1. Introduction

Myiasis is the infestation of host tissue with maggots, i.e. the larvae of various species of flies. Ophthalmomyiasis specifically is the infestation of the eye, which can be further classified into ophthalmomyiasis externa and ophthalmomyiasis interna. Externa describes involvement limited to the periocular structures including the eyelids, conjunctiva and cornea, while the interna variant involves penetration of the globe including the retina and vitreous, which can have much more serious, vision-threatening consequences.

Most reported cases of ophthalmomyiasis are in warmer climates, predominantly in the Middle East and Mediterranean regions.\(^1\)\(^,\)\(^10\) Additionally, the vast majority of cases are associated with rural settings and extensive contact with livestock - the most common host of flies causing this condition.\(^3\)\(^,\)\(^5\)\(^,\)\(^6\)\(^,\)\(^8\)\(^,\)\(^10\) The most common species in ophthalmomyiasis externa worldwide is the *Oestrus ovis*, or the “sheep botfly,” whose main hosts are sheep.

Much more rarely, ophthalmomyiasis externa has also been reported in North America. Much like the rest of the world, almost all of the cases were associated with warmer climates and rural settings. The greatest number of case reports occurred in patients who visited Santa Catalina Island, California, a rural setting with a large indigenous goat population.\(^4\)\(^,\)\(^5\)\(^,\)\(^9\) Although there were two case reports of ophthalmomyiasis in the more urban settings of Garland, TX, Atlanta, GA and Central Valley, CA, these again were mainly in warmer climates, similar to those reported internationally.\(^3\)\(^,\)\(^7\)\(^,\)\(^9\)

Like ophthalmomyiasis, aural myiasis, the infestation of the ear with fly larvae, is also very rare. Similar to the geographic and climate distribution of its ocular counterpart, most case reports of aural myiasis are from warmer climates such as the Middle East, the Mediterranean, and Asia.\(^2\)\(^,\)\(^6\) In contrast to ophthalmomyiasis, the most common species is *Wohlfahrtia magnifica*. Patients described in case reports were mostly children or those with debilitating conditions.\(^2\)\(^,\)\(^6\)

To our knowledge, there have not been any previous case reports of concurrent ophthalmomyiasis externa and aural myiasis in the same patient. We report a case of concurrent ophthalmomyiasis externa and aural myiasis in a male who presented to an urban hospital in Philadelphia, PA.

2. Case report

A 44 year-old homeless man with untreated HIV, cirrhosis secondary to alcohol abuse, hepatitis C and bipolar disorder was transferred from an outside hospital for management of maggots noted in his right eye and ear canal. He was initially found unresponsive for an unknown period of time by Emergency Medical Services, next to a...
dumpster and covered in his own urine and excrement. Upon arrival, the patient complained of significant headache, right eye pain, blurry vision, and right ear pain. He denied any other systemic complaints, recent illnesses, travel or exposure to livestock.

His visual acuity was 20/200 in the right eye and 20/60 in the left eye. The right eye had significant conjunctival injection and chemosis, and a central corneal epithelial defect. Examination of the fornices revealed a single cream-colored larvae moving across the eye (Fig. 1). No globe penetration or posterior involvement was noted on dilated fundus exam. Examination of the left eye was benign.

Examination of the ears revealed several maggots burrowed in each external auditory canal (Fig. 2). Both tympanic membranes were intact.

Laboratory evaluation was significant for pancytopenia, a blood ethanol level of 200 mg/dL and negative blood and urine cultures. CT imaging of the temporal and maxillofacial bones showed soft tissue swelling within the right external auditory canal, right middle ear cavity and bilateral mastoids without osseous erosion.

One cream-colored, live maggot was removed from the right eye at the bedside by the ophthalmology service. It measured approximately 10 mm by 1 mm (Fig. 3, Video 1). Proparacaine hydrochloride 0.5% eye drops were instilled in the right eye prior to the maggot being extracted with plastic forceps. No other maggots were found. Ophthalmic betadine was then copiously instilled on the ocular surface.

Supplementary video related to this article can be found at https://doi.org/10.1016/j.ajoc.2020.100590.

