CASE REPORTS

HUMAN PULMONARY DIROFILARIASIS IN TAIWAN

Swei H. Tsung¹ and Chia-Chuan Liu²

Abstract: Pulmonary dirofilariasis is a rare zoonotic disease in the United States. Most reported cases were from the southeastern or Gulf states. The disease is caused by Dirofilaria immitis (dog heartworm), a filarial nematode, and is transmitted to humans by mosquitoes. A 69-year-old asymptomatic man was found to have a pulmonary nodular lesion on chest x-ray during routine health examination. The lesion was resected, and pulmonary dirofilariasis was diagnosed based on histological findings. Postoperatively, recovery was uneventful. This is the second reported case of human pulmonary dirofilariasis in Taiwan. Awareness of this entity is important, since the clinicoradiographic presentation of human pulmonary dirofilariasis may mimic lung neoplasia. This case may help alert clinicians, radiologists, or pathologists that pulmonary dirofilariasis should be included in the differential diagnosis when a subpleural ‘coin-like’ lesion is observed on chest x-ray.

Key words: Dirofilariasis; Heartworm disease; Dog heartworm; Lung cancer; Solitary pulmonary nodule

Dirofilaria is a common parasite of dogs in the United States. In Taiwan, the number of dogs imported annually from the United States has been increasing. A recent survey suggests that the prevalence of dog heartworms in Taiwan is also increasing. Therefore, the recognition of this entity is important, since the clinicoradiographic presentation of human pulmonary dirofilariasis (HPD) may mimic lung neoplasia. Here we report a case of HPD.

Case Report

An asymptomatic 69-year-old man who had previously been in good health was admitted on 10 October, 2001 for evaluation of a pulmonary nodular lesion seen on chest x-ray films taken at another hospital where he underwent routine health examination (Fig. 1).

Fig. 1. Chest radiograph showing a noncalcified nodular lesion in the right lung field (arrows).
Computed tomography confirmed the presence of a well-defined noncalcified nodule 2.0 cm in diameter, in the right lung field between the upper and middle lobe (Fig. 2).

On admission, the physical examination was essentially negative. Hemoglobin level and white cell count were within normal limits, with no evidence of eosinophilia. The chemistry profile was also within normal limits. Right thoracotomy was performed on 14 October, 2001. The nodular lesion was found near the junction between the minor and major fissure, and was removed.

The cut surface of the lesion was yellowish tan, friable, partly laminated with a cheese-soft central portion, and measuring 2.0 cm in diameter (Fig. 3). Histologic studies revealed an area of coagulation necrosis. Cross and oblique sections of several degenerating nematodes were observed. Within the lumen of a thrombosed pulmonary artery, the worm, although markedly degenerated and poorly preserved, with characteristic features including thick cuticle and thick band of somatic muscle, could still be discerned (Fig. 4).

The patient was doing well at last follow-up on 12 July, 2002.

Discussion

The life cycle of *D. immitis* consists primarily of a vector-intermediate host, the mosquito, and a final host, the dog, with the possibility of some additional species of fleas, ticks and lice acting as vectors. The adult worms residing in the right ventricle of the dog may attain a size of several millimeters in diameter and up to 24 cm in length. These worms shed several thousand microfilariae per day. Microfilariae are ingested by the mosquito during a blood meal and subsequently undergo two molts within the Malpighian tubules.

Within 10 to 17 days, the microfilariae have reached the infective third stage and have come to rest within the labium of the mosquito vector. During the next blood meal, these larvae escape through labella and are deposited on the skin of the next host. They then migrate into the subcutaneous tissue and muscle sheaths, where they reside, molt, and mature for 80 to 120 days.

After an additional molt, they migrate into venous capillary channels, are transported to the right
ventricle, and within 6 months are sexually mature and ready to mate and repeat the cycle. Man is a ‘dead end’ host. The cycle can be arrested in the subcutaneous tissue, resulting in a nodular formation. An occasional larva may reach the right ventricle, and develop into a sexually immature form before death and embolization.

The male to female ratio is approximately 1.5:1. HPD is most often found in men in their sixth decade of life, with the youngest reported case occurring in an eight-year-old girl.6 The preponderance of HPD in men and its rarity in children are presumably related to biological characteristics of the parasite, human hormonal differences, underlying immunological mechanisms and the frequency of radiographic examinations in different subpopulations.6

HPD is usually discovered on routine chest radiograph and is seen as a well-circumscribed, non-calcified, subpleural coin lesion or nodule. The nodule can measure from 1 to 4 cm in diameter, but is usually 2 cm or less. The vast majority of patients have presented a solitary nodule, although two or more nodules have been reported. A right lower lobe predilection has been observed. Although Milanez de Campos et al found an exclusively subpleural location,12 Flieder and Moran observed 32% of lesions as being central.6

The most common presentation associated with HPD is that of an asymptomatic nodule discovered on routine roentgenographic examination. The symptomatic patient most commonly presents with cough, chest pain and hemoptysis. Eosinophilia is an uncommon finding.

With the exception of two of the reported cases, the diagnosis of HPD was made by thoracotomy with wedge resection to rule out malignancy. In the first of these two cases, a 62-year-old woman had a fine needle aspiration biopsy done on a noncalcified lesion in the upper right lobe of the lung. On histological examination, a cross section of *D. immitis* was observed.15

The second case was a 52-year-old man in whom computed tomography allowed aspiration using a percutaneous needle.16 The results revealed *D. immitis* as the cause of the nodule.

The sensitivity of immunologic tests including skin test, hemagglutination and complement fixation test is low.16 Examination of bronchial washings and biopsy and sputum cytology has not proved to be of any value in diagnosis.17 No treatment other than surgery is available for dirofilariasis, since it is the dead worm that is responsible for the pathology. A thoracotomy with wedge resection is normally performed immediately after a solitary pulmonary nodule has been identified to rule out carcinoma. However, should it be possible to develop a specific immunologic diagnostic test, surgery would probably be unnecessary, since the evidence suggests that the granulomatous lesion is stable and impairment of lung function is minimal.

In conclusion, HPD is rarely suspected clinically at the present time. A subpleural ‘coin-like’ pulmonary lesion in an appropriate clinical setting should alert clinicians, radiologists, or pathologists to the possibility of dirofilariasis.

References

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