Quiz

Correct answer to the quiz. Check your diagnosis

Case report

Human pulmonary dirofilariasis disguising as a lung tumour

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We described a case of pulmonary dirofilariasis of a 40-year-old woman, presenting with cough and haemoptysis for one week. It is a rare zoonotic disease in human beings, usually caused by incidental infection of *Dirofilaria immitis*.

Key words: pulmonary dirofilariasis, *Dirofilaria immitis*.

Introduction

Pulmonary dirofilariasis is a rare zoonotic disease in humans. It is usually caused by *Dirofilaria immitis* infection, also known as dog heartworms. The endemic regions include North America and the Asia-Pacific region [1]. By contrast, *D. repens* infection causing subcutaneous dirofilariasis is more common in European countries [2]. The typical radiologic picture is characterised by coin-like lesions, mimicking primary or metastatic lung tumour. Histopathologically, identification of the worms is mandatory to make accurate diagnosis and treatment. Herein, we report a typical case of human pulmonary dirofilariasis.

Case report

A 40-year-old woman presented to our hospital with cough and haemoptysis for one week. She denied any systemic disease before but is a heavy smoker of 20 cigarettes per day for more than 20 years. She also had a personal history of fostering a dog at home. During the survey of the cause of these symptoms, chest plain film and computed tomography (CT) were performed, in which a focal cavitary mass lesion measuring 4.5 cm in diameter was noted on chest CT scan (Fig. 1). Either pulmonary tuberculosis or primary lung cancer was suspected. For definite diagnosis and symptom treatment, wedge resection of the lung mass lesion by video-assisted thoracoscopic surgery (VATS) was done by a chest surgeon. Gross examination of the resected lung revealed a tan and solid nodule with necrosis and focal cavitation, measuring 4.3 × 4.2 × 4.0 cm (Fig. 2). Microscopically, the mass-like lesion exhibited granulomatous inflammation with central necrosis surrounded by epithelioid histiocytes (Fig. 3A, B). Inside the necrotic centre, there were some dead and degenerated nematoid larvae with thick cuticle and internal musculatures (Fig. 3C). Characteristic bilateral internal cuticular ridges were noted (Fig. 3D). The histopathological features accompanying the dog-raising history were consistent with the diagnosis of human pulmonary dirofilariasis.

Fig. 1. On chest computed tomography, there was a mass lesion with focal cavity at right lung

Fig. 2. The resected lung showed a mass measuring 4.3 cm in the greatest diameter. On sectioning, it was observed to be tan and soft with necrosis

