
Corresponding author. Assistant Professor, Department of Microbiology, ASRAM Medical College, Eluru	Professor, Department of Opththalmology, ASRAM Medical College, Eluru	Professor, Department of Microbiology, ASRAM Medical Collge, Eluru

Dr S Subbarayudu

Professor, Department of Microbiology, ASRAM Medical College, Eluru.

ABSTRACT *Mycotic keratitis is an important cause of preventable blindness in tropical and subtropical regions in agricultural and other outdoor workers. We present a case of keratitis due to Fusarium solani in an immunocompetent male who was diagnosed by culture and aggressive topical treatment was instituted for management. Filamentous fungi are found to cause keratitis in persons exposed to trauma by vegetable matter. Prompt microbiological investigations and immediate therapy with antifungals should be instituted to prevent ocular morbidity. Topical treatment with natamycin 5% or amphotericin B 0.15% is commonly given for keratitis due to filamentous fungi.*

Introduction

Fungal keratitis, an important cause of preventable blindness, is very commonly caused by molds which are widespread in the environment. We report such a case in an immunocompetent male.

Case Report

A 25 year old healthy male presented to the Ophthalmology outpatient department with complaints of progressive, painless blurring of vision, foreign body sensation, photophobia and discharge from the right eye since 1 week. He had a history of trauma to the eye while working in paddy fields.

On examination, there was a grey-yellow stromal infiltrate with indistinct margins on the right cornea. There was minor redness and lid swelling and progressive infiltration into the corneal stroma. There were no satellite lesions or hypopyon associated with the lesion. Corneal scrapings were obtained aseptically with a surgical blade from the site under local anaesthesia and sent to the Microbiology laboratory for microscopy and culture.

The corneal scrapings were inoculated onto blood agar in shape of "C" to distinguish actual pathogens from contaminants and incubated at 37^{O} C. 10% KOH mount was prepared to visualise fungal elements, gram staining was done and the scrapings were inoculated into two sets of Saboraud's dextrose agar (with and without cycloheximide) and incubated at 25^{O} and 37^{O}C.

The 10% KOH mount showed hyaline, septate, branching fungal elements suggestive of fungal keratitis. Blood agar showed white, tiny, fluffy colonies on the "C" streak. Sabouraud's dextrose agar had white to cream coloured, floccose, cottony colonies after 6 days of incubation (Fig 1), which were teased and a lactophenol cotton blue (LPCB) mount was made. The LPCB mount showed septate, hyaline, branching hyphae (2-4 µm diameter) and large macroconidia which were septate and banana-shaped with apical and basal cells (Fig 2).

The causative organism was found to be *Fusarium solani*. Aggressive topical treatment was started for the patient with natamycin 5% eyedrops hourly for 48 hrs after debulking of the lesion. Mydriatics were also administered to prevent synechiae formation. The frequency of application of the drugs was gradually reduced and the patient was advised to come for follow-up after a week.

Discussion

Ocular trauma and corneal ulceration are responsible for 1.5 to 2 million new cases of corneal blindness annually around the globe[1]. About 90% of these cases occur in developing countries and has been recognised as a silent epidemic[2]. A survey by the Government of India (1997-2001) has shown that corneal lesions are responsible for 9% of all blindness in our country[3].

Mycotic keratitis is found all over the world, but is especially common in tropical and subtropical regions where it may account for more than 50% of all ocular mycoses[4]. Mycotic keratitis may either be due to filamentous fungi (especially *Aspergillus* or *Fusarium* or dematiaceous fungi like *Curvularia*) or due to yeast or yeast-like organisms (particularly *Candida* spp). More than 105 species of fungi, classified in 56 genera have been reported to cause oculomycosis[5].

Filamentous fungi are common causative agents of keratitis in tropical countries. In a study done in Ghana and south India in 2002, they were responsible for 42% of the cases of suppurative keratitis[6]. It commonly follows trauma in healthy young males engaged in agricultural or other outdoor work. Traumatising agents of plant or animal origin, or even dust particles may abrade the corneal epithelium or may directly implant into the corneal stroma[7]. Other important predisposing factors are immunological incompetence, administration of corticosteroids and the use of extended-wear contact lenses[8]. In keratitis due to *Candida* spp, there is usually impaired tear secretion, lagophthalmos, reduced secretion of IgA in tears, or a systemic

Volume : 5 | Issue : 4 | April 2015 | ISSN - 2249-555X

condition like diabetes or immunosuppression. It may supervene on an epithelial defect due to previous herpes keratitis or abrasions by contact lenses[9].

