

## Ocular Loiasis in a US Soldier

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### Abstract

While loiasis is endemic to areas of equatorial Africa, sporadic cases have been diagnosed among travelers and migrants. Reports of *Loa loa* are rare in the U.S. and often asymptomatic patients remain undiagnosed. However, as international travel becomes more common, the risk of loiasis does as well. Although the clinical features associated with loiasis can be life-threatening, there are several treatments available that can minimize, alleviate, and often cure loiasis. The treatment regimen for loiasis is thorough and the particular treatment should be chosen depending on the severity of the patient's case. The following report presents a case of *Loa loa* in a soldier serving in the U.S. Army that was surgically removed.

**Keywords:** Retinitis/parasitology; Optic neuritis/pathology; Eye infections; Parasitic; *Loa loa*

### Introduction

Ocular loiasis is extremely rare in the United States. *Loa loa* filariasis (also known as loiasis, Calabar swellings, Fugitive swelling, Tropical swelling and African eyeworm) is a skin and eye disease caused by the nematode worm, *Loa loa*. Humans contract this disease through the bite of a Deer fly or Mango fly (*Chrysops spp*). The adult *Loa loa* filarial worm migrates throughout the subcutaneous tissues of humans, occasionally crossing into subconjunctival tissues. As the adult worm migrates to the eye, it crawls beneath the conjunctiva, causing transient conjunctival inflammation and edema. The adult worm usually measures 3 to 7 cm by 0.3 to 0.5 mm and typically migrates at the rate of 1 cm per minute. The worm is often directly visible as it crosses the conjunctiva, which usually takes approximately 10 to 20 minutes. Spontaneous resolution of symptoms occurs after the worm has left the eye, and there are usually no sequelae. In most cases, however, the worm is surgically removed [1].

### Case Report

A 31-year-old male U.S. Army soldier presented complaining of "something moving in my right eye." The patient was born and raised in Cameroon and immigrated to the U.S. in 2009. Four months prior to presentation he visited his hometown in Cameroon.

A thorough eye examination was performed. Slit lamp examination showed the presence of a live adult nematode 450 mm in length with a diameter of 0.5 mm, visible in the lateral subconjunctival space of the right eye (Figure 1). After informed consent, surgical removal was performed under local anesthetic (both topical with proparacaine and locally injected with 2% lidocaine). The worm was carefully removed, submitted for pathologic examination and identified as a gravid female *Loa loa* worm. The patient was discharged home and instructed to use erythromycin ointment to prevent secondary bacterial infection.

### Discussion

*Loa loa* is generally unknown outside endemic areas. Pasos reports on 10 cases of ocular loiasis that have occurred outside Africa, including on case in the US among a 24 year old immigrant [2,3]. Recently, the disease has gained more attention as it complicates treatment of another ophthalmic filarial disease, onchocerciasis, which the World Health

Organization has worked diligently to eradicate [4]. An estimated 20 to 40 million people are infected with *Loa loa* worldwide [5]. However, in the United States, loiasis remains quite uncommon. While sporadic cases have been documented as far back as the 1930s, cases of ocular loiasis are becoming increasingly common in the U.S. due in part to population mobility [4].

*Loa loa* has a predilection for ocular tissues. Most individuals with *Loa loa* infection are asymptomatic. The two cardinal clinical manifestations of loiasis are Calabar swellings and migration of the adult worm across the subconjunctiva of the eye. *Loa loa* worms usually appear subconjunctivally or in the periorbital subcutaneous tissues, but can sometimes present in the anterior chamber. *Loa loa* is often detected



**Figure 1:** Slit lamp examination showed the presence of a live adult nematode 450 mm in length with a diameter of 0.5 mm, visible in the lateral subconjunctival space of the right eye.

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when patients complain of something moving in or near their eye. Other associated symptoms can include joint swellings, angioedema and diffuse pruritus. Localization of a worm subconjunctivally or in the periocular subcutis is highly indicative of *Loa loa*, but other nematodes have been found in similar locations [6-8].

The *Chrysops* flies that transmit the nematode are indigenous to the high-canopied rain forest, swamps, streams, and moist areas full of rotting vegetation found in West and Central Africa. The fly is most active during the mid-day and rainy season, resulting in increased transmission [9]. These vectors are thought to be attracted by the movement of people and wood smoke. The *Chrysops* fly requires a blood meal in order to produce eggs that are deposited near water. During a blood meal, a vector introduces the larvae onto the skin where it gains entrance through the bite wound. After inoculation by an infected fly, adult worms take approximately 5 months to mature in the human host and have been reported to live for as long as 17 years. Thus, *Loa loa* may present many years after the patient was in an endemic area.

Treatment of loiasis is complex and various treatments are used depending on the severity of the individual's case. For adult worms the most effective treatment is surgical excision. This treatment, however, is limited as it can be only used if the worm is shallow and able to be isolated.

