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Case Report / Приказ болесника

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Human dirofilariasis

Хумана дирофиларијаза

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SUMMARY

Introduction Dirofilariasis is a zoonosis caused by nematodes from the genus *Dirofilaria*, which is a parasite in dogs and other canids and humans get infected by a mosquito bite. In Europe, the number of patients outside the endemic area is increasing. So far, more than 2850 cases of human dirofilariasis have been reported worldwide. In the last 20 years, we have had only two confirmed cases in our institution. The disease is manifested in a cutaneous, visceral and ocular form. From initial infection, the first symptoms can take several years to manifest. The diagnosis can be confirmed histologically, morphologically and/or by molecular techniques. The treatment includes surgical parasite removal and antiparasitic therapy.

Case outline The paper presents two cases of *Dirophilaria repens* infection. The paper presents two cases of *Dirophilaria repens* infection. The first patient had a migratory nodular facial skin change for several years. After the skin induration incision in the zygomatic region, a 7-cm-long worm was extracted, later identified as *Dirophilaria repens*. The pathohistological finding of the extirpated change showed that it was a granuloma inflammation. The second case is a patient with a persistent cough and haemoptysis, with a morphologically verified nodular change in the pulmonary parenchyma. The pathohistological finding of the extirpated change showed a chronic granulomatous inflammation and presence of parasites. The treatment of both patients resulted in a complete recovery without complications. The pathohistological finding of the extirpated change showed that it was a granuloma inflammation. The treatment of both patients resulted in a complete recovery without complications.

Conclusion In case of subcutaneous nodules or unclear lung changes, dirofilariasis should be considered. Video-assisted thoracoscopic surgery is the leading diagnostic surgical procedure concerning dirofilariasis, and a significant therapeutic modality.

Keywords: dirofilariasis; parasitosis; video-assisted thoracoscopic surgery

САЖЕТАК

Увод Дирофиларијаза је зооноза изазвана нематодом из рода *Dirofilaria*, која је паразит паса и других канида, а човек се инфицира убодом комарца. У Европи се повећава број оболелих ван ендемског подручја. До сада је у свету пријављено више од 2.850 случајева хумане дирофиларијазе. У нашој установи су уназад 20 година потврђена само два случаја хумане дирофиларијазе. Болест се манифестује као кутана, висцеларна и офталмична форма. До појаве првих симптома болести може проћи и више десетина година од настанака инфекције. Дијагноза је хистолошка или морфолошка и/или применом молекуларних техника. Лечење је хируршко уклањање паразита и примена антипаразитарне терапије.

Приказ болесника У раду су приказана два случаја инфекције нематодом *Dirofilaria repens*. Прва болесница је имала више година промене на кожи лица миграторног карактера са формирањем нодуларне промене. После инцизије индурације на кожи зигоматичне регије, евакуисан је црв величине 7 *cm*, који је идентификован као *Dirofilaria repens*. Други случај је пацијент са израженим кашљем и хемоптизијама, код кога је морфолошким претрагама верификована промена нодуларног изгледа у плућном паренхиму. Патохистолошки налаз екстирпиране промене је показао хронично грануломско запаљење и присуство паразита. Патохистолошки налаз екстирпиране нодуларне промене у целости, на месту евакуисаног паразита је показао да се ради о грануломској инфламацији. Лечење оба пацијента је завршено успешно.

Закључак У случају појаве поткожних нодула или нејасних промена на плућима треба мислити на дирофиларијазу. Видеоасистирана торакоскопска хирургија је хируршка процедура која заузима водеће место у процесу дијагностике дирофиларијазе, али и значајан терапијски модалитет.

Кључне речи: дирофиларијаза; паразитоза; видеоасистирана торакоскопска хирургија

INTRODUCTION

Dirofilariasis is a zoonosis caused by nematodes from the genus *Dirofilaria*. The parasite is transmitted to humans from infected animals, most often dogs, accidentally, by an infected mosquito bite. The infection includes only one worm, and it may take several

decades until the first symptoms occur. The disease is benign and very rare outside the endemic area. In Europe, the number of patients has been steadily increasing for the last ten years [1]. There are three forms of the disease, subcutaneous, visceral and ocular.

By the year 2012, there were 1782 cases of human dirofilariasis reported, out of which 1410 in Europe, and 372 in the USA [2]. In Serbia, 37 cases were reported by 2014 [3]. The diagnosis is based on anamnestic data, clinical course, possible parasite visualization, surgical extirpation, pathohistological verification, and, rarely, serological diagnosis. The treatment can be surgical and conservative. Prophylaxis includes the treatment and prophylaxis in dogs as a reservoir, the suppression of mosquitoes as vectors, and the protection of humans by means of repellents.

CASE REPORT

This paper presents two cases of *Dirofilaria repens* infection, which were confirmed at the Clinic for Infectious and Tropical Diseases of the Military Medical Academy in the last twenty years.

