

Role of Ivermectin in the Treatment of Severe Orbital Myiasis Due to *Cochliomyia hominivorax*

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We describe 2 patients with severe orbital myiasis due to *Cochliomyia hominivorax* (of the order Diptera and the family Calliphoridae) who had underlying skin carcinomas and were treated with oral ivermectin and debridement. We suggest that ivermectin plays an important role in the treatment of severe cases of myiasis.

Human myiasis is the invasion of human tissue by larvae from the order Diptera. Furuncular myiasis is caused by *Dermatobia hominis* in the Americas and by *Cordylobia anthropophaga* in Africa. Wound myiasis is caused by the larvae of *Wohlfahrtia magnifica*, the Eastern Hemisphere screwworm *Chrysomya bezziana*, or the Western Hemisphere screwworm *Cochliomyia hominivorax* [1–5].

During the larvae phase, the *C. hominivorax* fly (Coquerel, 1858) requires warm-blooded mammals, including humans, for its development [3–7]. Therefore, parasitic larval forms invade human skin and subcutaneous tissue; this process is the reason for the scientific Latin name *C. hominivorax*, which means “human eater.” Larval infestation of cattle is associated with significant economic loss in countries with ecological conditions conducive to the growth of *C. hominivorax*. Areas of endemicity for illness due to *C. hominivorax* include the region from Southern Mexico to Northern Argentina and the Caribbean; more recently, there have been many cases of myiasis reported in the Canary Islands and limited areas in Northern Africa. There are no reported cases of myiasis due to *C. hominivorax* in areas where the average temperature is lower than 12°C [2–5].

Female *C. hominivorax* flies are attracted to human secretions

produced in skin wounds, including blood or pus; they can deposit >3000 eggs in these wounds. The eggs hatch and the larvae develop, feeding on live human tissue [2, 3]. The larvae penetrate tissue, forming a pocketlike wound and causing significant tissue destruction. However, occasionally, the female flies may be attracted to natural human secretions produced in the nostrils, eyes, ears, vagina, or rectum [5]. The female *C. hominivorax* is able to fly long distances to seek a host in which to deposit her eggs [2–5].

In many areas in Colombia, the occurrence of myiasis has been a persistent public health problem for centuries. There are descriptions of myiasis that date to the era of Spanish colonization [2–4]. These early descriptions include many accounts of cases of severe facial myiasis. We believe that there is an underreporting of cases of myiasis due to *C. hominivorax* in Colombia; therefore, we do not know the precise prevalence of this condition, even in areas of high endemicity. However, we are aware of many anecdotal reports of illness with severe facial and orbital involvement that are often associated with an elevated case-fatality rate.

The successful use of ivermectin to treat myiasis in animals has led to its use in humans, with significant success for the treatment of various parasitic diseases [7–10]. The experience in the medical community of using ivermectin along with surgical debridement for the treatment of orbital myiasis is limited. Here, we report 2 cases of persons with orbital myiasis with severe tissue destruction in which initial therapy with ivermectin followed by surgical debridement proved to be an effective strategy.

Case 1. A 79-year-old man who works in agriculture and lives alone sought medical care at our institution because of a 15-day history of purulent secretions coming from his left orbital area. He had a 5-year history of an underlying orbital mass that had been evaluated only by a local healer and had been treated with herbs and local remedies. On hospital admission, his vital signs were within normal limits, and he was alert and oriented. He had a large, ulcerative lesion in the left orbital area involving the left eye, with significant necrosis and extensive tissue destruction with erythematous borders and macroscopic evidence of myiasis (figure 1).

His initial treatment consisted of oral ivermectin therapy (a single dose of 200 µg/kg per day), along with ampicillin-sulbactam therapy (3 g intravenously every 6 h) to cover for bacterial superinfection. A few days later, after significant improvement in swelling and death of the larvae, the patient underwent surgical debridement with enucleation of the left eye.

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Figure 1. Severe left orbital myiasis due to *Cochliomyia hominivorax* infestation.

The patient did well during the surgical procedure, but in the immediate postoperative period, he developed a third-degree atrioventricular block that subsequently led to asystole that did not respond to resuscitation maneuvers. Histopathological examination demonstrated the presence of a moderately differentiated squamous cell carcinoma of the skin with clear borders. Entomological assessment of the larvae extracted on admission revealed that they were *C. hominivorax*.

Case 2. A 76-year-old man from Cundinamarca, Colombia, sought medical care at our institution because of a 1-week history of swelling, erythema, and pain in the left orbital area. He also noted the presence of parasitic larvae coming out of the swollen area. He mentioned having an ulcerative lesion in the underlying skin area of the left orbital region for the past 15 years. He was single, had never attended school, and worked in agriculture. On hospital admission, he had significant swelling and erythema surrounding a 7-cm ulcerative lesion in the left malar and orbital area, with extensive necrosis, purulent secretion, and the presence of multiple white larvae (figure 2). One of the larvae was submitted for entomological assessment. The patient was treated with a single dose of ivermectin (200 µg/kg per day) and ceftriaxone (2 g intravenously every 24 h), with significant improvement of the lesion, followed by surgical debridement without enucleation. Histopathological analysis of the surgical specimen demonstrated an underlying, ulcerated skin basocellular carcinoma.

Discussion. The majority of human cases of myiasis in the Western Hemisphere are caused by *C. hominivorax* infestation [1]. This screwworm was first discovered outside of North and South America, but it has remained a persistent pest only in the Western Hemisphere [2]. In some countries during the warmer seasons, the burden of myiasis in cattle is considered

a significant public health zoonosis. Epizootic of myiasis usually correlate to the occurrence of epidemics in humans [3].

