

Myiasis in a dog in Jerusalem

Salant, H.,¹ Mumcuoglu, K.Y.² and Baneth, G.¹

¹ Koret School of Veterinary Medicine, Hebrew University of Jerusalem, Rehovot, Israel.

² Department of Microbiology and Molecular Genetics, The Hebrew University – Hadassah Medical School, Jerusalem, Israel.

* Corresponding author: Dr. H. Salant, Email: Harold.Salant@mail.huji.ac.il, Tel. +972544531029

ABSTRACT

Myiasis is the infestation of live humans or animals by the larvae (maggots) of *Diptera* flies, usually developing on damaged skin or inside body orifices of their host while feeding on its vital or necrotic tissue. We describe post traumatic myiasis due to *Wohlfahrtia magnifica* in a mixed Pit-Bull Terrier dog in Israel. The dog was successfully treated by removing the maggots, administering a larvicidal endectocide, ivermectin, and treating the wound with antibiotics and antiseptic topical washes. Dog owners and veterinarians should pay attention to the presence of myiasis in suppurative cutaneous wounds and in the vicinity of the natural orifices of dogs, during the warm months of the year, especially in animals that are raised outdoors.

Keywords: Canine; Myiasis; *Wohlfahrtia magnifica*.

INTRODUCTION

Myiasis is a parasitic infestation of the body of a live animal by dipterous larvae (maggots) which feed on the living or dead tissue of the host animal (1, 2). Myiasis-producing dipterans may be subdivided into three groups: 1) obligatory, requiring a living host for their development; 2) facultative, which only occasionally lay eggs or larvae on living hosts and usually develop in decaying matter; and 3) accidental myiasis, when eggs or larvae are ingested with contaminated food or come in contact with the urogenital tract (2, 3). Facultative myiasis can be classified as primary, secondary and tertiary, according to the ability of the species to initiate the myiasis (primary) or occurring only after pre-existing myiasis (secondary and tertiary). In addition, the classification of myiasis may be based on the anatomical localization of the larvae on the host, either external or internal: auricular, cutaneous, gastrointestinal, ophthalmic, oral and urogenital (4, 5). *Diptera* associated with myiasis are usually blowflies (*Calliphoridae*), flesh flies (*Sarcophagidae*) and bot flies (*Oestridae*). *Oestridae* are composed of obligate parasites whilst *Calliphoridae* and *Sarcophagidae* are for the most part facultative (1). The health of humans and animals

may be adversely affected by myiasis and if left untreated, can cause serious damage to the host, sometimes resulting in death.

Wohlfahrtia magnifica is an obligate parasite causing wound myiasis, and is widely distributed from the Mediterranean basin, through central and eastern Europe to northern Asia. Infestations with larvae of *W. magnifica* (*wohlfahrtiosis*) have been detected in many domestic animals such as sheep, horse, cattle, pig, and geese (6, 7, 8).

In the following report, we describe a case of *W. magnifica* myiasis in a dog that was presented to the Jerusalem Veterinary Municipal Services in 2020 and discuss its clinical presentation, the morphological identification of the larvae, as well as response to treatment.

CASE STUDY

An intact male mixed breed Pit-Bull Terrier, weighing about 20 kg and 8 months of age, was presented to the Jerusalem Veterinary Municipal Services in July 2020, after having been captured roaming in the eastern quarter of the city. On examination, a large open wound about 6 x 8 cm was noticed on the dorsal inter-scapular region of the dog with

an aluminum-based topical spray over the affected area, presumably previously applied by the owner. On closer examination, movement of numerous dipteran larvae was noticed accompanied with serous exudation from the wound (Figure 1 A,B,C). The dog did not appear to be depressed or bothered by the wound and maggot presence. It was sedated with a mixed suspension of 1.1mg/kg xylazine (100mg/ml; AnaSed, Akorn, IL, USA) /10mg/kg and ketamine (100mg/ml; Clorketam, Vetoquinol, France) IM.

