

Ophthalmomyiasis Externa: A Potentially New Challenge to the Medical Climate in the United States

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ABSTRACT

This reviews the first document of bilateral ophthalmomyiasis externa due to *Calliphoridae* in the United States. This fascinating study demonstrates how *Calliphoridae* can induce severe trauma to the cornea and ocular surface via mechanical disruption and enzymatic digestion of these tissues. This study underscores the importance for clinicians to use a multi-layered treatment approach including complete debridement, pharmacologic treatment, secondary management of complications and continued monitoring for late recurrence in order to obtain the optimal visual outcome. Given ophthalmomyiasis typically occurs in tropical climates, this study may be just another example of how climate change is contributing to alterations in the profile of infectious vectors in our environments.

Keywords: Epidemiology; Maggot; Ophthalmomyiasis; Orbital myiasis

DESCRIPTION

Myiasis refers to infection with maggots, the larval stage of flies. Myiasis may be facultative where larvae incubate opportunistically in wounds or necrotic tissue or obligate where larvae feed on living tissues. Ophthalmomyiasis denotes a larval infection of the eye or ocular tissues. Ophthalmomyiasis remains a rare condition with less than 300 cases reported in the last century [1]. A recent case report by Wolek, et al., [2] of ophthalmomyiasis externa, where larval infestation is limited to external eye structures, highlights the importance for clinicians to remain aware of this serious medical condition as well as the importance of prompt and multi-faceted treatment that address both ocular and systemic concerns.

The reported study describes a 30-year-old male, the victim of an assault who was found unconscious beside a garbage receptacle. His past medical history was notable for multiple comorbidities including a history of alcohol use disorder, diabetes, bipolar disorder and anxiety. At presentation, he exhibited bilateral ocular maggot infestation, altered mental status and bloody secretions from both ears. Computed Tomography (CT) imaging revealed loss of the anterior chamber space in the left eye but an otherwise normal globe.

As described treatment of the reported infection followed a straightforward algorithm that addressed both ocular and systemic concerns of the infections, namely

- Complete debridement and primary repair.
- Pharmacologic treatment.
- Management of complications/secondary repair.
- Monitoring for recurrence. This particular study highlights many of the nuances and challenges of treating such infestations.

Following vacuum extraction of all the externally located and visible maggots, a more thorough examination with complete debridement was performed in the operating room. In this general anesthesia was required. This allowed for full examination with manipulation and eversion of the eyelids to completely expose the fornixes where additional maggots had migrated to avoid the exam light. Without complete visual exposure of the fornixes, the possibility of leaving maggots behind would have been more likely. After removal of all ocular maggots, the surface was cleansed with betadine and the full extent of the severe ocular surface trauma became evident. Although most of the corneal stroma and epithelium were absent

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Received: 28-Dec-2023, Manuscript No. JCEO-23-28761; **Editor assigned:** 01-Jan-2024, Pre QC No. JCEO-23-28761 (PQ); **Reviewed:** 15-Jan-2024, QC No. JCEO-23-28761; **Revised:** 22-Jan-2024, Manuscript No. JCEO-23-28761 (R); **Published:** 29-Jan-2024, DOI: 10.35248/2155-9570.24.15.966

Citation: Langman L, Galenchik-Chan A, Tourmouzis K, Chou T, Honkanen R (2024) Ophthalmomyiasis Externa: A Potentially New Challenge to the Medical Climate in the United States. J Clin Exp Ophthalmol. 15:966

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due to the action of the maggots, a perforating wound was not present and no primary surgical closure was required. Following ocular debridement and cleansing, a full body cleansing with chlorhexidine to remove any other larvae and eggs that may have been deposited elsewhere on the body was performed. The patient was treated with both topical and systemic medications to prevent recurrent infection with larvae or superinfection of the ocular tissues damaged by the infection. In this particular study, the patient received topical treatment with ofloxacin eye drops and erythromycin ophthalmic ointment. Systemic coverage with a single dose of oral ivermectin 200 µg/kg and broad-spectrum intravenous antibiotics including vancomycin, cefepime and metronidazole for empiric coverage of orbital cellulitis was initiated. This local and systemic regimen was successful in preventing recurrence, supporting the effectiveness of a comprehensive approach to treatment.

Despite the successful debridement and prevention of recurrence, the patient suffered severe ocular trauma due to the *Calliphoridae* infestation. Since the 1970s, the reported case by Wolek, et al., [2] marks a significant milestone as it is the first documented instance of bilateral facultative ophthalmomyiasis externa due to *Calliphoridae* in the United States. *Calliphoridae* are relatively common causes of facultative myiasis but do not cause ophthalmomyiasis as frequently as the most common species *Oestrus ovis* and *Hypoderma tarandi*. *Calliphoridae* larvae are predominantly flesh breeders but can also use other food sources including excrement and garbage containing meat scraps as well as human wounds as in the report [3]. *Calliphoridae* larvae can cause significant tissue destruction from their mouth hooks which mechanically grind tissues and from the proteolytic enzymes in their excreta which break down proteins. These actions explain the extensive ocular surface injury seen in the more severely affected left eye in the report. Despite the comprehensive debridement and pharmacologic prevention, the extensive damage done required multiple reconstructive procedures of the anterior segment and such a prolonged visual recovery that it was too premature to report the ultimate visual outcome at the time of publication. The severity of ocular injury observed serves as a stark reminder of the potential consequences of this rare condition and the need for prompt, comprehensive intervention. Fortunately, this patient never developed findings consistent with ophthalmomyiasis interna or orbital disease during his long-term follow-up reported.

In the described report, the authors also review patient and environmental risk factors for ophthalmomyiasis. The report underscores the fact that these cases can be reported in all areas and that at risk populations may be broader than previously thought. Although ophthalmomyiasis occurs more commonly in tropical, developing and rural regions, recent reports of ophthalmomyiasis in metropolitan areas exist. Patient risk factors include poor hygiene, history of trauma and multiple comorbidities. Environmental risk factors include warmer climate, poor sanitation, high population density and proximity to non-domesticated animals [4]. Although the study reported

had several personal risk factors present, one must also consider environmental risk factors including the possibility of climate change. Our review of the literature found that out of the 16 reported cases in the United States, 10 occurred in warm, humid regions such as California and the Southeastern US. Among the remaining six, five specified occurrences during the summer months in the Northeastern United States, while the last one did not mention the time of year. This further supports the link between warm temperatures and risk of infestation. A link between climate and changes and other infectious vectors including tick borne diseases in the Northeast has already been postulated and remains an area of active study [5,6]. The fact that this was the first case of ophthalmomyiasis due to *Calliphoridae* in the United States may support the possibility of other less obvious contributing factors, including climate change to this case.

CONCLUSION

The first case report of bilateral ophthalmomyiasis externa due to *Calliphoridae* in the United States highlights the severe ocular trauma and sight threatening complications that can result from this rare infestation. The study serves as a poignant reminder for all healthcare professionals to be aware of the appropriate treatment measures for such infections, particularly in populations already known to be at risk. Employing a multilayered approach, including systemic treatment, can increase chances for a successful outcome. The broader considerations of environmental risk factors, including warm climate, underscores the potential evolving nature of this entity and the need for continued awareness in diverse settings even those not previously thought to be at high risk for such infestations.

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