The first case was diagnosed in 1998 in a woman aged 64 from the village Kusadak, located in the vicinity of Belgrade. She had had a migratory nodular facial skin change for several years. Since her youth, the patient had been having a dry, irritating cough, and later some problems in the form of redness and itching of the skin. Three years prior to diagnosis, some migratory tumor changes occurred on the scalp, and then she developed swelling and redness of the upper eyelid region. Further on, pain, redness and skin induration of the right zygomatic region occurred. When pressure was applied to the induration, a vital 7-cm-long parasite was extracted (Figure 1). The identification was carried out at the Institute of Medical Biochemistry of the Military Medical Academy where *D. Repens* female was confirmed. The patient's clinical findings were dominated by a zygomatic bone swelling, together with induration and hyperemia. All laboratory findings were within reference values, while serological analyses were negative. Histopathological examination of the extirpated change showed granuloma inflammation.

The second case was diagnosed in 2018 in a 72-year-old male from Belgrade. He first came to the doctor's due to persistant cough and haemoptysis. Morphological tests and

multislice computed tomography (MSCT) of the thorax showed a lobulated, infiltrative change 16 × 16 × 11 mm in the VI segment of the right lower lung lobe, showing signs of infiltration of the surrounding parenchyma, followed by minimal pneumonitis (Figure 2). Video-assisted Thoracoscopic Surgery (VATS) was performed and a knot tissue sample 27 × 15 mm was obtained. Histopathological examination showed chronic granulomatous inflammation with necrosis similar to dirofilariasis. The patient was feeling well all the time and all his laboratory parameters were within reference values. Albendazole therapy was a used for 28 days. In the further course of the disease, the patient lost all subjective symptoms, while the definitive suspicion of a malignant neoplasm was removed by the control MSCT thorax examination.

DISCUSSION

Natural hosts of dirofilaria are dogs and wild canids, such as foxes, wolves and raccoons. Humans get infected by a mosquito bite. In Serbian every species of mosquitos transmit [4]. The infection in humans is most commonly caused by three species, *D. immitis*, *D. repens*, and *D. tenius*. *Dirofilaria immitis* usually causes human pulmonary dirofilariasis throughout the world, while subcutaneous dirofilariasis caused by *D.repens* is recorded in Europe [5]. These two species are able to cause both pulmonary and extrapulmonary infection. It most commonly occurs in adults between the ages of 21 and 60 (ESDA), but the case of a 14-month-old child with dirofilaria in the scrotum region [6] was also described, which is its most common localization in children. Women are more likely to be infected than men, but without a significant statistical difference. Generally, it occurs rarely in people, has a benign character, and, in most cases, the diagnosis is made by histopathological examination, and extremely rarely, as in our first case, by the evacuation of a live parasite.

The endemic areas for dirofilariasis are Asia, Africa, the Mediterranean, but in the past decade, there has been an increasing number of cases reported outside the endemic area, i.e. in the region of northern and central Europe [1]. The highest percentage of cases was registered in Italy (66%), followed by France (22%), Greece (8%) and Spain (4%) [7]. *D. repens* spread faster than *D. immitis* from the endemic arease of southern Europe to northern Europe [8].

Risk factors and predispositions are not clear and well defined. The number of dogs in a given area, the prevalence of infection, the number of infected mosquitoes, and human exposure can contribute to the spread of the disease in certain geographical areas. It is believed that the risk of human pulmonary dirofilariasis is greater in periods of natural disasters [1], most likely due to the occurrence of floods, more mosquitoes and an increase in the number of stray dogs. In Serbia during the period ten years, seroprevalentia dog went from 7% to 26.9% (2004–2014) [9].

The anatomical localization of this parasite is different as well as the clinical presentation. Ophthalmic presentation accounts for 40% of reported cases. Nodular localization is found on the head and neck 18.9–25.3%, extremities 14.8–22.1%, torso 11.4–11.8%, male genitalia 2.9–4.1%, female breast 2.5–2.7%. Cases of uncapsulated forms in peritoneum were also described 0.6% [10]. The large majority of patients with dirofilariasis had one painful subcutaneous nodus, without signs of infection. In the case of ocular localization, symptoms are the feeling of burning, itching and pain in the eye. The majority of patients with pulmonary dirofilariasis are asymptomatic, while 38% have symptoms [8] in the form of cough, fever and haemoptysis.

The diagnosis of the disease is based on the possible visualization of the parasite, as well as the pathohistological verification. VATS has been proven [2] to be the best, both diagnostic and therapeutic method, because in this way a safe differential diagnosis is performed concerning malignant diseases, tuberculosis, pulmonary thromboembolism, and Wegener's granulomatosis.