Apheresis, a procedure performed to decrease the microfilarial loads at a substantial rate, is a known treatment for loiasis, but is rarely used. Apheresis, an expensive technology, has limited availability, as most patients live in remote areas far removed from modern facilities. Furthermore, apheresis must be followed by oral therapy. Resultantly, antihelminthic drugs are presumed to be the most beneficial and efficacious treatments available.

There are currently 3 antihelminthic drugs commonly used in the treatment of loiasis: diethylcarbamazine (DEC), albendazole (ALB), and ivermectin (IVM). DEC is the preferred chemotherapeutic agent as it has rapid and highly effective cidal action against both microfilariae and adult worms. DEC is the only agent among the 3 drugs discussed that produces a microfilaricidal effect. Although DEC has a high efficacy rate, more than one dose is required to cure *Loa loa* infection. Since DEC crosses the blood-brain barrier, however, it cannot be used with high filarial loads defined as >8000 MF/mL, as this may cause serious morbidity and/or mortality. Side effects that can occur even at low microfilarial loads include pruritus, muscle or joint pains, swelling of the face or limbs, encephalitis, retinal hemorrhage, and even death [5,7].

ALB is used as an alternate treatment due to its degenerative effect on the cells of the worm. However, because of its slow gastrointestinal absorption, microfilarial level reduction takes significantly more time. Although ALB has a minor effect on *Loa loa*, it is suspected of having an embryotoxic effect that interrupts embryogenesis of female worms.

IVM, a microfilaricide, has been shown to reduce microfilarial densities. The densities remain at a decreased level due to either a macrofilaricidal or embryostatic effect. In addition to decreasing microfilarial densities, IVM also has a positive effect on the clinical features associated with loiasis. While IVM is generally used for treatment of onchocerciasis, in patients with both onchocerciasis and loiasis (a common occurrence since endemic areas overlap greatly), administration of IVM can sometimes cause serious side effects including coma, encephalitis, retinal hemorrhage and membranous glomerulonephritis. This is why patients suspected of *Loa loa* must always be screened and treated for onchocerciasis prior to initiation of

treatment. Our patient was screened and found free of onchocerciasis; his microfilarial load was 300-400/ml, thus making him an ideal candidate for DEC.

Although several treatment options available, the particular treatment chosen is dependent upon the severity and risk of adverse events of the individual's case. The severity of the individual's case is determined by the *Loa* microfilarial density, which is observed by a blood smear. Treatment must be carefully assessed due to the array of events that could occur depending on the amount of microfilariae present in the blood.

ALB does not usually present adverse events and is generally regarded as safe. However, due to the possibility of an adverse event occurring when using DEC or IVM, a careful strategy must be followed. *The Journal of Travel Medicine* suggests the following guidelines:

1. DEC should be used if the subject's microfilarial density is below 2000 mf/ml.
2. IVM is recommended in patients with a microfilarial density between 2000 and 8000 mf/ml. IVM can also be used when the densities are between 8000 and 30000 mf/ml, however, the patient should be under close observation.
3. ALB is suggested as the most efficient treatment for patients with microfilaremia exceeding 30000 mf/ml [10].

There are several factors that increase the difficulty of mitigating a *Loa loa* infection. First, patients presenting with a loiasis infection are usually from various geographic regions and therefore require a detailed analysis of their symptoms to ensure that the appropriate treatment is provided. Also, DEC while highly efficacious is not always readily available. Each individual's treatment plan will differ, making it laborious for providers to treat their patients in a timely manner.

Currently, researchers at the National Institutes of Health are conducting clinical trials investigating whether pretreatment with reslizumab, a humanized monoclonal antibody directed against IL-5 can decrease the side effects seen with administration of DEC. While studying *Loa loa*, it was noted that severe adverse reactions were accompanied by dramatic increases in IL-5 with a subsequent rise in eosinophils. In theory, by administering reslizumab 3 to 7 days prior to administration of DEC, a patient will be prevented from developing eosinophilia and resultantly have less adverse side effects [11].

Our patient was admitted to the National Institute of Health and given reslizumab. He was monitored over the weekend and DEC was initiated the following Monday. Our patient reported malaise and fatigue and developed generalized pruritus and fevers, which were well-controlled with an antihistamine. Four days after hospitalization, the patient's symptoms resolved and he remained asymptomatic over the 4 remaining weeks of therapy.

As the world becomes more diverse and the leisure of travel becomes more available, the incidence of loiasis may continue to increase. Therefore, providers far removed from areas of endemicity are advised to consider this diagnosis in any "at-risk" patient with unexplained ophthalmic foreign body sensation. Loiasis infections can be critical, but can be treated and usually cured when the proper treatment strategy is enforced.

## Disclosures

The authors attest that the views expressed herein are those of the authors and do not reflect the official policy of the Department of the

Army, Department of Defense, or the U.S. Government. There are no sources of financial interest or potential conflicts of interests.

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