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Review Article

Dirofilariasis and related traumas in Greek patients: Mini Review

Nikiforos Rodis [1], Vasiliki Kalouda Tsapadikou [1], Georgios Zacharis [2], Nada Zacharis [3], Charalampos Potsios [4], Efrosini Krikoni [5], Panagiota Xaplanteri [5]

[1] Medical School, Democritus University of Thrace, Greece
[2] Department of Surgery, General Hospital of Patras, Greece
[3] General Practitioner, Internal Medicine, Patras, Greece
[4] Department of Internal Medicine, University General Hospital of Patras, Greece
[5] Department of Microbiology, University General Hospital of Patras, Greece

Corresponding author:
Tel: +0030-2613-603663
Email: panagiota.xaplanteri@gmail.com

Abstract

Dirofilariasis is a rare vector-borne parasitic human disease. The culprit pathogens belong to the nematode's family Filaridae. In humans most commonly species related to disease are Dirofilaria repens, D. tenuis, and D. immitis (the dog heartworm). Of those, D. immitis is related to pulmonary infection, whilst the other species are related to subcutaneous dirofilariasis. The vector is mosquitoes of the genera Aedes, Culex, Anopheles, and Mansonia. The natural transmission of Dirofilaria species from animals to humans occurs during the blood meals of the arthropods, where the worm is injected via the bite. Herein we describe case reports related to autochthonous dirofilariasis in Greek patients. All data have been retrieved from PubMed and Google Scholar. Many autochthonous cases of pulmonary, ocular and subcutaneous disease have been described in Greek patients from 1996 till 2020. Climate change and global warming is affecting the vectors and dirofilariasis should be considered as an emerging parasitic disease. All forms of dirofilariasis, although rare, should be included in the differential diagnosis of subcutaneous or ocular nodules or coin like formations in the lungs in Greek patients.

Keywords: Dirofilaria, Dirofilariasis, Subcutaneous Nodule, Nematoda

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Introduction

Dirofilariasis is a zoonotic vector-borne parasitic disease. The culprit pathogens belong to the nematode's family Filaridae. The family includes the genera Dirofilaria, Brugia, Wuchereria, Onchocerca, Dipetalonema, Loa, and Meningonema (1). In humans most commonly species related to disease are D. repens, D. tenuis, and D. immitis (the dog heartworm) (2). Of those, D. immitis is related to pulmonary infection, whilst the other species are related to subcutaneous and ocular dirofilariasis (2). The vector are mosquitos of the genera Aedes, Culex, Anopheles, and Mansonia (2). The natural transmission of Dirofilaria species from animals to humans occurs during the blood meals of the arthropods, where the worm is injected via the mosquito's bite (3). For D. immitis, the most typical hosts are canids: domestic dogs, coyotes, jackals, and wolves. Aberrant hosts of

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adult worms are domestic cats, bobcats, ferrets, and foxes. For D. repens definitive hosts are canids, and occasionally felids. For D. tenuis the only definitive host is the raccoon. D. immitis is cosmopolitan in dogs in America, Australia, Japan and Europe. D. repens infects dogs and cats in Europe (especially the Mediterranean region), Asia, and Africa. D. tenuis seems prevalent in raccoons in Florida (2). When a mosquito has a blood meal, the circulating microfilariae of the infected host get to the insects' midgut. From there, they migrate from the mosquito's Malpighian tubules in the abdomen, where they evolve initially into first-stage larvae (L1) and finally into the L3 stage. L3 are the infective forms and migrate to the mosquito's proboscis to be injected to another definitive host (2). Pulmonary infection (most commonly D. immitis): The third-stage filarial larvae (L3 larvae) of the nematode are ingested by the blood meal of a mosquito to the skin of the definite host (canids), where they evolve to L4 and adult worms. Adult forms are female and male and have a lifespan of 5 – 10 years. Females are longer (230-310 mm) than the male(120-190 mm). Adults reside in pulmonary arteries. In the right heart ventricle, the female worms produce microfilariae which circulate in the peripheral blood (2). Subcutaneous infections (most commonly D. repens and D. tenuis) and ocular infections (most commonly D. repens): The third-stage filarial larvae (L3 larvae) of the nematode are ingested by the blood meal of a mosquito to the skin of the definite host (canids and sometimes felids for D. repens, raccoons for D. tenuis), where they evolve into L4 and adults. The adult forms reside in subcutaneous tissues. Adult females of D. repens are usually 100—170 mm long whilst males are usually 50—70 mm long. Adult females of D. tenuis are usually 80-130 mm long, whilst males are usually 40—50 mm long. In humans, the nematode is either a wandering worm in the subcutaneous tissue or forms a granulomatous nodule (2-4).

