

External ophthalmomyiasis: a case series and review of ophthalmomyiasis in Turkey

Pelin Özyol · Erhan Özyol · Funda Sankur

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Abstract Ophthalmomyiasis externa is the infestation of the superficial external ocular structures by fly larvae. This is a particularly rare condition, which has nevertheless been reported in several countries worldwide. It is common in sheep-farming areas, especially in Mediterranean countries. The patients may present with classic conjunctivitis, pseudomembranous conjunctivitis, conjunctival hemorrhages, punctate keratitis, keratouveitis, and eyelid edema with erythema. Herein, we present three cases of external ophthalmomyiasis caused by *Oestrus ovis* larvae and review ophthalmomyiasis cases reported from Turkey.

Keywords Ophthalmomyiasis · Ocular surface · *Oestrus ovis*

Introduction

Ophthalmomyiasis is the infestation of ocular or orbital tissues by various species of flies. In humans, ophthalmomyiasis is caused by the cattle botfly *Hypoderma bovis*, the Russian botfly *Rhinoestrus purpureus*, and the ovine nasal botfly *Oestrus ovis* [1]. *Oestrus ovis* is the most common cause of ophthalmomyiasis in the world [2]. This botfly is a common parasite in the nasal and paranasal cavities of goats and sheep. Therefore, it is common in sheep-farming areas, especially in the Mediterranean countries, Southern Africa, and Central America [3].

Ophthalmomyiasis can be classified as external, with conjunctiva or eyelid involvement; internal, when the larvae invade the ocular globe (sub-retinal space or vitreous cavity); or orbital, when the larvae invade the orbit [4]. In the external type, the patients may present with classic conjunctivitis, pseudomembranous conjunctivitis, conjunctival hemorrhages, punctate keratitis, keratouveitis, and eyelid edema with erythema [1, 5]. The manifestations of internal ophthalmomyiasis include iridocyclitis, retinal and vitreous hemorrhage, linear sub-retinal tracks, retinal detachment, endophthalmitis, and panuveitis [2, 6, 7]. Orbital cellulitis and massive orbital destruction have been reported in patients with orbital ophthalmomyiasis [8, 9].

In this report, we presented three different cases diagnosed with external ophthalmomyiasis in a week

P. Özyol (✉)

Ophthalmology Department, Faculty of Medicine, Muğla Sıtkı Koçman University, Muğla, Turkey
e-mail: pelingesoglu@yahoo.com.tr

E. Özyol

Ophthalmology Department, Muğla Sıtkı Koçman University Training and Research Hospital, Muğla, Turkey

F. Sankur

Microbiology Department, Muğla Sıtkı Koçman University Training and Research Hospital, Muğla, Turkey

and reviewed ophthalmomyiasis cases reported from Turkey.

Case 1

A 45-year-old female patient was admitted to ophthalmology clinic because of foreign body sensation, pain, and redness in her right eye after plucking fruits from the tree. The visual acuity was 16/20 in her right eye and 20/20 in her left eye. Biomicroscopic examination of the right eye revealed motile larvae about 1 mm length moving on the surface of the conjunctiva. Retraction of the eyelids enabled visualization of many larvae that moved away from the light (Fig. 1). The conjunctiva was diffusely congested and mucopurulent secretion was present in the fornices. Topical anesthetic drop was administered to the eye and 11 larvae were removed with forceps. The larvae were preserved in 70 % alcohol solution and sent for microscopic examination. Topical antibiotic and steroid (moxifloxacin 4 × 1 and loteprednol etabonate 4 × 1) drops were prescribed. The symptoms completely resolved and the biomicroscopic examination was normal bilaterally at the control days of 1 and 7. Topical medication was ceased at day 7.

The microscopic examination of the larvae showed that they were oval shaped with segmented bodies and had a pair of large dark oral hooks connected to their cephalopharyngeal skeletons (Fig. 2). According to these findings, they were identified as the first stage of *O. ovis* larvae.

