

An imported case of external ophthalmomyiasis caused by sheep botfly (*Oestrus ovis*) - case report

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Abstract. Oestrosis caused by *Oestrus ovis* larvae (sheep botfly) is a zoonotic nasal myiasis affecting small ruminants across the world. Reports of human infestation have increased over the last years. We report here an imported case of unilateral severe conjunctival ophthalmomyiasis caused by *O. ovis*. A 27 year old female returning from a summer holiday in Greece showed unilateral severe conjunctivitis, foreign body sensation and severe lacrimation. Slit lamp examination revealed motile, light-evading larvae that were extracted and sent for parasitological examination. Larvae, measuring 0.7 mm in length were identified as L1 of *O. ovis*. Human ophthalmomyiasis is an important parasitic condition and is usually confined to the external ocular tissue but without treatment can result in ocular invasion and occasionally sight loss. The condition should not escape proper diagnosis and cure is only via mechanical extraction of all infesting larvae, followed by local antibiotic and corticosteroid treatment.

Keywords: Ophthalmomyiasis; Conjunctivitis; *Oestrus ovis* myiasis; Sheep nasal botfly.

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Introduction

Myiasis is the clinical infestation of human or vertebrate animals with living insect larvae of order Diptera which feed on host tissue, liquid body-substances or ingested food (Lane and Crosskey, 1993). Ophthalmomyiasis is the infection of human eye such larvae and is known to be caused by members of Oestridae, Calliphoridae and Sarcophagidae families. It accounts for almost 5% of all cases of human myiasis (Bali et al., 2007). External ophthalmomyiasis only involves the superficial

periocular tissues usually the conjunctiva, and is normally caused by the larvae of sheep nasal botfly *Oestrus ovis* (Reingold et al., 1984; Chodosh et al., 1991). The first reported case of human ophthalmic myiasis due to *O. ovis* was in 1947 (Patel, 1975). Since then, it has been assigned a pantropical, subtropical and temperate distribution that includes the Mediterranean parts of Europe (Lucientes et al., 1997; Suzzoni-Blatger et al., 2000; Weinand and Bauer, 2001), North America (Healey et al., 1980; Reingold et al., 1984; Sigauke et al., 2003), New Zealand (Macdonald et al., 1999),

and Australia (McDermott and Schafer, 1983). However, the majority of reported cases were imported from a region extending from North Africa through the Middle East into southern Asia (Vermeil, 1954; Zumpt, 1963; Hennessy et al., 1977; Al-Dabagh et al., 1980; Dar et al., 1980; Omar et al., 1988; Torok et al., 1991; Amr et al., 1993; Hira et al., 1993; Masoodi and Hosseini, 2003; Fekry et al., 1997; Victor and Bhargva, 1998; Beri et al., 2002). All available data suggest there is an increased prevalence of human *O. ovis* infestation during the summer and early autumn (Amr et al., 1993).

The natural hosts for larvae of *O. ovis* are sheep and goats. Adult female flies are larviparous. Naturally, larvae (L1) that hatch from eggs in the fly's vagina are deposited with a stream of milky fluid into the nasal cavity of small ruminants. Accidentally, they can be deposited in the mammalian eye (Masoodi and Hosseini, 2003). Other sites of *O. ovis* infection in humans are the nose, ears, eyes and the surrounding skin but can also include the pharynx, the gastrointestinal and genitourinary tracts (Reingold et al., 1984). Infestation can also occur by direct contact of a female fly with host mucous membranes or by the transfer of larvae via infested water splashed onto the host's face and eyes (Hennessy et al., 1977). In contrast to the natural hosts, in humans the further development of larvae doesn't occur. Poor health, close contact between animals and man and poor living conditions are amongst the highest contributing factors to this infestation (Beri et al., 2002).

Case history

Upon finishing a Southern European tour in July 2009, a 27-year-old female presented herself to the Polyclinic of Ophthalmology, Klinikum rechts der Isar with severe unilateral conjunctivitis. Ophthalmic examination showed normal eye movement but the patient complained that over the last two days she had suffered from foreign body sensation with intense lacrimation and photophobia. The patient was in general good health and had a negative ophthalmologic history. She denied recent contact with animals and could not recall any objects hitting her eye in the last days.