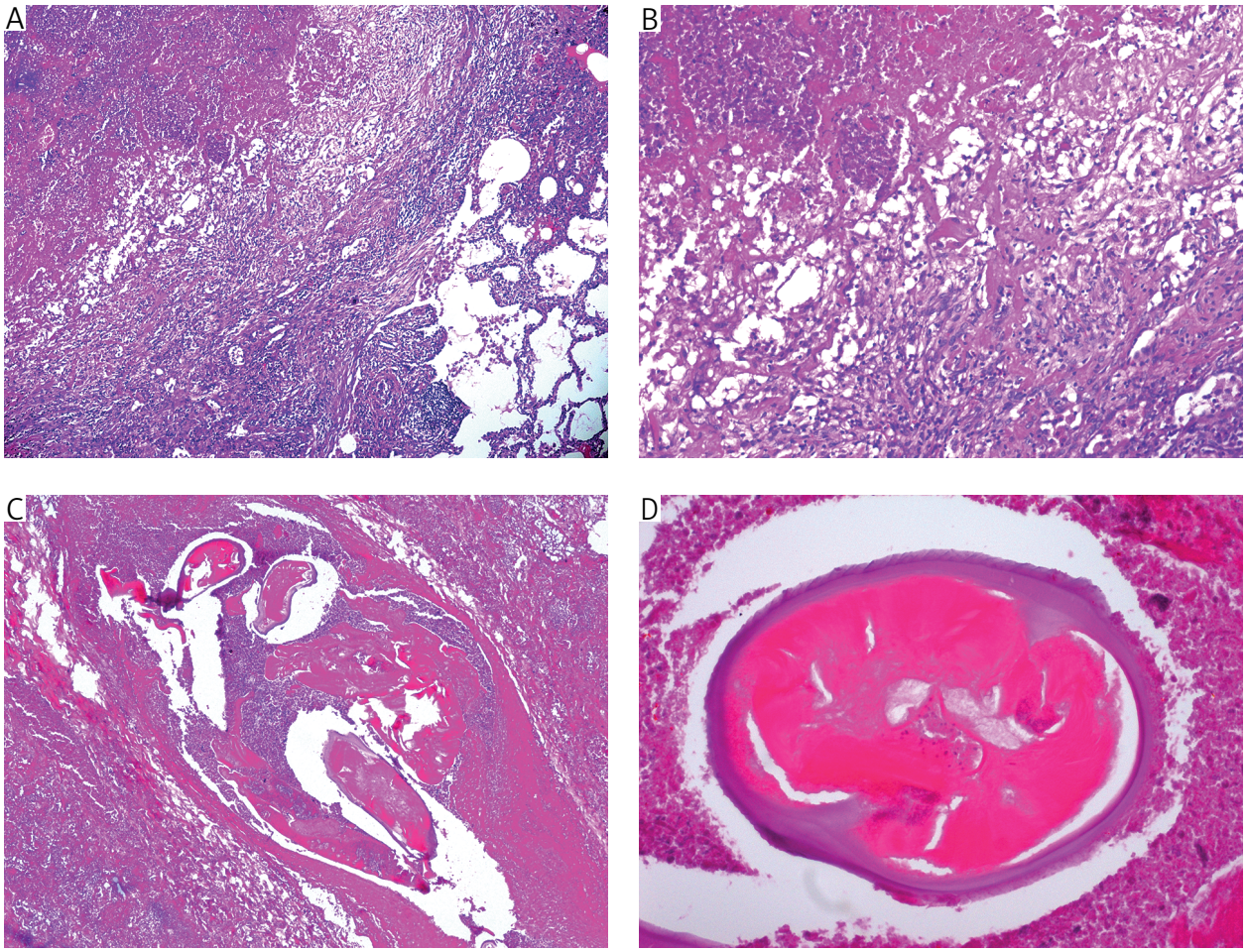

Fig. 3A-D. Microscopically, the lung mass revealed: A) granulomatous inflammation composed of central necrosis surrounded by B) epithelioid histiocytes. C) Inside the necrotic centre, filarial larvae with thick cuticle and musculature were noted. D) Characteristic bilateral internal cuticular ridges were also found. (A and C: HE, magnification 40×; B: HE, magnification 100×; D: HE, magnification 200×)

Discussion

Dirofilariasis is a disease caused by *Dirofilaria* infections. *Dirofilaria* is a genus of nematode. There are three main species of *Dirofilaria*: *D. immitis*, *D. repens*, and *D. tenuis*. Dirofilariasis caused by *D. immitis* is a common disease in dogs, also known as canine heartworm. The parasites are transmitted by mosquitos, which serve as the vectors as well as the intermediate hosts. When a mosquito bites the infected dog, the microfilariae develop into first-stage filarial larvae (L1) and then third-stage filarial larvae (L3). After being biten by the vectors, the larvae mature into adult worms and infest the pulmonary artery and right heart of the next host, where the gravid worms produce microfilariae into peripheral blood. Pulmonary dirofilariasis is a zoonotic disease, also transmitted by mosquito, in spite of the rarity of infection in humans. Adult filariae can live for 5-10 years in definitive hosts. However, humans are not the definitive host of *D. immitis* but a dead-end host. Therefore, the larvae cannot develop into adult worms. The first case of human pulmonary dirofilariasis was reported in 1887 by De Magalhães in a Brazilian boy [3]. Then, the second case was described as pulmonary infarction in 1961 by Dashiell in the United States [4]. Most infected patients are asymptomatic [5, 6], and the remainder present with respiratory or other symptoms, such as chest pain, cough, haemoptysis, fever, or malaise [7]. As in dogs, the worms reside at the small pulmonary arteries. The dead organisms usually result in granulomatous inflammation or infarction subsequently. They will appear as nodules or cavitary lesions on chest X-ray or computed tomography, featuring coin-shaped lesions, usually less than 3 cm in size [8]. Radiologically, it is a great mimicker of primary or metastatic lung cancer [6]. Histopathological examination is the gold standard for the diagnosis of pulmonary dirofilariasis. Serology or polymerase chain reaction have also been used for diagnosis, but neither of these are well standardised or widely available [9, 10]. Dirofilarial nematodes measure 400 to 500 microns in diameter with characteristics of a thick multi-layered cuticle with longitudinal ridges, lateral cords, and internal lateral thickening of the cuticle [11]. Due to necrosis and degeneration of the filarial worms in humans, some morphological features may be obscured. Therefore, internal cuticular ridges are important characteristics that are more easily observed [12]. Complete surgical excision achieves curable intention. No antifilarial drugs are required [13].

References

1. Pampiglione S, Rivasi F, Gustinelli A. Dirofilarial human cases in the Old World, attributed to Dirofilaria immitis: a critical analysis. Histopathology 2009; 54: 192-204.
2. Genchi C, Kramer L. Subcutaneous dirofilariosis (Dirofilaria repens): an infection spreading throughout the old world. Parasit Vectors 2017; 10: 517.
3. Shah MK. Human pulmonary dirofilariasis: review of the literature. South Med J 1999; 92: 276-279.
4. Dashiell GF. A case of dirofilariasis involving the lung. Am J Trop Med Hyg 1961; 10: 37-38.
5. Flieder DB, Moran CA. Pulmonary dirofilariasis: a clinicopathologic study of 41 lesions in 39 patients. Hum Pathol 1999; 30: 251-256.
6. Ro JY, Tsakalakis PJ, White VA, et al. Pulmonary dirofilariasis: the great imitator of primary or metastatic lung tumor. A clinicopathologic analysis of seven cases and a review of the literature. Hum Pathol 1989; 20: 69-76.
7. Hiroshima K, Iyoda A, Toyozaki T, et al. Human pulmonary dirofilariasis: report of six cases. Tohoku J Exp Med 1999; 189: 307-314.
8. Asimacopoulos PJ, Katras A, Christie B. Pulmonary dirofilariasis. The largest single-hospital experience. Chest 1992; 102: 851-855.
9. Glickman LT, Grieve RB, Schantz PM. Serologic diagnosis of zoonotic pulmonary dirofilariasis. Am J Med 1986; 80: 161-164.
10. Nuchprayoon S, Junpee A, Poovorawan Y, et al. Detection and differentiation of filarial parasites by universal primers and polymerase chain reaction-restriction fragment length polymorphism analysis. Am J Trop Med Hyg 2005; 73:895-900.
11. Furtado AP, Melo FT, Giese EG, et al. Morphological redescription of Dirofilaria immitis. J Parasitol 2010; 96: 499-504.
12. Choi SH, Kim N, Paik JH, et al. Orbital dirofilariasis. Korean J Ophthalmol 2014; 28: 495-496.
13. Ciferri F. Human pulmonary dirofilariasis in the United States: a critical review. Am J Trop Med Hyg 1982; 31: 302-308.

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