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Research Note

Three Cases of Pulmonary Dirofilariasis Found in Miyazaki Prefecture

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Dirofilaria immitis is known as a zoonotic parasite causing pulmonary or extra-pulmonary dirofilariasis in man. Nishimura *et al.* (1964) reported the first case of human dirofilariasis in Japan, in which the parasite was found in the tumor in the anterior chest wall. The first case of pulmonary dirofilariasis in Japan was reported by Yoshimura *et al.* (1968). Since then, the number of human dirofilariasis cases gradually increased with time (reviewed by Yoshimura and Akao, 1985; Yoshimura, 1985, 1989; Makiya *et al.*, 1987). Here we report three cases of pulmonary dirofilariasis with different clinical manifestations recently found in Miyazaki Prefecture, southern Japan.

Case No. 1: 64-year-old female. She died of hepatoma with liver cirrhosis in 1981. At the time of autopsy, a small granulomatous lesion was found in the left lower lobe of the lung. By histopathological examinations, multiple cross sections of parasites were found embolized in the branch of pulmonary artery surrounded by a granulomatous lesion (Fig. 1a). This case was reported in the 35th South Japan Regional Meeting of the Japanese Society of Parasitology, (Ibusuki *et al.*, 1983).

Case No. 2: 44-year-old female. She was admitted to the hospital in January 1986 with the chief complaint of epigastralgia. Chest X-ray revealed massive pleural effusion in the left thoracic cavity (Fig. 2). Leukocyte count in peripheral blood was 20,000/mm^3 with 20% eosinophils at the time of admission. The pleural effusion was turbid with numerous inflammatory cells, 80% of which were eosinophils. The pleural effusion gave clear precipitin bands against *D. immitis, Trichinella spiralis,* and *Anisakis simplex* antigens by an Ouchterlony's double diffusion test in agarose with the dominant bands against *D. immitis* antigen (Fig. 4). Although she had been treated with diethylcarbamazine, the amount of pleural effusion did not decrease. Eventually, the left lower lobe including granulomatous lesion was surgically dissected in May 1986 (Fig. 3). *Dirofilaria* larvae were found in the center of the granuloma (Fig. 1b).

Case No. 3: 64-year-old male. A coin lesion was noticed in the right middle lobe when he underwent a mass examination for pulmonary diseases (Fig. 5). Such a lesion was not noticed by a mass examination in the previous year. By computed tomography (CT), a small coin lesion was noticed in the right lower lobe (Fig. 6). Since this lesion was solid and well-demarcated, the granuloma was surgically enucleated (Fig. 1c). His sera obtained at the time of and also a month after surgery did not show antibody activity against *Dirofilaria* antigen nor against other parasite antigens. However, when his serum obtained at the time of surgery was concentrated 5-fold, precipitin bands were observed against