Filamentous fungi were found to cause majority of mycotic keratitis in a study done in South India in which only 0.7% of the cases were due to yeast-like fungi. Males were more affected than females (in a ratio of 2.5: 1) and 64% of the patients were found to be in the age-group of 16-49 years. Ocular trauma was found to be a predisposing factor in 54% of the patients[10]. Trauma due to plant material was found to be a specific risk factor in another study (upto 14-17% of the cases) [11].

Fusarium solani keratitis is usually devastating, resulting in destruction of the eye in a few weeks. Infection is usually severe and perforation, deep extension and malignant glaucoma may supervene[12]. About 23-32% of corneal ulcers due to *Fusarium* may require keratoplasty. Any part of the cornea may be involved, with firm, elevated slough. Satellite stromal infiltrates may be seen and "immune ring" may be formed. Endothelial plaque and hypopyon may be seen after the first week.

Microbiological investigations should be done in every case where fungal keratitis is suspected[13]. A sterile blade or spatula is used to scrape material from the base and edges of the lesion. Corneal biopsy is done in cases where a small epithelial defect is present, but fungal proliferation is confluent in the depth of the corneal stroma. Corneal material may also be obtained at the time of a penetrating keratoplasty[14]. Impression debridement procedure may be considered in cases where the patient is reluctant to undergo biopsy[15].

Direct microscopic observation of corneal scrapings allows a rapid presumptive diagnosis of fungal keratitis. A wet mount preparation of 10% KOH or one of its modifications with the material spread as thinly as possible helps in the visualisation of fungal elements. Lactophenol cotton blue or Calcofluor white may also be used. Gram or Giemsa staining done on the corneal material, or a smear stained by periodic acid-Schiff (PAS) or Gomori methenamine silver (GMS) gives good results[16].

Culture, which remains the cornerstone of diagnosis, is done by inoculating the corneal material onto several media like blood agar, brain-heart infusion agar and Sabouraud glucose-neopeptone agar (with added antibacterials to prevent bacterial contamination) in the form of "C" streaks and incubated at 25^{O} and 37^{O} C. Growth occurring only in the region of the streaks distinguishes true pathogens from contaminants. The corneal material may also be inoculated into broth media like Sabouraud broth, brain-heart infusion broth and thioglycollate broth with added antibiotics. Fungal growth can be observed within 4-5 days, though incubation may be required for about 4-6 weeks. Growth of the same fungus on two or more solid culture media or growth that is consistent with clinical findings is considered significant[17].

Mycotic keratitis can be managed by medical or surgical means or a combination of the two. Cycloplegics are used to relieve anterior uveitis that usually accompanies fungal keratitis and broad-spectrum antibiotics are given for bacterial infection that supervenes on the fungal. The antifungal agent is selected based on the microbiological results. Topical natamycin 5% or amphotericin B 0.15% is usually administered as first-line therapy for superficial keratitis due to filamentous fungi[18]. If yeasts or pseudohyphae are seen on direct microscopy, topical amphotericin B 0.15%[19], fluconazole 2% or flucytosine 1% eyedrops are used. Topical therapy is given hourly round the clock for several days after which the frequency of application is gradually reduced. Oral azoles or intravenous miconazole is given for severe keratitis. Surgical intervention is required if corneal infection continues to progress in spite of rigorous antifungal therapy. Debridement, conjunctival flaps[20] and penetrating keratoplasty is done as per the requirement of the condition. Removal of the necrotic tissue and infected material helps in better penetration of the topical drugs and helps in complete healing of the lesion.

Conclusions

Fungal infection of the cornea is an important problem in outdoor workers in the tropical and subtropical regions. It should be adequately investigated and prompt treatment started to prevent ocular morbidity.

Acknowledgements

We would like to thank Dr Naga Sai Anila and Dr Sangeeta Panigrahy for their invaluable help. We gratefully acknowledge the help rendered by the technical staff in the Department of Microbiology. We thank the ASRAM authorities for their permission to publish this article.