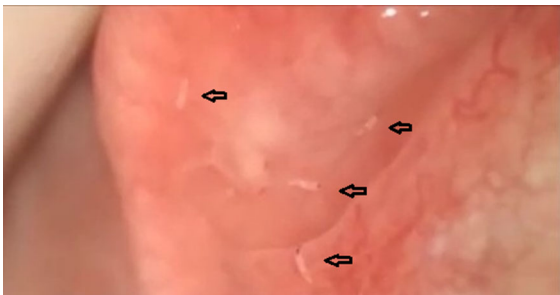


Fig. 1 *Oestrus ovis* larvae on upper fornix and bulbar conjunctiva

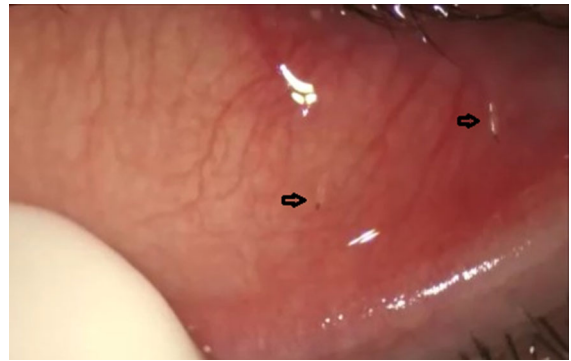


Fig. 2 *Oestrus ovis* larvae on bulbar conjunctiva

Case 2

A 37-year-old female patient was referred to ophthalmology clinic with complaints of foreign body sensation, redness, and lacrimation in her right eye after a fly strike. The visual acuity was 20/20 in both eyes. The eyelid was edematous. Biomicroscopic examination revealed punctate keratitis, conjunctival hyperemia, and motile larvae on the conjunctival surface and fornices (Fig. 3). After topical anesthetic



Fig. 3 The first stage of *Oestrus ovis* larvae

drop was administered, 8 larvae were removed with forceps. Topical steroid–antibiotic combination drop (loteprednol etabonate 0.5 %/tobramycin 0.3 %, 4 × 1) was prescribed. During follow-up examinations, the eye irritation resolved and patient had no complaints. The medical therapy was stopped after day 7. The larvae were identified as the first stage of *O. ovis*.

Case 3

A 17-year-old male patient presented with sudden onset of pain and redness of his right eye. There was no history of trauma or exposure to farm animals. The visual acuity was 20/20 in both eyes. Biomicroscopic examination revealed conjunctival hyperemia, small conjunctival hemorrhages, and motile larvae on the conjunctival surface and fornices (Fig. 4). Under topical anesthetic drop, the larvae were removed with forceps. A larva in subconjunctival tissue was observed under slit-lamp examination, after that the subconjunctival larva was removed through a small conjunctival incision under operating microscope. The subconjunctiva was checked carefully for any more subconjunctival larvae both under operating microscope and slit-lamp examination during follow-up. Larvae's dark oral hooks made it easier to check the subconjunctival area. No larvae had penetrated sclera or moved into the orbit. The patient was treated with steroid–antibiotic drops (moxifloxacin 4 × 1 and loteprednol etabonate 4 × 1, for 7 days) and followed up to 3 months without any complication. During the follow-up period, no larva was seen. The larvae were identified as the first stage larvae of *O. ovis*.



Fig. 4 The larva in subconjunctiva is marked

Discussion

Ophthalmomyiasis, also known as ocular myiasis, is the infestation of the eye or orbital tissues by the larvae of the insect order Diptera. The normal hosts of the larvae include sheep and goats. The *O. ovis*, the common sheep bot fly, breeds in the nasal cavity and sinuses of sheep [1]. The fly enters the nostrils and deposits its larvae. The larvae then move to the nasal cavity or the frontal sinus of the animal. After maturation, these larvae fall to the soil and enter into the pupal stage that lasts for 3–4 weeks [10]. The lifespan of *O. ovis* is about 28 days. Humans are accidental hosts and the flies release their larvae on to the eye.

Ophthalmomyiasis is generally presented with its external form. Symptoms are related to the foreign body. A punctate keratitis may be present as a result of the larvae moving across the cornea and small conjunctival hemorrhages may be present as a result of clinging with the larvae's mouth claws [11]. Histologically, conjunctival eosinophilic infiltrations and non-necrotizing granulomatous inflammation surround the parasitic structures [12]. Eosinophil degranulation may cause epithelial cell damage and goblet cell discharge. Therefore, the disease can easily be misdiagnosed as allergic or viral conjunctivitis because of ocular pruritus and watery-mucopurulent discharge symptoms [13].