These 2 cases, as well as previous reports, demonstrate the ability of *C. hominivorax* larvae to produce severe internal orbital myiasis in patients with underlying skin carcinomas [8]. However, in most of these reports, myiasis has been caused by the Eastern Hemisphere screwworm *C. bezziana*. Our patients lived in areas of high endemicity with ecological conditions conducive to the development of *C. hominivorax* (an altitude ~1500 m above sea level with an average temperature of 20°C year-round). Both patients demonstrated substantial orbital involvement and likely became infected because female *C. hom-*

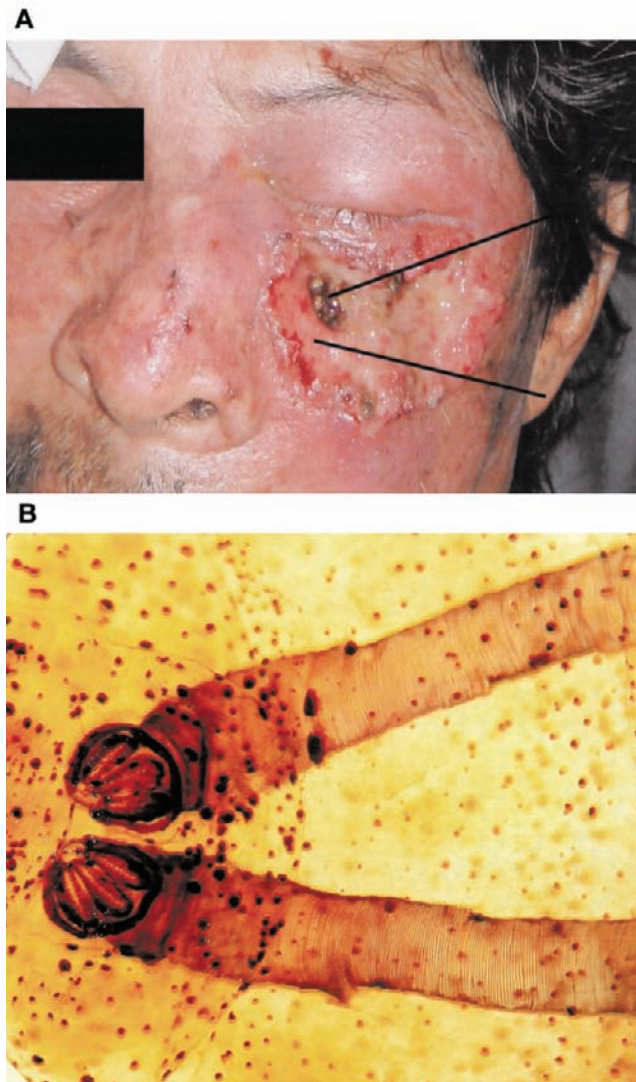


Figure 2. A, An ulcerative lesion in the left malar and orbital regions with extensive necrosis, erythema, purulent secretion, and left proptosis (black bars). B, Parasitologic identification of *Cochliomyia hominivorax* larvae, showing the pigmented tracheal trunks leading from the posterior spiracles (original magnification, ×400).

inivorax flies were attracted to the ulceration of their skin carcinoma lesions. Cases of severe myiasis usually occur in patients living in low-resource areas, and there is frequently a concomitant history of alcohol use, social isolation, and poverty.

Successful treatment of orbital myiasis depends on the degree of involvement at the time of the initial evaluation and the severity of underlying predisposing conditions. Historically, treatment entails mechanical extraction of the maggots, and it has been suggested that there is no antiparasitic therapy that will dislodge the larvae [7–10]. In addition, cases of severe orbital myiasis require prompt surgical debridement to prevent the risk of involving vital structures. More recently, the use of antiparasitic therapy has been suggested as a potential adjunctive treatment. Ivermectin is a semisynthetic macrocyclic lactone that has been demonstrated to have activity against *Strongyloides stercoralis*, *Ancylostoma braziliense*, *C. hominivorax*, *Dermatobia hominis*, *Filaria bancrofti*, *Wuchereria malayi*, *Onchocerca volvulus*, and *Loa loa*, as well as ectoparasites, such as *Sarcoptes scabiei*, *Pediculus humanus*, *Demodex folliculorum*, and *Cheyletiella* species. Ivermectin has, therefore, become an important alternative for the treatment of patients with different forms of ectoparasite infestations, such as scabies, head lice, demodicidosis, and myiasis [2, 3, 7–10].

Neoadjuvant ivermectin therapy prior to surgical debridement has been recommended to prevent enucleation in patients with massive orbital involvement or to avoid the difficulties associated with mechanical removal of the larvae [9]. In our patients, the main objective of using ivermectin was to prevent the subsequent need for enucleation, prevent further extension of the necrotizing process to deeper structures, and, therefore, decrease the risk of lethal outcome. In addition, ivermectin is used to avoid the need for mechanical removal of the larvae that sometimes is problematic and that often requires extensive debridement, with resultant unfavorable cosmetic and functional results. Higher doses of ivermectin (400 µg/kg), similar to what is currently recommended for the treatment of *W. bancrofti* or *L. loa* infestation, may prove to be more beneficial than the dose that we used for the treatment of our patients (200 µg/kg).

Our patients demonstrate that ivermectin is an important part of the medical armamentarium for cases of severe orbital myiasis. Our first patient sought care when ocular involvement was very advanced, so we were unable to avoid enucleation. However, we were able to demonstrate that the use of ivermectin decreased the associated inflammation and destructive process prior to debridement. However, in our second patient, we were able to avoid an extensive surgical debridement and enucleation of the left eye with the use of ivermectin. In summary, we suggest that ivermectin should be considered as a standard antiparasitic recommendation for cases of severe myiasis to prevent the need for extensive surgical debridement.

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