There are serological tests, but they are rarely available, not satisfactory, give cross-positive results with other filariases, most commonly with nematoda *Toxocar canis* [2]. Bearing in mind all the aforementioned, we may conclude that serological tests should be used exclusively as supplemental diagnostic procedures. Eosinophilia is present in less than 20% of cases [2]. The differential diagnosis of pulmonary forms of dirofilariasis, between a malignant tumor and benign lesion is a major diagnostic challenge. Usually, lesions are detected in the lower right lung, in the form of subpleural pulmonary nodules, the size of 1 to 3 cm. Pulmonary nodules can be individual, multiple, and bilateral. Their radiological signs are non-specific, which causes differential diagnostic problems that cannot be resolved by diagnostic procedures such as MSCT and nuclear magnetic resonance (NMR). However, VATS leads to the ultimate and definitive diagnosis, which puts this diagnostic therapeutic

modality first in diagnostics, but also in the treatment of human dirofilariasis as well. After performing the VATS resection and diagnosis of human dirofilariasis, other therapeutic procedures are not necessary [1].

In conclusion, the treatment is both surgical and conservative. Conservative treatment involves the use of *ivermektin*® or *albendazol*® for 4 weeks. In many cases, causative therapy is not necessary before the surgery. One group of authors [6] thinks that the patient should be given a single dose of *ivermectin*® with three doses of *diethylcarbamazine* if there is a marked suspicion of dirofilariasis.

The importance of dirofilariasis is increasing with regard to global warming, increased number of pets and human migrations. The number of the diseased is rising and the geographic distribution is changing, especially in northern Europe, outside the endemic area. In case of subcutaneous nodules or unclear lung changes, dirofilariasis should be considered. VATS is the leading diagnostic surgical procedure concerning dirofilariasis, and a significant therapeutic modality.

Conflict of interest: None declared.

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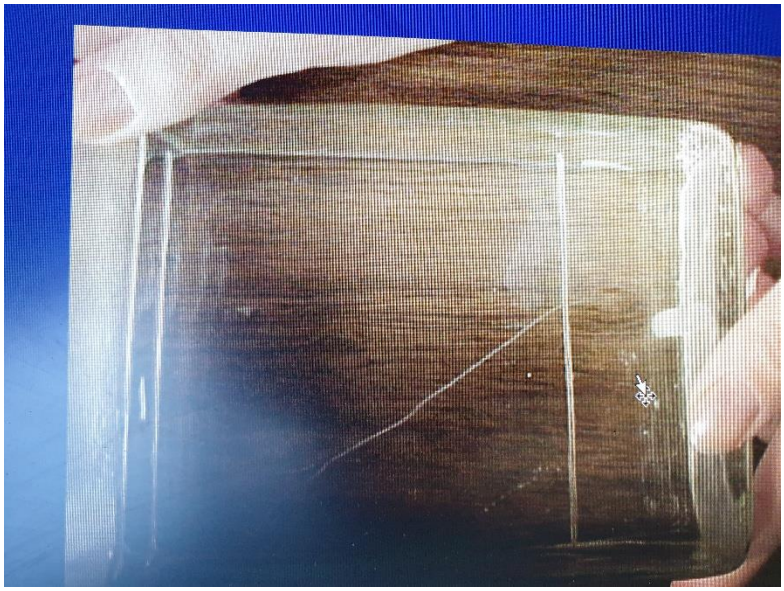

Figure 1. Extracted vital 7 cm long parasite

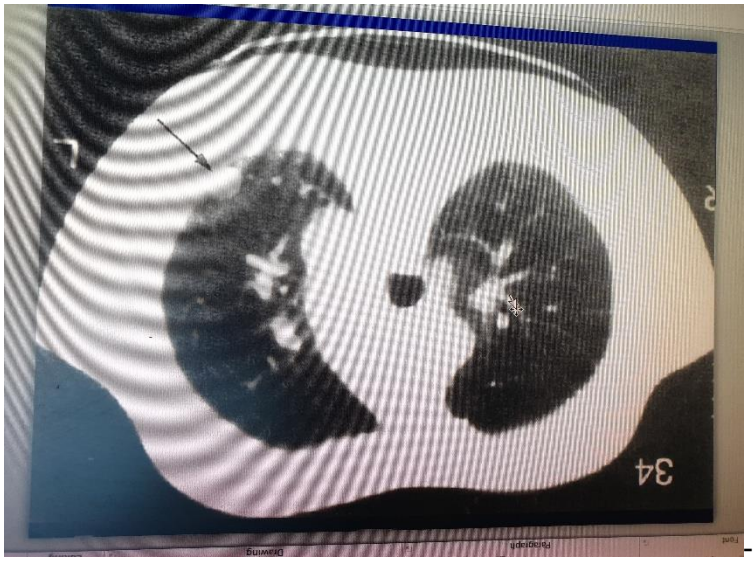

Figure 2. Multislice computed tomography of the thorax showed a lobulated, infiltrative change 16 × 16 × 11 mm in segment VI of the right lower lung lobe

