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Human Parasitic Diseases

Subcutaneous Infection with *Dirofilaria repens*—A Case Report

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ABSTRACT: Zoonotic filariasis because of *Dirofilaria repens* (*D. repens*) is prevalent in several regions of the world. It is considered an emerging zoonosis, in view of recent rise of human *D. repens* infections in Europe, Africa, and Asia. Most of the documented cases of human dirofilariasis recorded in India had ocular infections, but very few subcutaneous dirofilariasis have been reported. We hereby report a case of subcutaneous human dirofilariasis because of *Dirofilaria* species. Because dirofilariasis is a vector-borne transmitted disease, their distribution and infection rates have undergone substantial alterations influenced by global climate change. In spite of advances in our knowledge of *D. repens* and the pathologies that they inflict on different hosts, there are still many unidentified aspects of dirofilariasis. This review is focused on human dirofilariasis, including the basic morphology of *Dirofilaria* species; the climate and human behavioral factors that influence distribution dynamics; the disease pathology; the host–parasite relationship; and the clinical management of human infections.

KEYWORDS: human dirofilariasis, subcutaneous infection

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Introduction

Dirofilaria repens is a filarial nematode that, in its natural course, infects wild or domestic carnivores including dogs, cats, foxes, etc.[1] Humans may become accidently infected as aberrant hosts,[2] and apart from unusual exceptions, the worms remain infertile. Clinically, human infection usually presents as a solitary subcutaneous nodule, which is caused by a macrofilaria that is imprisoned by the immune system. The worm may migrate in subcutaneous planes resulting in local swellings with altering sites (creeping eruption). Rarely, it may infect organs including the lungs, male genitals, female breast, or eye. Ocular involvement is usually periorbital, orbital, subconjunctival, or subtenon infection.[3] Organ infestation is usually encountered during the migratory phase of the parasite.

Typically only a single worm is present; therefore, surgical removal of the parasite from the skin is usually adequate to treat human infections. Final diagnosis is established by microscopic examination of the excised worm.[4] The possibility of subcutaneous infection in our patient from pet dogs cannot be ruled out; however, pet dogs were not investigated for parasitic infestation.

As natural infective stage of dirofilariasis is a microfilariae, which in any case does not occur in humans, the infection cannot be transmitted from person-to-person. Vectors of the parasite are mosquitoes belonging to the genera *Aedes, Armigeres, Culex*, *Anopheles*, and *Mansonia* species.

Although human dirofilariasis is considered to be rare, cases are being increasingly reported in the past few years. The disease thus requires special attention as an emerging zoonosis in many parts of the world. *D. repens* is also the main causative agent of subcutaneous dirofilariasis in Asia. Within the Asian sub-continent, Sri Lanka is the most endemic zone for this infection. In India although dirofilariasis cases are seldom being reported, the number of cases is gradually

increasing. Most of the cases of *D. repens* have been reported from the southern part of India, being geographically close to Sri Lanka, the endemic zone.[4] Kerala state in India seems to be the focus for human dirofilariasis. Few cases have also been reported from states of Karnataka,[1] Assam,[4] and Orissa.[5] Ocular involvement is the most commonly reported clinical presentation in most of the documented cases of human dirofilariasis recorded in India. The alarmingly rising trend of dirofilariasis infection in the past few years directs toward a necessity for appropriate and needed actions to be taken toward the control of this parasitic infection. Systematic epidemiological surveys, developing suitable molecular diagnostic tools for species identification, and more rigorous studies on vectors, natural hosts, and environmental factors will help in assessment of the precise prevalence of this emerging zoonotic infection and in formulation of suitable control measures.

Case Report

A young adult female with no other known systemic illness presented with the complaints of a mobile worm under the skin of the right eyelid since two days. There was no history of headache, vomiting, skin rashes, or fever. She gave history of contact with pet dogs. Her ophthalmic examination revealed small, thin, yellowish pink-colored motile worm in the subcutaneous area of the right upper lid. MRI of the orbit and brain was done to rule out meningeal involvement and was found to be normal. Complete blood count showed eosinophilia. The worm was successfully removed after giving local anesthesia—4% lignocaine infiltration. The worm was sent to parasitology division of Department of Microbiology for identification. Microscopic examination of the adult worm showed several characteristics resembling those of *D. repens* (Figs. 1–3). The cuticula was thick, multilayered, and transverse striated, and contained large numbers of external longitudinal ridges. Cross-sections showed a well-developed musculature, and worm length was approximately 18–20 cm. The patient received three weeks of albendazole post-operatively. The post-operative period was uneventful.

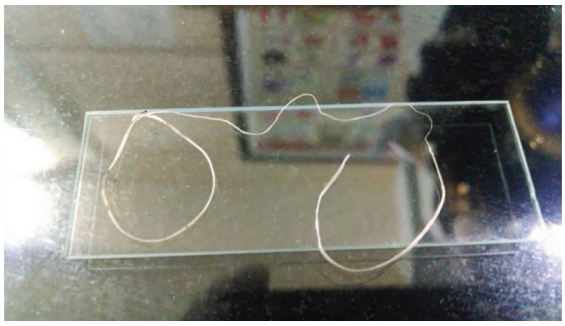

Figure 1. Macroscopic view of *Dirofilaria* nematode (18 cm).