The wound was clipped, disinfected with a 1:10 diluted chlorhexidine solution (Septal Scrub, Teva, Ashdod, Israel) and 3% hydrogen peroxide and larvae were manually removed using a blunt-nosed thumb forceps, and placed into stainless steel beakers with hot tap water.

After removal of all visible larvae, the dog was administered 500 mg intramuscular amoxicillin (Moxyl-LA, Range-Pharma, Malaysia; 150 mg/ml). In addition, 200ug/kg ivermectin (Ivomec, 1%, Vetmarket, Israel) and a pyrethrin dusting powder impregnated with petroleum jelly was applied to the intact skin lateral to the wound in order to prevent flies infesting the affected region in the future.

The dog was administered 500mg cephalexin (Cepharol 500, Teva, Israel) PO BID with food for the next 10 days and the wound was flushed with chlorhexidine twice daily every 12 hours for the first week. The wound underwent complete healing by secondary intention (Figures 2A, B). Healing was completed in four weeks. The larvae were placed in a vial with 70% alcohol and identified according to standard taxonomic keys (1) as the first, second and third instar stages of *W. magnifica* (Figure 3).



Figure 1: A) The lesion on day of initial presentation with maggot presence. B) The same cutaneous ulcerative lesion after removal of the larvae. C) Close-up view of the same lesion after removal of the maggots.



Figure 2: A) Lesion two weeks after initial presentation showing major contraction and reduction in its size. B) Close up view of the same lesion.

DISCUSSION

Myiasis in dogs is seen by companion animal veterinarians, especially in outdoor housed animals (9). This condition is more often observed during the summer months when dipterous flies are prevalent. The condition requires urgent treatment as the lesions may progress in severity in a relatively short period without care. In fact, if left untreated, wohlfahrtiosis infestations can produce mature larvae within five days, resulting in deep wound damage (6). The ears, legs and genitals are the most frequently affected anatomical regions

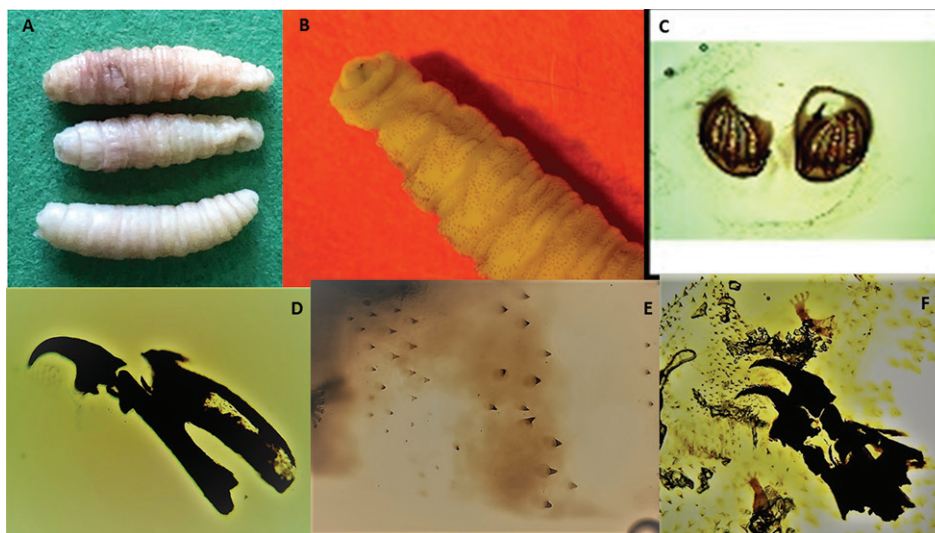


Figure 3: Third instar larva of *Wohlfahrtia magnifica*. A) Overview of three specimens of the third larval stage; B) Pseudocephalon and thoracic segments; C) Posterior spiracle; D) Cephalopharyngeal skeleton; E) Arrangement of the dorsal spines; F) Cephalopharyngeal skeleton and anterior spiracle.