The conjunctiva of the left eye was markedly hyperaemic with abundant watery exudates. Slit lamp examination revealed normal pupillary reaction but interestingly, five tiny semi-translucent worm-like structures were attached to the inner side of the upper and lower eye lids. Upon closer inspection, the motile larvae measuring 0.6-0.8 mm in length with dark appendages on one pole end displayed vermiform movement and were observed crawling over the bulbar conjunctiva and cornea. Upon bright light the larvae burrowed deeper into the conjunctival fornices. Extraction of the larvae was difficult as they were hooked onto the conjunctiva. After frequent attempts to remove them with the forceps they were finally caught and transferred onto a piece of adhesive tape, mounted on a microscopic slide and immediately sent for identification. Direct and indirect ophthalmoscopy showed no further abnormalities and no evidence of intraocular organisms or inflammation. The patient's right eye was normal. After worm extraction the patient was treated with topical antibiotics and corticosteroids. This form of treatment is recommended after mechanical extraction of the larvae to alleviate the inflammatory response and to prevent or control secondary bacterial infection. After a few days, the symptoms and clinical signs resolved.

Microscopic examination of the larvae revealed shrunken ellipsoid-shaped, ventrally flattened larva measuring approximately 0.7 mm. The larva had a segmented body (figure 1A), equipped with a multi-component attachment apparatus which consisted of two large dark brown hornlike shaped oral hooks (MH) as shown in figure 1B. These were connected to a cephalopharyngeal apparatus which included pharyngeal and hypo-pharyngeal sclerites (PS and HPS) as shown on figure 1B. The larva also possessed numerous inter-segmental rows of tiny spines on the anterior margin of each segment. Small crown-shaped bristles (CB) were also present on the last segment, while two caudal pigmented respiratory spiracles (RS) were visible in the caudal segment indicative of 1st instar larva (L1) (figure 1C). According to the previously described morphological criteria this structure was clearly identified as first stage larvae of *O. ovis*.

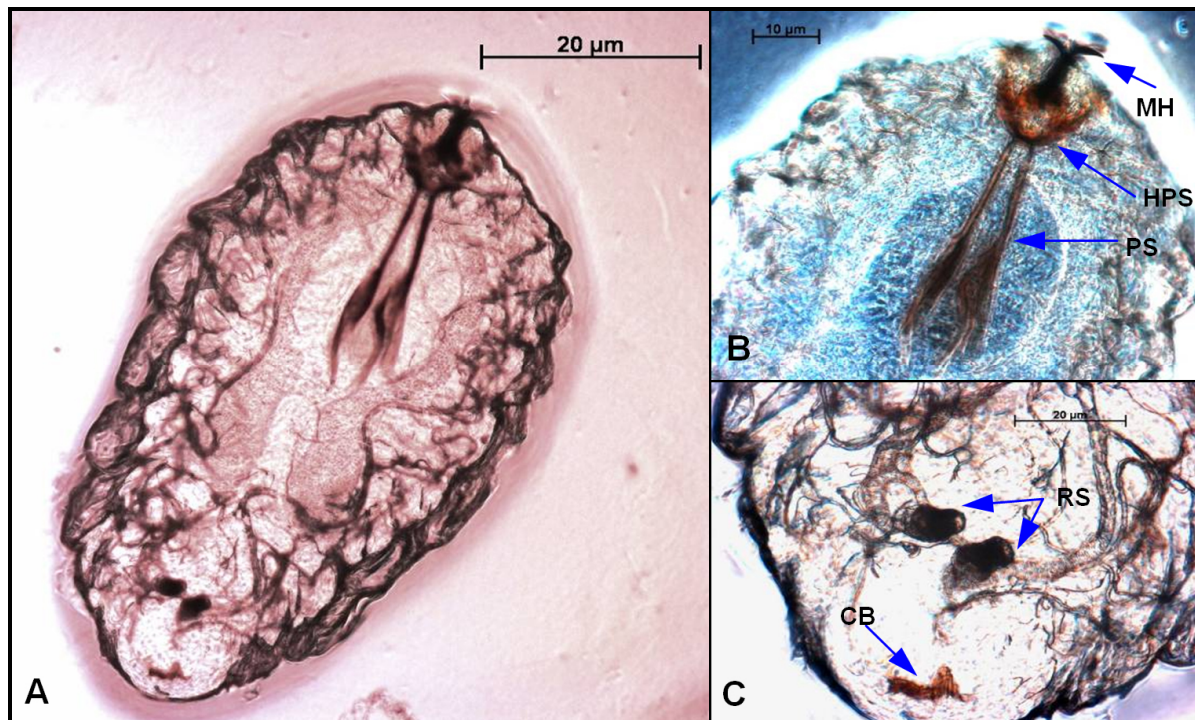


Figure 1. Microscopic aspect of the extracted larva. (a) Whole larvae with body segmentation (10x). (b) Anterior end of the larvae with oral hooks (OH), pharyngeal sclerite (PS) and hypo-pharyngeal sclerite (HPS) (x20). (c) Caudal ends of the larvae with crown-shaped caudal bristles (CB) and pigmented respiratory spiracles (RS) on the last segment (x40).