Numerous maggots were then extracted from each external auditory canal by the otolaryngology service at the bedside. Due to incomplete visualization of the auditory canals and poor patient cooperation, the patient was taken to the operating room the next day for further examination under anesthesia. The remaining maggots were removed completely in the operating room. No penetration of the tympanic membranes was noted.

The extracted specimens were sent to the pathology laboratory for further evaluation, but unfortunately, they were not able to be definitively classified.

The patient was started on erythromycin 0.5% ophthalmic ointment 6 times daily in the right eye, ofloxacin 0.3% drops 2 times daily and prednisolone acetate 1% drops 2 times daily in both ears. The patient improved significantly over his five-day hospital course following manual extraction of the larvae and topical administration of antibiotic and steroid therapies.

The patient was subsequently lost to follow-up after being discharged from the hospital.

3. Discussion

We report a case of concurrent ophthalmomyiasis externa and aural myiasis that resolved with relatively conservative management. Our case is unique in several respects, including the geographic location, urban setting and relatively temperate climate of Philadelphia, PA. Ophthalmomyiasis externa and aural myiasis have mostly been reported in warm, humid climates. Located in the more temperate northeastern United States, the location is certainly atypical. Additionally, most cases of myiasis are associated with recent close interactions with livestock and/or wild animals, in a rural location. Our patient lived in an urban city and did not have any interactions with the typical livestock or animal hosts.

Furthermore, previous cases of ophthalmomyiasis externa were mostly reported in otherwise healthy individuals. Our patient, in contrast, had significant comorbidities and was in a severely deconditioned state with poor self-care and hygiene. These characteristics are more consistent with case reports of aural myiasis. Being found down after a prolonged period of immobility next to a trash dumpster undoubtedly also placed him at a higher risk of developing myiasis.

One limitation of our case report is the lack of speciation of the larvae removed from the ocular surface and auditory canals. Although likely from one primary source, it is difficult to conclude without definitive classification of the larvae. Additionally, we cannot ascertain if this case fits the profile of the most typical species in ophthalmomyiasis and aural myiasis. Previous cases of ophthalmomyiasis involve larvae in the first stage, or instar, of development, when they are generally less than 1 mm in size. Given the much larger size in our case, we postulate that it may represent a later stage in development, which again highlights the unique nature of our case.

Finally, given the relative rarity of both ophthalmomyiasis and aural myiasis, there is a lack of standard protocol for the management and treatment of both conditions. Previous reports have described the use of topical anesthetic drops such as proparacaine hydrochloride 0.5% and cocaine hydrochloride 4% to facilitate removal of the larvae by causing paralysis. Additionally, topical antibiotic ointment has been used in an attempt to suffocate the larvae. Systemic prophylactic treatment with albendazole 400 mg for 3 days has been reported in conjunction with manual extraction. Another case report described the use of a single dose of ivermectin to aid in the spontaneous emigration of larvae for
better visualization for extraction\textsuperscript{11}. In our case, the patient was successfully treated with bedside manual extraction with forceps after instilling several drops of proparacaine 0.5%, which may have aided in slowing the larvae for removal. This was followed by copious irrigation with ophthalmic betadine and treatment with erythromycin 0.5% ointment for the corneal epithelial defect and the prevention of bacterial infection. Given the patient’s improvement over the course of his hospital stay, we did not initiate systemic antimicrobial treatments. Close follow-up and timely removal of the larvae are important for resolution of the infestation, and to prevent more serious complications, such as penetration of peri orbital structures and the globe, which can lead to sight-threatening ophthalmomyiasis interna. Additionally, in our case, aural myiasis was successfully treated with manual extraction, irrigation and topical antibiotic and steroid drops.

4. Conclusion

In summary, we describe a case of concurrent ophthalmomyiasis externa and aural myiasis in a severely deconditioned patient. Although rare in urban settings in the United States, in certain demographic populations, it is important to consider myiasis in the setting of eye and ear pain and to perform a complete eye and ear examination.

Patient consent

Written consent was unable to be obtained from the patient as he did not follow up and could not be reached. No patient-identifiable information is included in the case report.

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Authorship

All authors attest that they meet the current ICMJE criteria for

Declaration of competing interest

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