A solitary pulmonary nodule with zoonotic implications

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An 82-year-old white man presented with a chief complaint of productive cough without hemoptysis. He denied chest pain, dyspnea, wheezing, fevers, rigors, night sweats, weight loss, or recent travel. His medical history was notable only for bilateral venous stripping of the lower extremities 40 years ago. He was not taking any prescription medications, over-the-counter medications, herbs, or supplements. Sulfa drugs caused a rash. He denied alcohol abuse or ever smoking. He retired as a diemaker without any chemical exposures. He denied having any pets. His father died at age 65 of lung cancer.

Physical examination revealed a BP of 115/71 mm Hg, pulse rate of 90 beats/min, respirations of 18 breaths/min, and a temperature of 36.7°C. The lungs were clear to auscultation without egophony or wheeze. The head, neck, cardiac, abdominal, neurologic, and dermatologic examinations were all unremarkable.

The WBC count was $7 \times 10^3$/L, with a normal differential and without eosinophilia. A chest radiograph revealed a solitary noncalcified left upper lobe pulmonary nodule (Fig 1) that was not present on previous chest radiographs dating back to 1991. CT confirmed a single noncalcified, well-circumscribed left upper lobe nodule measuring 1.3 × 1.3 cm (Fig 2). The patient underwent a video-assisted thoracoscopic wedge resection. The histopathologic examination revealed the diagnosis (Fig 3).

What is the diagnosis?

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Figure 1. Chest radiograph revealed solitary noncalcified left upper lobe pulmonary nodule.

Figure 2. Nodule measured 1.3 × 1.3 cm on CT scan.

Figure 3. Histopathologic specimen obtained by wedge resection (elastic stain, original × 4).
Diagnosis: Human pulmonary Dirofilaria immitis

The pathologic findings follow. The nodule was well delineated from the adjacent unremarkable lung and was composed of necrotic tissue with a rim of fibrous tissue and histiocytes. In the center of the necrotic nodule, a remnant of a pulmonary artery, highlighted by elastic stain, contained visible fragments of nonviable roundworm characteristic of D immitis.

Discussion

D immitis is derived from the Latin words diro and filum, meaning "evil thread." Dogs, cats, foxes, and other mammals are natural hosts, with the mosquito as the vector-intermediate host, and humans as dead-end hosts. In dogs, mature adult worms shed microfilariae from the right ventricle into the blood stream, which are taken up by the mosquito and transferred to humans during a blood meal in the larval stage. The larvae migrate to the human venous circulation, die in the right ventricle, embolize into the pulmonary artery, and organize into a necrotic and fibrotic nodule. Since man is a dead-end host and not subject to microfilaremia, treatment is unnecessary.

The distribution of canine infestation with Dirofilaria is worldwide. Canine transmission rates in the Northern Hemisphere appear to be greatest during the warmer, humid months of July and August. The vast majority of reported human cases in the United States are clustered in the eastern seaboard states down the Atlantic border into the southeastern states and parallel that of canine infestation. The majority of patients present asymptptomatically. In a review of 39 patients with pulmonary dirofilariasis, Flieder and Moran reported that 56% were without symptoms. Robinson et al reported a series of 47 patients, of which 57% were asymptomatic. The most common symptoms in both series were cough, chest pain, hemoptysis, and wheezing.

The typical radiographic presentation is that of a single well-circumscribed noncalcified solitary nodule without clear predilection for any particular lobe. Flieder and Moran reported that 19 of 31 patients (61%) had the nodule in the right lower lobe. Contrary to this, Ciferri found no statistically significant pattern of distribution in a review of 59 patients.

Serologic detection of human antibodies to dirofilariasis has been reported, but with poor sensitivity and specificity. In a single series of 95 patients with focal lung disease, Perera et al reported enzyme-linked immunosorbent assay testing for the Di22 molecule of the worm to hold a sensitivity of 100% and specificity of 90%. This test is not commercially available. Of interest, peripheral eosinophilia is reported in various case series ranging from 0 to 15% with a median of 5%.

Conclusion

Humans with pulmonary dirofilariasis typically are asymptomatic, and the disease is usually discovered as a solitary pulmonary nodule on radiograph. In the absence of commercially available noninvasive testing, diagnosis rests on histopathologic identification of the excised worm. Treatment of this self-limited condition is not required.

References

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