

## A Stowaway, Case Report of Subconjunctival Dirofilariasis

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### 1. Abstract

We report the case of a 56-year-old man with subconjunctival ocular dirofilariasis caused by *Dirofilaria repens*. The treatment consisted in the surgical extraction of the parasite. The parasite species was identified via polymerase chain reaction.

### 2. Introduction

*Dirofilaria repens* is a filarial nematode of domestic and wild carnivores (dogs, cats and foxes), usually found in the hosts subcutaneous tissue, and can accidentally infect humans [1-3]. Of all dirofilaria species, *D. immitis* and *D. (Noctiella) repens* are most commonly involved with human infection due to their high prevalence and incidence although other dirofilaria species like *D. tenuis*, *D. ursi* or *D. subdermata* can infect humans [1, 4]. Infective larvae are transmitted by mosquitoes during a blood meal and develop into adult worms in animals and into immature worms in aberrant hosts such as humans [1]. The most common site for human dirofilariasis are subcutaneous and ocular lesions causing itching, erythema and swelling [5-7] or foreign body sensation [8]. Treatment usually consists in the surgical removal of the parasite [9].

### 3. Case Report

A 56-year-old man living in Tirol, Austria, presented with a foreign body sensation and redness in the left eye. Symptoms started the day before with a sudden pain covering the left half of his face and lasting for about 30 minutes followed by the aforementioned foreign body sensation and redness. Visual acuity was 0.2 without glasses on the right eye, due to a working accident with an intraocular foreign body about 20 years ago. Visual acuity on the left eye was 0.8 without glasses.

Intraocular pressure was normal on both eyes (14mmHg in the right eye and 16mmHg in the left eye, respectively).

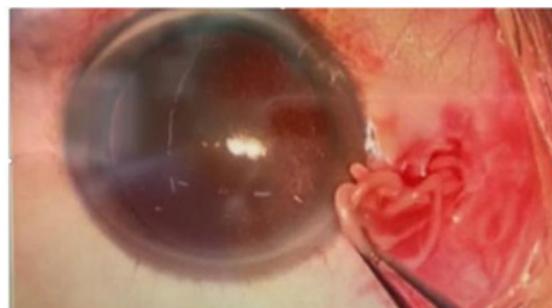
On slitlamp examination, a thin, coiled worm like structure was seen in the medial subconjunctival space in the left eye. Corneal examination of the left eye was normal and no evidence of an anterior chamber reaction was seen. Fundus examination of both eyes was normal.

Under topical anaesthesia, a small conjunctival incision was made followed by a careful extraction of the worm with a forceps (Figure 1).

It was preserved in formaldehyde, and sent to the hygiene and medical microbiological division for identification. Based on the morphological features, the parasite was identified as *Dirofilaria repens* which was later confirmed via PCR by the Institute of Parasitology of the medical university of Vienna. No additional antibiotic or antihelminthic treatment was considered necessary.

Previous symptoms such as itching or migratory swelling were denied by the patient, also no contact to animals was reported, neither private nor at work.

The patients travel history included annual stays in Croatia and Serbia for a few weeks during summer as well as sporadic stays northern Italy.



**Figure 1:** Surgical extraction of the parasite

#### 4. Discussion

Dirofilariasis is a parasitic, vector borne disease caused by species of the genus *dirofilaria* and transmitted by mosquitoes, infesting wild and domestic animals of several orders, as well as humans, with canids as the predominant definitive host [1-3].

During a blood meal mosquitoes ingest the microfilariae (L1 stage) which then develop into the L2 larval form and consecutively from L2 into the infective L3 stage. Infective L3 larvae reside in the mouthparts of the vector until transmission during a blood meal. In the new host L3 larvae develop into L4 larvae and consecutively into preadult worms [1, 3]. *D. immitis* worms take residence in the pulmonary artery and right ventricle of canine hearts, causing heartworm disease and can cause benign pulmonary lesions in humans which can be mistaken as carcinomas [1, 10]. *D. repens* worms remain in subcutaneous tissues causing subcutaneous nodules in both canine and human hosts [11]. Canine infections of *D. immitis* are reported in the Americas, Asia and Europe, while human pulmonary dirofilariasis due to *D. immitis* is predominantly reported from the Americas [1]. In Europe and Asia, apart from Japan and Sri Lanka, human subcutaneous dirofilariasis caused by *D. repens* predominates [1, 11]. As canine dirofilariasis is a risk factor for human infection [1], the difference in the prevalence of human dirofilariasis between *D. repens* and *D. immitis* is hypothesized to be due to the location of *D. repens*, in the subcutaneous tissue, allowing it to easier escape the human immune response [11]. Another reason being hypothesized is that canine *D. immitis* infections are more often diagnosed due the existence of antigen test kits with high sensitivity and specificity for serological diagnosis as well as more apparent symptoms like exercise intolerance, fatigue, cardiac decompensation or haemoptysis caused by heartworm disease, while most canine *D. repens* infections are subclinical or show no specific symptoms and the lack of serological tests for *D. repens* [2, 3, 11].

