External ophthalmomyiasis caused by *Muscae* fly larva in the Thar Desert

Punit K. Singh · Subhadra Singh · Prabhu Prakash ·
Manju Singh · Shanker Singh Shekhawat ·
Gajesh Bhargav

Received: 20 November 2011 / Accepted: 2 December 2011 / Published online: 3 January 2012
© Springer Science+Business Media, LLC 2011

Introduction

We reported clinical manifestations of ophthalmic myiasis in three patients in Balesar/Shergarh village in Jodhpur district (Thar Desert area) in Rajasthan, India. All three patients belonged to the same regional area. The clinical picture is that

Capsule: external ophthalmomyiasis is the infestation of external ocular tissues (eyelids, conjunctiva and lacrimal ducts) of man by fly larvae. In this study, we present the clinical manifestations with ophthalmomyiasis caused by larvae of *Muscae* fly in three patients from rural areas in Indian deserts.

The study was conducted at Dr. S.N. Medical College, Jodhpur (Raj), India.

Electronic supplementary material The online version of this article (doi:10.1007/s12177-011-9071-9) contains supplementary material, which is available to authorized users.

P. K. Singh · S. S. Shekhawat · G. Bhargav
Department of Ophthalmology, Dr. S.N. Medical College,
Jodhpur (Raj), India

S. Singh
Dr. S.N. Medical College,
Jodhpur (Raj), India

P. Prakash
Department of Microbiology, Dr. S.N. Medical College,
Jodhpur (Raj), India

M. Singh
MJ Hospital,
Bharatpur (Raj), India

P. K. Singh (✉)
B 33 Subhash Enclave, Air Force Area,
Jodhpur(Raj) 342011, India
e-mail: singhpunit12@gmail.com

of a viral or allergic conjunctivitis with itching of the eye, tearing and foreign body sensation. The larvae can be easily missed on routine examination as they are small, translucent and quickly avoid the slit lamp. External ophthalmomyiasis is deposition of fly larvae confined to conjunctiva, eyelid and lacrimal ducts. Ophthalmomyiasis is not uncommon but underestimated in rural areas, and it is still frequently misdiagnosed as viral or allergic conjunctivitis. In our opinion, this is the first report of ophthalmomyiasis in the Thar Desert.

Case history

We observed three cases of external ophthalmomyiasis from Jan. 11 to May 11 at MDM Hospital Jodhpur, a tertiary level ophthalmic center of western Rajasthan, the only one in this vast area of desert. Each patient was examined thoroughly and was evaluated in detail about the history and, in particular, symptoms related to the development of myiasis (Table 1). Diagnosis of external ophthalmomyiasis was made by direct visualization of the highly motile and photophobic larvae using slit lamp. The major presenting symptoms were irritation, foreign body sensation, lacrimation and redness. In each case, the symptoms began while the affected individual was working in a farm or playing in the farm. One of the patient was expeditious enough and had himself discovered two larvae in his conjunctival fornix. In one of the cases, the eye involvement was bilateral, and in the others, unilateral and with motile larvae present in the conjunctival fornix and bulbar and only occasionally in palpebral conjunctiva. All patients had injection of conjunctiva, lid edema and sometimes chemosis. Visual acuity was also normal in all patients. There was no sign of any aggressive corneal or intraocular involvement.

Table 1 Details of patients diagnosed

S no.	Age	Sex	Date of diagnosis	Place of occurrence	No. of larvae recovered
1	11 years	Male (child)	11-1-2011	Playing in fields	8 (bilateral)
2	45 years	Male	4-4-2011	Working in fields	4 (unilateral)
3	25 years	Male	9-5-2011	Working in fields	4 (unilateral)

After instillation of proparacaine eye drop, the larvae became paralyzed and after photographic documentation (Figs. 1, 2 and 3), were taken out with a cotton tip applicator (Fig. 4) and the eyes washed with Ringer lactate solution. The entire cotton tip of the applicator was submerged in thioglycollate broth media. Soon after the submersion, the larvae were seen freely motile in the fluid of the culture media (Video 1). The media was sent for microbiological investigation. The larvae measured 1–2 mm in length varying from four to eight in number. They were mounted on a microscope slide and examined. On the basis of their spindle shape, translucent, segmented body and two large dark oral hooks connected to a white cephalopharyngeal skeleton, the larvae were identified as first instars of Muscae fly (?Diptera: Oestridae). We were told by microbiologists that the larvae, if grown in pork meat fat, can mature to grow into pupae and then adult, and species identification would be certain then. However, by preliminary examination, they seemed

Fig. 1 High magnification microbiology laboratory photographs of larva that we have retrieved from the conjunctival cul de sac of our patient. Note the spindle shape, translucent, segmented body and two large dark oral hooks connected to a white cephalopharyngeal skeleton. The larvae were identified as first instars of Muscae fly, suspected *Oestrus ovis* (Diptera: Oestridae) or *Dermatobia hominis*. [Courtesy Dr. Prabhu Prakash, MD, Professor, Microbiology, Dr. SN Medical College, Jodhpur]

Fig. 2 Microbiology laboratory photographs of another larva that we have retrieved from the conjunctival cul de sac of the same patient

to be *Oestrus ovis* (sheep botfly) or *Dermatobia hominis* (human botfly).