(10, 11), and risk factors for new infestations in animals and humans include open wounds, poor hygiene, advanced age, vascular occlusive disease, and the inability to discourage flies from depositing eggs because of physical impairment (12). Adult female flies are especially attracted to moist exudative areas, typical in ulcerative wounds on affected animals, in order to oviposit eggs.

Pit-bull terriers require specific national licensing requirements for ownership purposes, such as a lack of a previous criminal offense by the owner. In addition, a subcutaneously administered microchip implant to the dog is carried out after its sterilization. Details of the owner and the dog are placed in a computerized national database. However, screening of the animal for a previously implanted microchip was not found to be successful. This particular dog breed is often kept as guard dogs and frequently used for illegal arranged dogfights. Thus, it is likely that the dog had been previously injured from a dog bite and since the owner had not attempted to seek veterinarian care for his/her injured animal, it was abandoned in the neighborhood with a suppurated fresh wound during a warmer, summer period, when *W. magnifica* adult flies are abundant allowing for ideal conditions for infestation of wounds with eggs, possibly due to the odors specific in such lesions (13).

The fact that first, second and third instar larvae were observed in the same wound could be explained by the possibility that adults of *W. magnifica* oviposit on different

occasions on the same wound for several days.

Wohlfahrtiosis has been reported previously by Schnur *et al.* in dogs in Israel (14) and is apparently a common cause of myiasis in dogs as well as other animal species. For example, traumatic myiasis by *W. magnifica* has been reported in horses (7, 15), camels in Mongolia (16), Iran (17) and the Sinai Peninsula (18), sheep in Israel (19), Iran (20) and Italy (21), and cats. One report of wohlfahrtiosis in cats involved cutaneous traumatic myiasis in Israel (14), while the

second case was reported in Italy and involved a young stray cat, where larvae of *W. magnifica* caused a respiratory tract and oral myiasis with heavy infestations of nasal, palatal and lingual tissue (22).

For the treatment of canine myiasis, underlying conditions that predispose animals to develop suppurative lesions, such as otitis externa, bite-wounds, urine or fecal scalding due to incontinence, or moist exudative dermatitis (“hotspots”) should be addressed and corrected. Lesions should be clipped and cleaned to remove maggots. Nitenpyram 1 mg/kg PO administered every 24 hours may be effective against maggots. A pyrethrin- or pyrethroid-containing spray (for dogs only) should be judiciously applied to lesions to kill remaining maggots. Alternatively, macrocyclic lactones, such as ivermectin at a dose of 0.2 to 0.4 mg/kg SC once, is usually effective against maggots. In arthropods, the avermectins interfere with the transmission among nervous and muscular cells, as the GABA receptors are located at the neuromuscular junction (23). In vertebrates, where GABA receptors are located mostly in the brain, avermectins also interact with the GABA receptors but their affinity for the invertebrate receptors is approximately 100 times greater (23). Fluralaner (Bravecto, Animal Health, NJ, USA) administered at 25 mg/kg seems to be effective and safe. If the animal’s overall condition is stable, wounds should be surgically debrided and follow-up routine daily wound care provided. The animal should be

housed in screened, fly-free quarters. The prognosis is good to guarded, depending on predisposing factors.

It may be stressed however that in the presence of deep wounds, larvae may not necessarily be killed by applying local or systemic insecticides, as dead larvae from the targeted treatment within the deeper recesses of the wound may cause additional damage when they begin to decay. Larvae of any myiasis infested animal would normally leave the wound or body orifice when they complete their development, in order to reach a dry environment where they are able to pupate and later become adult flies.

In conclusion, we have presented a detailed report of canine myiasis due to *W. magnifica* in Israel. Both owners and veterinarians should pay attention to any wounds and to the natural orifices of dogs, especially during the warm months of the year in outdoor dogs. Lastly, the role of stray dogs in the overall epidemiology of *Wohlfahrtia* needs to be addressed especially in regions of the world where high numbers of stray carnivores exist associated with domestic livestock in rural settings.

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