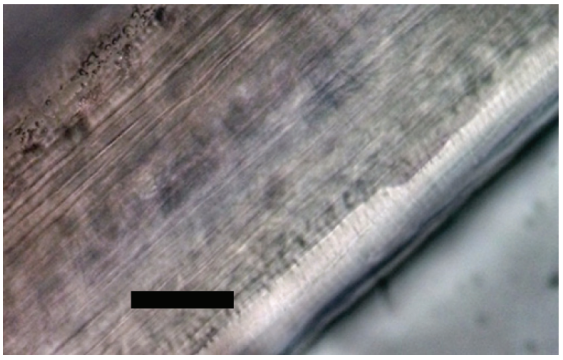

Figure 2. Microscopic view of the outer cuticula with multiple longitudinal ridges. Scale bar = 100 µm.

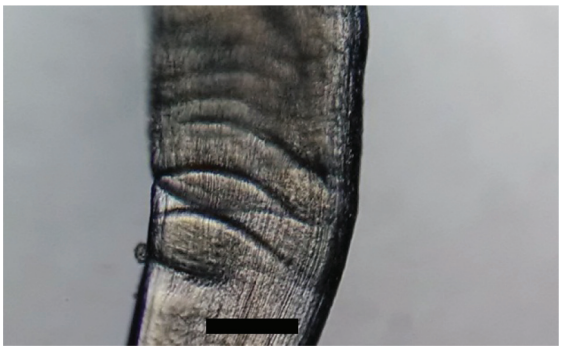

Figure 3. Multilayered transverse striations with external ridges. Scale bar = 100 µm.

Discussion

Our patient was a young female; however, in a case series reported by Kramer et al worm was removed from skin lesions of 14 patients with age range between 23 and 66 years.[6] In India, human ocular dirofilariasis was first reported in Kerala state in 1976 and subcutaneous dirofilariasis caused by *D. repens* was documented in 2004 from the same region.[7,8] Our state is adjacent to Kerala state, and having almost similar climatic conditions especially humidity and rainfall pattern and the presence of suitable vectors species is favorable to the endemicity of dirofilariasis. Few cases have been reported from the northern[9] or western[10] regions of India too. *D. repens* is the most common causal agent of human dirofilariasis in India; however, a small number of cases caused by *Dirofilaria immitis* have also been reported.[10]

In our case, we were able to identify the species by studying the characteristic morphology of the nematodal worm. *D. repens* has a cuticle of 20 µm thickness, transverse striations, as well as large number of external longitudinal ridges. *D. immitis* can be distinguished from *D. repens* by lack of longitudinal ridges and transverse striations.[7,11] DNA extraction supplemented with panfilarial polymerase chain reaction (PCR) can be used for confirmation of *D. repens* infection.[11] Unfortunately, in our setting, PCR methods and

standard antibody detecting tests were not available for the diagnosis of *D. repens*. Although our case presented with a complaint of a mobile worm under the skin of the right eyelid, she was otherwise systemically asymptomatic as seen in most of the cases of dirofilariasis.

Most cases of human dirofilariasis are diagnosed retrospectively by observing histopathological sections of biopsy or excision material. Human infections by *D. repens* are mostly confined to the upper parts of the body, generally involving the eyes with usual presentation of solitary, tender, or non-tender migratory nodule.[7] However, some may have serious complications, with symptoms including impaired vision, floaters, or loss of site.[12] In 10% of unfortunate cases, permanent complications, such as retinal detachment, glaucoma, opacity of the vitreous humor, crystalline lens, or other losses of visual acuity can develop.[13] Surgical excision of the worm or the lesion is the treatment of choice and is also a diagnostic modality. As microfilaraemia is infrequently seen, chemotherapy is not required. Few reported cases of meningoencephalitis secondary to *D. repens* microfilaraemia were successfully treated with the antihelminthic drug albendazole and methylprednisolone.[14]

Conclusion

Cases of human dirofilariasis are underreported because many of them continue to be undiagnosed or unpublished. Increased awareness of this infection among clinicians is required. Medical awareness of risk factors is particularly vital for a correct diagnosis. Further, monitoring of the situation in the endemic areas is needed to institute guidelines for preventive measures, including effective chemoprophylaxis in animals. Dirofilariasis should be considered in the differential diagnosis of a single migratory or non-migratory subcutaneous swelling, particularly if the patient belongs to an endemic area. The clinical repercussion of human dirofilariasis is that these subcutaneous lesions may be initially misidentified as malignant tumors, requiring invasive investigation and surgery.

Author Contributions

Conceived and designed the experiments: SS. Analyzed the data: SV, NM. Wrote the first draft of the manuscript: VK. Contributed to the writing of the manuscript: SSH. Agree with manuscript results and conclusions: SS. Jointly developed the structure and arguments for the paper: VK, KT. Made critical revisions and approved final version: CM. All authors reviewed and approved of the final manuscript.

DISCLOSURES AND ETHICS

This paper was subject to independent, expert peer review by a minimum of two blind peer reviewers. All editorial decisions were made by the independent academic editor. All authors have provided signed confirmation of their compliance with ethical and legal obligations including (but not limited to) use of any copyrighted material, compliance with ICMJE authorship and competing interests disclosure guidelines and, where applicable, compliance with legal and ethical guidelines on human and animal research participants.

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