In Europe, initially both canine and human *D. repens* infections were restricted to Mediterranean nations (Italy, Spain, Greece, southern France and former Yugoslavia) [9], although the last two decades saw a spread north- and eastwards with autochthonous human *D. repens* cases being reported from Germany [7], Poland [12], Slovakia [13] and Russia [14], reaching as far north as Lithuania [15] and Finland [5]. In our case it is most likely that the patient was infected during a visit to Serbia where *D. repens* is endemic in both dogs and humans [9], although an infection in Austria cannot be ruled out.

The spread of *D. repens* in Europe is contributed to climate change, favouring the development of infectious larvae stages in mosquitoes as well easier movement of animals throughout the European Union allowing for an increasing number of dogs with a travel history to endemic regions as well as being imported from endemic regions [11, 16].

In humans the most common sites of *D. repens* infection are subcutaneous lesions as well as ocular dirofilariasis [1], especially subconjunctival findings [8, 15, 17-19], but also cases of dirofilariasis of the male reproductive system [20], oral cavity [21] bursa of the elbow [12], as well as the lung, mimicking metastasis [13, 22] were reported. Generally human *D. repens* infection does not cause severe symptoms [9], although a case of *D. repens* infection with concomitant meningoencephalitis in a patient returning from Sri Lanka was reported from Germany [23].

Depending on the site of infections patients may present with a subcutaneous nodule [24] itching, erythema and swelling [5-7], larva migrans sensations [13, 21, 25] or in the case of ocular dirofilariasis with recurrent ocular redness and discomfort [26], epiphora [18] and foreign body sensation [8]. In our case the patient presented with foreign body sensation of the left eye, a very characteristic symptom in a very common location.

Diagnosis of human *D. repens* infection is dependent on the localisation of the worm and clinical symptoms [9], but, due to the unspecific nature of the described symptoms patients often present with a prolonged history of misdiagnosis [5, 13, 21, 26, 27]. Serological testing can be difficult due to its high negative but low positive predictive value [1] as an immunological reaction is triggered by the presence of microfilariae which are rarely observed in humans [9, 28] and serum IgE levels remain within normal levels in the majority of patients [17]. If a worm is acquired during biopsy of a nodule or during surgery further molecular analysis is recommended to avoid misdiagnosis [9].

Due to the rareness of human *D. repens* infection, there are no treatment guidelines but generally, after the removal of *D. repens* no further special treatment is required unless the patient is immunosuppressed [9]. In the rare case of a positive serological result for microfilariae treatment with ivermectin, an antihelmintic drug or, if the use of ivermectin is contraindicated, with doxycycline, targeting the bacterial endosymbiont *Wolbachia*, should be considered [6].

In this case the patient presented with a very short history of discomfort. Identifying a worm as the source of discomfort was easy due to its superficial location. Removing the worm also proved to be easy and was quickly done following a small incision under topical anaesthesia. The difficult part was waiting for the identification of the worm and, depending on that, deciding whether an additional antibiotic or antihelmintic treatment or further diagnostics would be necessary.

#### 5. Conclusion

In Austria over 30 cases of human dirofilariasis caused by *D. repens* were reported since 1978 [6, 29] with the first autochthonous human case being reported in 2008 [30]. The majority of the reported cases in Austria where subcutaneous followed by ocular lesion [29].

Although a rare disease, due to an alarming increase in reported canine infections of both *D. immitis* and *D. repens* in Austria since 2014 [31] we assume that human *D. repens* cases in Austria will also increase. With this case report we want to draw attention of both medical doctors and veterinarians for considering *Dirofilariasis* as a differential diagnosis of skin and eye diseases.

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