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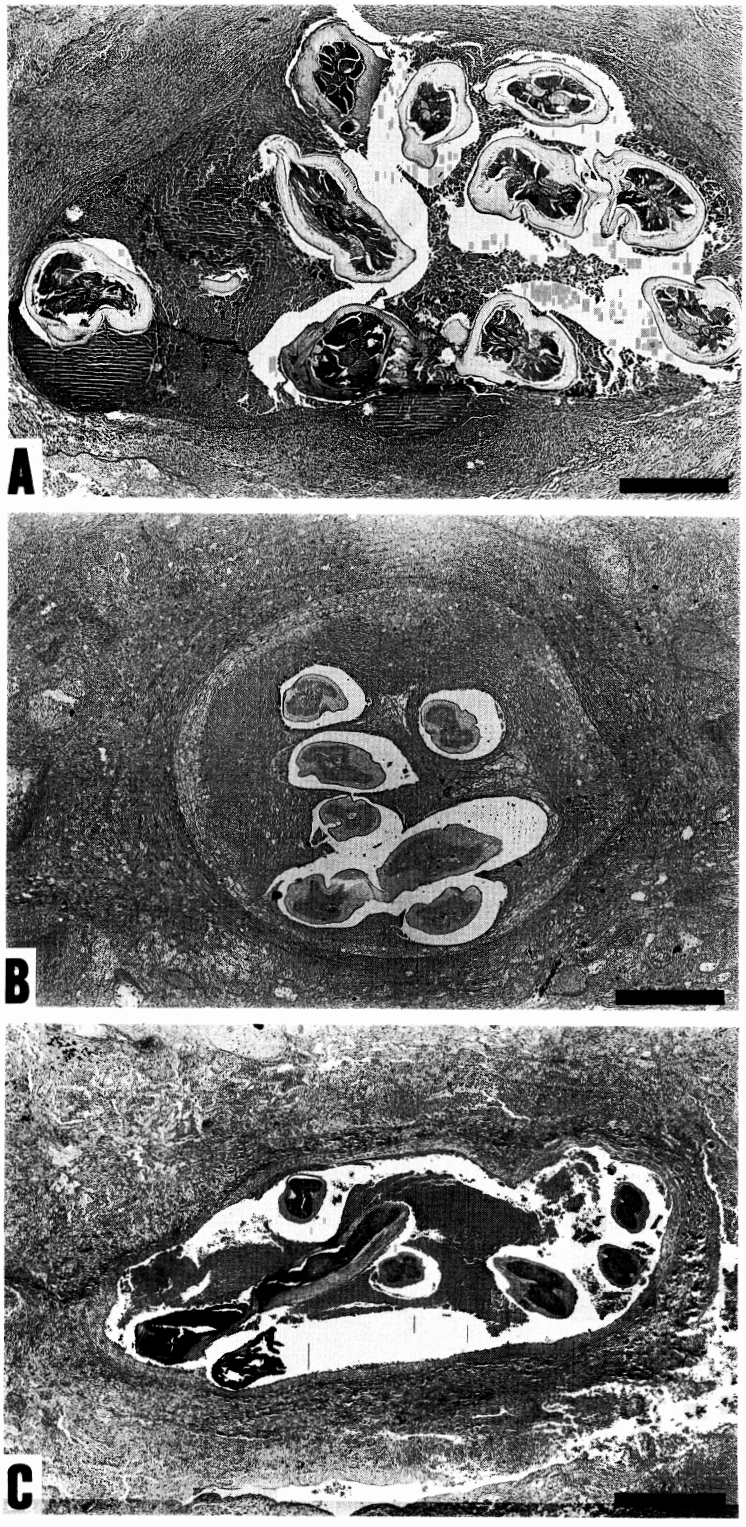
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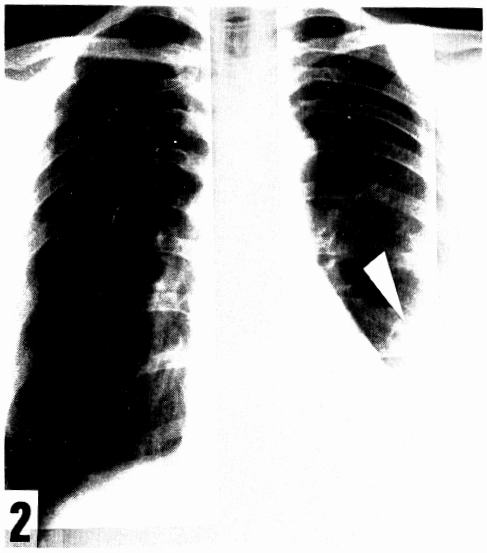
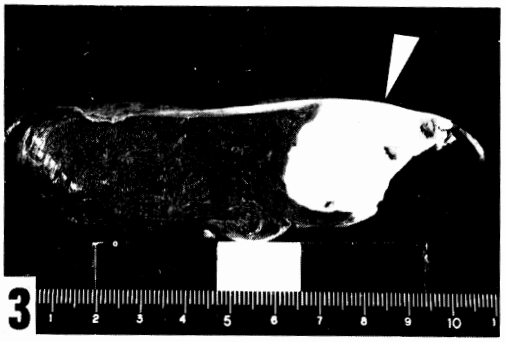




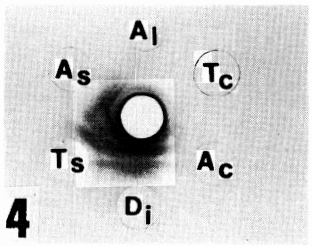


Fig. 2. Chest X-ray of case No. 2 showing pleural effusion in the left lung (arrow head).
Fig. 3. Surgically dessected left lower lobe of case No. 2 showing pulmonary infarction (arrow head).
Fig. 4. Ouchterlony's double diffusion in agar
Al: *Ascaris lumbricoides* Tc: *Toxocara canis* Ac: *Ancylostoma caninum* Di: *Dirofilaria immitis*
Ts: *Trichinella spiralis* As: *Anisakis simplex* Centre well: pleural effusion of case No. 2

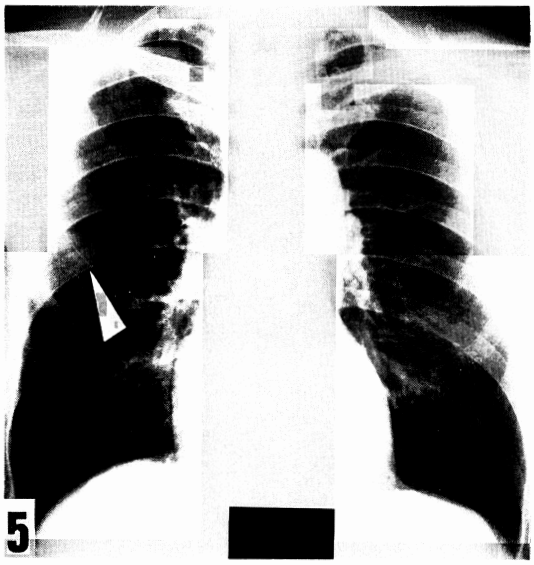
crude somatic extracts of *Toxocara canis* and also against *Ascaris lumbricoides,* but not against *Dirofilaria immitis* (Fig. 7).