In humans, D. immitis that migrate to the heart do not usually survive. In pulmonary vessels, those dead worms cause infarcts known as "coin lesions" in chest x-rays. The patient has the typical symptoms of pulmonary embolization. Subcutaneous nodules may be fixed or migratory and are usually located in the exposed sites of the body, where usually the mosquito bites. In this area they may form cyst, abscess, nodule, granuloma, or swelling (5-7). Humans are suboptimal hosts and the nematode does not usually evolve to the adult form. Thus, microfilariae are not usually detectable in the blood and the lesions typically contain an immature worm (2). The purpose of this review was to describe case reports related to autochthonous dirofilariasis in Greek patients.

Materials and Methods

All relative articles have been retrieved from PubMed and Google Scholar, using as keywords Dirofilaria, dirofilariasis, ocular, subcutaneous, pulmonary, Greece. Articles not referred to Greek patients with autochthonous disease have not been included in the present study. We included all relevant accepted articles without publication year limitation. The main language of publication research was English. We grouped the articles by year of publication, location of Dirofilariasis, culpable parasite, and implemented therapy.

Results

Several cases of pulmonary dirofilariasis in Greece have been described. Pampiglione et al (2000) reported the first case of human pulmonary dirofilariasis in a 31-year-old Greek man. Chest x-ray revealed a coin lesion in the left lung that proved to be D. repens (8). Foroulis et al (2005) presented a 55-year-old male patient with a peripheral pulmonary lesion which invaded the anterior chest wall and mediastinum and did not have the usual coin shaped form. The man proved to suffer from D. immitis infection (9). Miliaras et al. (2010) described a case of a 52-year-old Greek male patient with a coin lesion in the right lung, caused by D. immitis (10). Sileli et al (2016) described a 45-year-old Greek female with influenza-like symptoms and chest pain that proved to suffer from a solitary pulmonary nodule in the right upper lobe due to D. immitis (11). Ocular involvement may be periorbital, subconjunctival or intraocular. The common symptoms and signs if the worm enters the

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subconjuntiva are redness, pain, swelling of the eyelids and blurred vision. Symptoms appear mostly weeks or months after infection (12). In Greece many cases of eye infection have been reported. Kalogeropoulos et al (2014) reported eight cases of unilateral ocular dirofilariasis: five subconjunctival, two intravitreal and one intraorbital (13). Subcutaneous lesions that proved to be dirofilariasis have been described. Pampiglione et al (1996) described the case of a subcutaneous nodule due to D. repens in a 45-year-old Greek male patient (14). Maltezos et al (2002) described the cases of two women and one man, (aged between 32 and 67 years) with breast axillary nodules respectively. From the lesions D. repens was isolated (15). Tzanetou et al (2009) described the case of a patient with subcutaneous inflammation of the groin by D. repens. (16). Falidas et al (2016) reported a 45-year-old immunocompromised woman patient with a subcutaneous nodule at the right hypochondrium due to D. immitis (17). Xaplanteri et al (2017) reported a 24-year-old Greek male patient who presented with a painless swelling in the right groin with duration of one month. The patient proved to suffer from subcutaneous dirofilariasis due to D. repens (18). An exceedingly rare case of microfilaremia was described by Petrocheilou et al (1998) probably due D. repens in a 70-year-old Greek man patient with marked eosinophilia in the peripheral blood and no subcutaneous lesions (19).