Fig 1: Growth of *Fusarium solani* on Sabouraud's dextrose agar

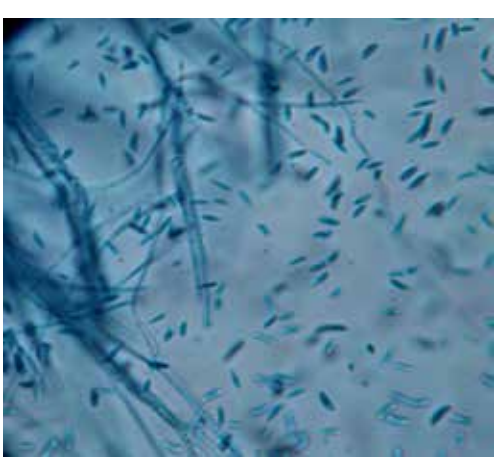

Fig 2: Lactophenol cotton blue mount of the fungus showing hyaline, septate hyphae and banana-shaped macroconidia

Volume : 5 | Issue : 4 | April 2015 | ISSN - 2249-555X

REFERENCE

1. Whitcher JP, Srinivasan M, Upadhyay MP. Corneal blindness: A global perspective. Bull World Health Organ 2001;79:214-21. | 2. Whitcher JP, Srinivasan M. Corneal ulceration in developing world: A silent epidemic. Br J Ophthalmol 1997;81:622-3 | 3. Govt. of India. National Survey on blindness. 1999-2001. Report 2002 | 4. Srinivasan R, Kanungo R, Goyal JL. Spectrum of oculomycosis in South India. Acta Ophthalmol 1991; 69:744–749. | 5. Wilson LA, Ajello L. Agents of oculomycosis: fungal infections of the eye. In: Collier L, Balows A, Sussman (eds). Topley and Wilson's Microbiology and Microbial Infections, 9th edn, Vol 4, Medical Mycology (Ajello L, Hay RJ (section eds)). Arnold: London, 1998, pp 525–567. | 6. Leck AK, Thomas PA, Hagan M, Kaliamurthy J,John M, Newman MJ, Codjoe FS, Opintan JA, Kalavathy CM, Essuman V, Jesudasan CAN, Johnson GJ. Aetiology of suppurative corneal ulcers in Ghana and south India, and epidemiology of fungal keratitis. Br J Ophthalmol 2002; 86: 1211-1215 | 7. Houang E, Lam D, Fan D, Seal D. Microbial keratitis in Hong Kong: relationship to climate, environment and contact-lens disinfection. Trans R Soc Trop Med Hyg 2001; 95:361–367 | 8. Hagan M, Wright E, Newman M, Dolin P, Johnson G Causes of suppurative keratitis in Ghana. Br J Ophthalmol1995; 79: 1024–1028. | 9. Thomas PA. Tropical ophthalmomycoses. In: Seal DV, Bro AJ, Hay J (eds). Ocular Infection: Investigation and Treatment in Practice. Martin Dunitz: London, 1998, pp 121–142 | 10. Gopinathan U, Garg P, Fernandes M, Sharma S, Athmanathan S, Rao GN. The epidemiological features and laboratory results of fungal keratitis: a 10-year review at a referral eye care center in South India. Cornea 2002; 21: 555–559 | 11. Rosa Jr RH, Miller D, Alfonso EC. The changing spectrum of fungal keratitis in South Florida. Ophthalmology 1994; 101:1005–101 | 12. Sharma S, Srinivasan M, George C. The current status of Fusarium species in mycotic keratitis in south India. Indian J Med Microbiol 1993; 11: 140–147. | 13. McLeod SD. The role of cultures in the management of ulcerative keratitis. Cornea 1997; 16: 381–382. | 14. Vemuganti GK, Garg P, Gopinathan U, Naduvilath TJ John RK, Buddi R et al. Evaluation of agent and host factor in progression of mycotic keratitis: A histologic an microbiologic study of 167 corneal buttons. Ophthalmology 2002; 109: 1538–1546 | 15. Arora I, Singhvi S. Impression debridement of corneal lesions. Ophthalmology 1994; 101: 1935–1940. | 16. Rao NA. A laboratory approach to rapid diagnosis of ocular infections and prospects for the future. Am J Ophthalmol 1989; 107: 283–291 | 17. Thomas PA, Fungal infections of the cornea. Eye 2003; 17: 852-862 | 18. Johns KJ, O'Day DM. Pharmacologic management of keratomycosis. Surv Ophthalmol 1988; 33: 178–188 | 19. Tanure MA, Cohen EJ, Grewal S, Rapuano CJ, Laibson PR. Spectrum of fungal keratitis at Wills Eye Hospital, Philadelphia, Pennsylvania. Cornea 2000; 19: 307–312 | 20. Alino AM, Perry HD, Kanellopoulos AJ, Donnenfeld ED, Rahn EK. Conjunctival flaps. Ophthalmology 1998; 105: 1120–1123. |