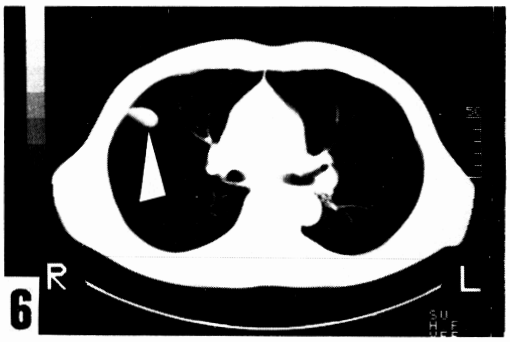
In all the three cases, multiple cross sections of the parasites were seen embolized in the pulmonary artery which was surrounded by granulomatous tissue. Although the inner structures of the parasites were not well preserved, they had thick cuticle and well-developed lateral chords with internal longitudinal ridges. Identification of the parasite species was confirmed by Prof. H. Yoshimura and Assoc. Prof. K. Kondo, Department of Parasitology, School of Medicine, Kanazawa University.

Recently the number of confirmed cases of dirofilariasis is gradually increasing with time not only in Japan (Yoshimura, 1989) but also in other countries (Ciferri, 1982). From a clinical point of view, pulmonary and extra pulmonary dirofilariasis can be distinguished. Makiya *et al.* (1987) made a retrospective literal survey on this disease in Japan. According to their analysis, 39 of 56 cases were of pulmonary type, with the involvement of right lobes predominating (29/39: 74.4%). In the present study as well, the lesion was found in the right lobe in 2 of 3 cases. Clinical manifestation of pulmonary dirofilariasis is variable and often asymptomatic. For example, granulomatous lesion is noticed by autopsy like case No. 1, or, a coin lesion is unexpectedly found by a chest rentogenogram of mass examination like case No. 3. Pleural effusion, which was noticed in case No. 2, is rather rare and only one case was reported in the past (Yoshimura 1980).

The major clinical problem of dirofilariasis is the difficulty of differential diagnosis of this disease from other pulmonary diseases, especially from tuberculosis or from primary or metastatic

Fig. 1. Histopathological preparations showing multiple cross sections of the parasites embolized in the branch of the pulmonary artery.
Fig. 1A. Case No. 1 PAS stain; Fig. 1B. Case No. 2 H.E. stain; Fig. 1C. Case No. 3 H.E. stain. Scale bars; 0.5 mm





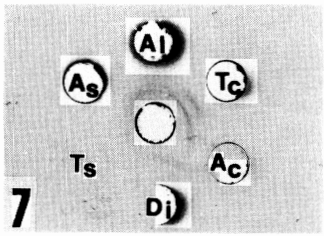


Fig. 5. Chest X-ray of case No. 3 showing coin lesion (arrow head) in the right lung.
Fig. 6. CT showing coin lesion (arrow head) of case No. 3.
Fig. 7. Ouchterlony's double diffusion in agar
The antigens are the same as those in Fig. 4.
Center well: 5-fold concentrated serum of case No. 3.

cancer. In the present study, serodiagnosis using an Ouchterlony's double diffusion method was helpful for case No. 2 but not for case No. 3. Since *D. immitis* is known to have antigen epitopes common with other helminths (Sato *et al.*, 1985; Glickman *et al.*, 1986), in case No. 3, antibody production against such common antigen might occur earlier or fade out slower than that against *D. immitis* unique antigen. Although possible applicabilities of immunodiagnosis such as enzyme-linked immunosorbent assay (ELISA: Sato *et al.*, 1985; Glickman *et al.*, 1986), or of mixed passive hemoagglutinin assay (MPHA: Ohnishi *et al.* 1988) were reported, their clinical evaluation is not fully established yet (Yoshimura 1989). The majority of the cases were, like cases No. 1 and 3, diagnosed by post-operative histopathological examination. In addition, even if this disease is diagnosed properly by immunological methods, drug treatment is often ineffective. Accordingly, development of reliable diagnostic methods as well as effective treatment is required for this disease.

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