Discussion

External ophthalmomyiasis is often a benign self-limiting disease unless the ensuing corneal abrasions are complicated due to secondary infections (Reingold et al., 1984; Cameron et al., 1991; Chodosh et al., 1991; Stevens et al., 1991). If the infestation is caused by larvae with burrowing habits they can produce destructive forms of internal ophthalmomyiasis, especially in debilitated patients (Dixon et al., 1971; Jakobs et al., 1997). This infection can lead to severe keratouveitis, loss of sight or even infection of the entire eyeball. During internal ophthalmomyiasis larvae may be visualized in the vitreous and subretinal spaces and elicit vitreous hemorrhaging, usually requiring acute vitrectomy for surgical removal of the larvae (Edwards et al., 1984; Newman et al., 1986; Perry et al., 1990). If the parasite is restricted to the ocular surface, larvae cannot develop beyond the first larval stage and die within ten days. Even though the larvae have no biting appendages scanning electron micrograph studies have described structural adaptations including mouth hooks and claw-shaped spines used by the organism

to attach and penetrate into the host's tissues. Indeed, small conjunctival hemorrhages may be seen at sites where the larva is fixed. These structures explain why *O. ovis* are not exclusively confined to the outer membranes of the eye and have the potential to invade other tissues (Jenzerin et al., 2009). In addition, salivary gland products contain thermostable serine proteases which appear to be important in host-parasite interaction and larval nutrition (Angulo-Valadez et al., 2007). The parasite also gains nutrition by ingesting the inflammatory exudates of the host that are induced by the parasite's activities.

As with the case described here, human ophthalmomyiasis frequently occurs in warm endemic areas but without prior contact with domestic animals (Beri et al., 2002). Affected individuals usually recall contact of the eye with an insect or the sensation of a foreign body falling or striking the eye shortly before the onset of symptoms (Hennessy et al., 1977). Symptoms include pain, irritation, redness, lid swelling, the feeling of movement or pressure, severe lacrimation, discharge, photophobia and blepharospasm. Complications include

subretinal hemorrhages, tractional retinal detachment, endophthalmitis and moderate to severe posterior uveitis (Huynh et al., 2005). Pathological changes are usually related to mechanical trauma caused by the larvae and the inflammatory responses towards them. The clinical differential diagnosis includes follicular conjunctivitis, foreign body conjunctivitis, allergic or viral catarrhal conjunctivitis and other parasitic causes such as the beetles from genus *Paederus* which occasionally penetrate into the conjunctival rima. Conjunctivitis may also be mucopurulent due to secondary infections, with palpebral oedema and blepharospasm and can be so severe as to mimic orbital cellulitis. However, severity of symptoms does not correlate with the number of larvae affecting the eye (Grammer et al., 1995).

Since mechanical extraction is the only accepted management of larval conjunctivitis, it is necessary to double turn the eyelids to ensure that all the larvae have been removed, considering that up to 60 larvae can be found in one eye (Lane and Crosskey, 1993). As also experienced in this case, the removal of the larvae is often difficult and painful, because the larva tenaciously attach to the ocular surface with their hooks and spines. Therefore, irrigation of the conjunctival sac with a saline wash is an ineffective procedure for larvae removal. Although inconclusive, some reports have mentioned that administration of a topical anesthetic could lead to immobilization or loosening of the larval attachment resulting in easier extraction (Fathy et al., 2006). Others suggest washing the conjunctival sac with a cholinesterase-containing solution since this appears to paralyze the larva (Grüntzig and Lenz, 1981; Reingold et al., 1984).

The present case highlights the importance awareness about *O. ovis* to ophthalmologists and lab workers, especially in non-endemic regions, where cases of ophthalmomyiasis are unexpected. To ensure correct laboratory diagnosis the larvae should be preserved in balanced salt solution to avoid dehydration since removal from the eye causes their death. This is essential for exact identification since microscopic evaluation relies upon the translucency of the body, viability of larval

tissue and detection of vulnerable structures such as segmentation, large dark oral hooks and posterior spiracles. In conclusion, when assessing patients with conjunctivitis it is important to include the possibility of ophthalmomyiasis, especially with regard to the potential risk of corneal affection or serious internal ophthalmomyiasis caused by penetrating larval dipterans. Early diagnosis and treatment are essential to avoid subsequent complications.

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