Discussion

In this study, most patients with pulmonary dirofilariasis presented with a lesion or nodule resembling a tumor. In all patients partial lobectomy and excision of the nodule were performed. Diagnosis was based on histopathologic examination. In one case the lesion appeared as an upper lobe mass, infiltrating the mediastenum, and chest wall. The posterior surface of the sternum and the third and fourth cartilages were invaded. In this patient anterior mediastinotomy with resection of the third costal cartilage was initially performed in order to obtain biopsy, followed by anterior thoracotomy and complete resection of the mass (9). All patients reported in this review with subcutaneous dirofilariasis were successfully treated by complete surgical excision of the lesion, which is the treatment of choice (14,18). Subconjunctival dirofilariasis was treated by incision in the conjunctiva and complete removal of the worm (13). Intravitreal disease was treated via vitrectomy (13). Patients suffering from subcutaneous dirofilariasis have usually normal eosinophil count in the peripheral blood and normal Immunoglobulin E (IgE). Therefore, laboratory tests are of limited value in the differentiation of a subcutaneous mass (7-9). Subcutaneous lesions are often asymptomatic, but the usual signs and symptoms of inflammation may occur (7-16). In this study, elevated eosinophil count was reported in a case of breast dirofilariasis and in one case of ocular disease (13-15) Marked eosinophilia was reported in the unusual case of microfilaraimia reported by Petrocheilou et al (19). Eosinophil count returned to normal after the successful removal of the parasite (13-15). The infection is usually limited to the site of injection. Therefore, anthelminthic drugs are not routinely recommended (6-7).

Epidemiologic studies reveal that undiagnosed companion animals, especially canids, continue to facilitate the life cycle of the worm. In addition, climate change and global warming is affecting the vectors as the culpable mosquitoes move in previously non-endemic areas (20).

Thus, dirofilariasis should be considered as an emerging parasitic disease (20). There may be some possible limitations in this study. Data were retrieved from PubMed and Google Scholar databases in English language only. Also data presented in medical congresses were not included in this study. Therefore, the data represented in this study reflect the search findings in the aforementioned databases only.

Conclusion

All forms of dirofilariasis, although rare, should be included in the differential diagnosis of subcutaneous or ocular nodules or coin like formations in the lungs. Further epidemiologic studies are needed to provide more information about this emerging parasitic disease in Greece.

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Conflict of Interest

The authors have no conflicts of interest to declare.