Oestrus ovis larvae are unable to secrete proteolytic enzymes [14], preventing them from penetrating into the sclera and corneal barrier. However, some fly species unlike *O. ovis* are capable of invading the ocular structures. Therefore, exact taxonomic classification of these larvae gives idea about potential risk of possible complications [15].

Predisposing conditions to ophthalmomyiasis include local factors such as eye infections or ocular wounds which may have been surgically induced or traumatic in nature; advanced age; debilitating diseases such as chronic infections, malignancies and HIV infection; poor general health; and close contact with farm animals [8, 16].

In the current report, three different external ophthalmomyiasis cases who were admitted to ophthalmology clinic in a week were presented. There was no history of exposure to farm animals in any case. Biomicroscopic examination revealed larvae on the ocular surface. The larvae hidden into the conjunctival

fornices and subconjunctival area were detected with a detailed examination. The case 3 was followed up to 3 months for possible complications.

Ophthalmomyiasis due to *O. ovis* has been reported in India, Iran, Afghanistan, France, Russia, America, and South Africa. Most reported cases belong to people from tropical countries and from low socioeconomic classes [16–18].

In Turkey, all 20 human ophthalmomyiasis cases (15 human ophthalmomyiasis cases in Pubmed search and 5 human ophthalmomyiasis cases in national publication search via Google Scholar for the term ‘ophthalmomyiasis’) have been reported in the last 11 years. In Pubmed search, all the cases were external ophthalmomyiasis except one with internal ophthalmomyiasis reported by Gözümlü et al. [19]. It was reported that during pars plana vitrectomy, both a foreign body and an 8-mm-long larva that was identified as a cattle botfly were simultaneously encountered in the vitreous cavity of a 3-year-old girl with endophthalmitis. Caca et al. [20] reported that *Chrysomya bezziana*, from the Calliphoridae family of suborder Cyclorrhapha, caused massive periorbital tissue destruction after larvae were noticed in a wound that had been present for a year around the eye and cheek of an 8-year-old girl. The naso-external ophthalmic myiasis caused by *O. ovis* in a 33-year-old male who worked as a research assistant in the faculty of agriculture was presented by Eyigör et al. [21]. A few external ophthalmomyiasis cases have been reported from urban areas of Turkey [22–25]. Two external ophthalmomyiasis cases caused by *O. ovis* were reported from eastern of the Black Sea region in Turkey [13]. It was reported that one of the cases was misdiagnosed as bacterial conjunctivitis because of lack of experience about ophthalmomyiasis. İstek [26] and Caliskan et al. [27] have reported external ophthalmomyiasis cases in rural areas of Turkey.

Most of the myiasis cases have been reported in people from tropical countries belonging to a low socioeconomic class and rural areas; however, most of cases are reported in those living in urban areas of Turkey and without any contact history with animals, most likely due to unreported cases in rural areas. Sheep-farming areas are more common in different regions of Turkey; however, a few cases have been documented in rural areas. *Oestrus ovis* may be also seen in city centers because of the close relationship to villages that have sheep and goat farms in Turkey.

Ophthalmomyiasis externa may be much more frequent in Turkey than that reported since it can heal spontaneously and can be treated empirically. For this reason, human eye infestations may have been reported in a lower rate than expected.

Treatment strategies depend on the type of ocular involvement and the level of damage. Initially, treatment is performed by removal of the larvae with forceps using a topical anesthetic. Following this, antibiotics and topical corticosteroids can be used to prevent bacterial contamination and relieve the patients from inflammation. A single oral dose (200 mcg/kg) or topical (10 mg/ml solution, three times a day) administration of ivermectin, an antiparasitic agent, has also been described as a successful first choice medical therapy in the treatment of ophthalmomyiasis externa [16, 28].

Conclusions

Physicians should be aware that myiasis may occur not only in tropical countries and rural regions, but also in other areas and city centers. Due to the rarity of ophthalmomyiasis and overlapping symptoms with more commonly occurring ophthalmic conditions, thorough ophthalmic examination is required to avoid misdiagnosis and delay in treatment. Subsequent examinations are very important to ensure that no complications have occurred.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest. No author has a financial or proprietary interest in any of the materials mentioned.

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