For a patient, an antibiotic and a steroid eye drop were started. Following removal of all larvae, the symptoms resolved drastically within a few hours or days. Instillation of petroleum jelly or turpentine oil in the conjunctival sac can also be used as they arrest larval breathing by hypoxia and then larvae run out of the cul de sac in search of fresh air. None was used in our patients.

Discussion

Myiasis can be of three types: obligatory, facultative and accidental. Obligatory myiasis is mainly caused by botfly larvae (*Dermatobia*, *Condylobia* and *Oestrus*) as they do not

Fig. 3 Larva visible hiding in the inferior fornix

Fig. 4 Removal of larva with cotton tipped applicator under local anesthesia

get enough nutrition from the parent fly. A botfly larva causes myiasis mainly in animals, and human infection is a zoonosis. *D. hominis* larvae are spread by mosquitoes as the female lays its eggs on mosquito wings. It is the most common cause of myiasis in humans. *Condylobia anthrophagia* spreads by urine and feces. Facultative myiasis is caused by blowflies (*Phormia*, *Lucilia* and *Musca*). Some facultative larvae of *Lucilia serrica* secrete bacteriolytic enzymes and is used for sterilization of infected wounds! Accidental myiasis usually involves housefly larvae on wound dressings and *Eristalis* in the anal canal.

Ophthalmic myiasis is due to deposition and inhabitation of dipterous larvae in the human eye. Various species of flies are able to cause ophthalmomyiasis including *O. ovis* (sheep nasal botfly), house fly (*Musca domestica*), latrine fly (*Fannia*) and cattle botfly (*Hypoderma*) [1, 2]. *O. ovis* is the most common (90%) of these as a cause of ophthalmic myiasis in humans, as reported till now. However, there may be wide geographical variation [3]. Ophthalmic myiasis due to *O. ovis* was described for the first time in 1947 by James [4]. More cases have been reported from the Mediterranean, India and also from Russia, Iran [5], Serbia, Africa [6], Oman and America. Grammer et al. [3] and Masoodi et al. [1] described cases of external ophthalmomyiasis caused by *O. ovis* in farmers living in close contact with sheep and goat.

Ophthalmomyiasis mostly occurs in rural areas, where man lives in close contact with cattle. Involvement by *O. ovis* is in the form of external ophthalmomyiasis only, which is confined to conjunctiva, eyelid and lacrimal ducts as first instar larvae have no bite organs and are unable to secrete proteolytic enzymes [6]. Identification of the species is important to estimate the risk of penetration of the globe. Larvae from some other species such as *Hypoderma* [1] or *Chrysomya bezziana* can penetrate the eye globe and cause endophthalmitis and iridocyclitis and may even lead to blindness.

They are capable of living in eye fluid and cause symptoms by crawling on the eye balls with the help of anterior hooks and by their curved mandibular barbs and body spines causing much irritation.

Symptoms such as severe eye irritation, redness, foreign body sensation, pain, lacrimation and swelling of the lids, season of occurrence and also predominance of young male patients and one boy in our case series are similar to those described in other reports [1–3]. Complications such as corneal ulcer, invasion into eye globe and decreased vision are not usual, and none of these complications were encountered in our patient.

Conclusion

We should suspect larval conjunctivitis in rural areas, especially during spring and summer, in patients presenting with viral or allergic conjunctivitis-like picture or following a history of something falling in the eye. As the larvae are small, translucent and the slit lamp beam makes them run away, they can be easily misdiagnosed on routine examination. This is the first clinical reporting of ophthalmomyiasis by *Muscae* fly in the Thar Desert, to the best of our knowledge.

Disclosures All authors have read and agreed with the content of the article, are fully informed and believe the work to be honest.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflict of interest There is no competing interest with any person or firm.

References

1. Masoodi M, Hosseini K. External ophthalmomyiasis caused by Sheep botfly (*Oestrus ovis*) larva: a report of 8 cases. Arch Iranian Med. 2004;7:136–9.
2. Verstrynge K, Foets B. External ophthalmomyiasis: a case report. Bull Soc Belge Ophthalmol. 2004;294:67–71.
3. Grammer J, Erb C, Kamin G, Wild M, Riedunger C, Kosmidis P, et al. Ophthalmomyiasis externa due to the sheep botfly *Oestrus ovis* in southwest Germany. Germ J Ophthalmol. 1995;4:188–95.
4. James MT. The flies that cause myiasis in man, Washington D.C., U.S. Dept. Agric Misc Publ. 1947;1:631.
5. Janbakhsh B, Pirouz MS, Tirgari S, Agha-Mohammadi A. A case of ophthalmomyiasis in man by *Oestrus ovis* Linnaeus in Tehran (Diptera, Oestridae). Acta Med Iran. 1977;20:19–26.
6. Patel SJ. Extra ocular myiasis due to the larva of *Oestrus ovis*. East Afr Med J. 1975;52:167–9.