References

1. De NV, Le TH, Chai JY. Dirofilaria repens in Vietnam: Detection of 10 Eye and Subcutaneous Tissue Infection Cases Identified by Morphology and Molecular Methods. Korean J Parasitol 2012; 50(2):137-141.
2. CDC [Internet]. 2020 May [cited 202May];Available from: https://www.cdc.gov/parasites/dirofilariasis/biology.html
3. Tahir D, Davoust B, Parola P. Vectorborne nematode diseases in pets and humans in the Mediterranean Basin: An update, Veterinary World 2019; 12(10): 1630-1643.
4. Simón F, Kartashev V, González-Miguel J, Rivera A, Diosdado A, Gómez PJ, Morchón R, Siles-Lucas M. Dirofilarioses (Humans, Mosquitoes). Parasites & Vectors 2016, 10(Suppl1):5. DOI 10.1186/s13071-016-1902-x).
5. Joseph E, Matthai A, Abraham LK, Thomas S. Subcutaneous human dirofilariasis. J Parasit Dis 2011; 35(2):140–143.
6. Lupse M, Mircean V, Pastiu AI, Cavasi A, Mihalca AD, Briciu V. Recurrent Subcutaneous Human Dirofilariasis Due to Dirofilaria repens - A Case Report. Veterinary Medicine 2015; 72(1): 201-202.
7. Maraghi S, Sameri A, Jeddi Y. Human Dirofilaria repens infection of the breast: a case report. Arch Med Lab Sci. 2015; 1(1):42-44.
8. Pampiglione S, Rivasi F, Vakalis N. Dirofilariose pulmonaire humaine: un premier cas en Grèce [Human pulmonary dirofilariasis: the first case observed in Greece]. Ann Pathol. 2000; 20(6):626-628.
9. Foroulis CN, Khaldi L, Desimonas N, Kalafati G. Pulmonary dirofilariasis mimicking lung tumor with chest wall and mediastinal invasion. Thorac Cardiovasc Surg 2005; 53(3):173-175.
10. Miliaras D, Meditskou S, Kelekis A, Papachristos I. Human pulmonary dirofilariasis: one more case in Greece suggests that Dirofilaria is a rather common cause of coin lesions in the lungs in endemic areas of Europe. International Journal of Immunopathology and Pharmacology 2010; 23(1):345-348.
11. Sileli M, Tsagkaropoulos S, Madesis A. Dirofilariasis pulmonar: un escollo en el diagnóstico en la práctica clínica. Arch Bronconeumol. 2016; 52(6):338–339. doi:10.1016/j.arbres.2015.08.011.
12. Raniel Y, Machamudov Z, Garzozi HJ. Subconjunctival infection with Dirofilaria repens. The Isr Med Asso j: IMAJ. 2006; 8(2):139.
13. Kalogeropoulos CD, Stefaniotou MI, Gorgoli KE, Papadopoulou CV, Pappa CN, Paschidis CA. Ocular Dirofilariasis: A Case Series of 8 Patients. Middle East Afr J Ophthalmol.2014; 21(4):312-316.
14. Pampiglione S, Trotti CG, Rivasi F, Vakalis N. Human dirofilariasis in Greece: a review of reported cases and a description of a new, subcutaneous case. Annals of Tropical Medicine & Parasitology 1996; 90(3): 319-328. DOI: 10.1080/00034983.1996.11813057
15. Maltezos ES, Sivridis EL, Giatromanolaki AN, Simopoulos CE. Human subcutaneous dirofilariasis: a report of three cases manifesting as breast or axillary nodules. Scott Med J. 2002; 47(4):86-88. DOI: 10.1177/003693300204700404
16. Tzanetou K, Gasteratos S, Pantazopoulou A, Gogou C, Konidaris D, Fragia K. Subcutaneous dirofilariasis caused by Dirofilaria repens in Greece: a case report. J Cutan Pathol. 2009; 36(8):892-895.
17. Falidas E, Gourgiotis S, Ivopouloub O, Koutsogiannis I, Oikonomou C, Vlachos K, Villias C. Human subcutaneous dirofilariasis caused by Dirofilaria immitis in a Greek adult. Journal of Infection and Public Health 2016; 9:102-104.
18. Xaplanteri P. Patrikakos P, Kolonitsiou F, Zacharis N, Potsios C, Marangos M, Zacharis G. Subcutaneous dirofilariasis of the groin in a male due to Dirofilaria repens. Hellenic J of Surg 2017; 89:178–180. https://doi.org/10.1007/s13126-017-0409-z
19. Petrocheilou, V., Theodorakis, M., Williams, J., Prifti, H., Georgilis, K., Apostolopoulou, I. & Mavrikakis, M. Microfilaremia from a Dirojilaria-like parasite in Greece. Case report. APMIS 1998; 106(2): 315-318. https://doi.org/10.1111/j.16990463.1998.tb01352.x
20. Diaz JH. Increasing Risks of Human Dirofilariasis in Travelers. J Travel Med. 2015;22(2):116-123

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