[Jpn. J. Parasitol., Vol. 41, No. 4, 279–282, August, 1992]

A Case Report of Paragonimiasis Miyazakii with Cavitating Lesions in the Lung: The First Case Found in Miyazaki Prefecture

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(Accepted for publication; May 27, 1992)

Key words: Paragonimiasis, *Paragonimus miyazakii,* Miyazaki Prefecture, cavitating lesion

Paragonimus miyazakii, principally a lung fluke of wild animals, sometimes causes pulmonary paragonimiasis in human beings so that it is considered as one of important pathogens of zoonoses (Miyazaki and Fuji, 1988). Since Yokogawa *et al.* (1974) first reported a human case of paragonimiasis miyazakii, about 70 cases, majority of which were found in Kanto District, were reported in Japan (Yoshida, 1991). In most instances pneumothorax and/or massive pleural effusion with eosinophilia were the typical clinical manifestations of paragonimiasis miyazakii, and only few cases showed pulmonary infiltration with nodular or cavitating lesions (Hibiya *et al.*, 1984). Here we report immunoserologically diagnosed such a rare case of paragonimiasis miyazakii with cavitating lesions. This is the first case found in Miyazaki Prefecture.

Case Report

The patient is a 51 years-old female who was born and grew up in Kitago-Cho, Miyazaki Prefecture. She has no experience of travelling overseas. Although she has never eaten flesh of wild boars, *Sus scrofa leukomistax,* she sometimes cooks and eats freshwater crabs, *Eriocheir japonicus.* In addition, she occasionally goes around to catch freshwater crabs, *Geothelphusa dehaani,* a famous intermediate host of *P. miyazakii,* to sell the buyers.

On November 1991, the presence of abnormal lung shadow was accidentally noted by her home doctor and she visited the Miyazaki Prefectural Nichinan Hospital on Nov. 12. At that stage, chest roentgenogram and computed tomogram (CT) revealed two nodular shadows; one in 1-S_9 (about 3 cm in diameter) and the other in 1-S_3 (about 1.5 cm in diameter). Total WBC was 12,500/mm^3 with 45% eosinophils. She admitted to the Hospital on Dec. 5 for further workup. Shortly after admission, pleural effusion was transiently developed and then the nodular lesions became cavitating lesions by computed tomography (1-S_9: Fig. 1a; 1-S_3: Fig. 1b). At the time of admission, total WBC was 9,500/mm^3 with 30% eosinophils. Total serum IgE was 240 IU/ml. Since paragonimiasis was strongly suspected, the immediate type skin test using *P. westermani* antigen was carried out and it gave positive results (25 × 15 mm swelling with pseudopodia formation). Parasite eggs were negative in stool and sputum, though they were repeatedly examined. By a dot-ELISA test (Fig. 2) and an Ouchterlony's double diffusion test (Fig. 3), her serum gave far stronger reaction against *P. miyazakii* than *P. westermani* antigen. Immuno-

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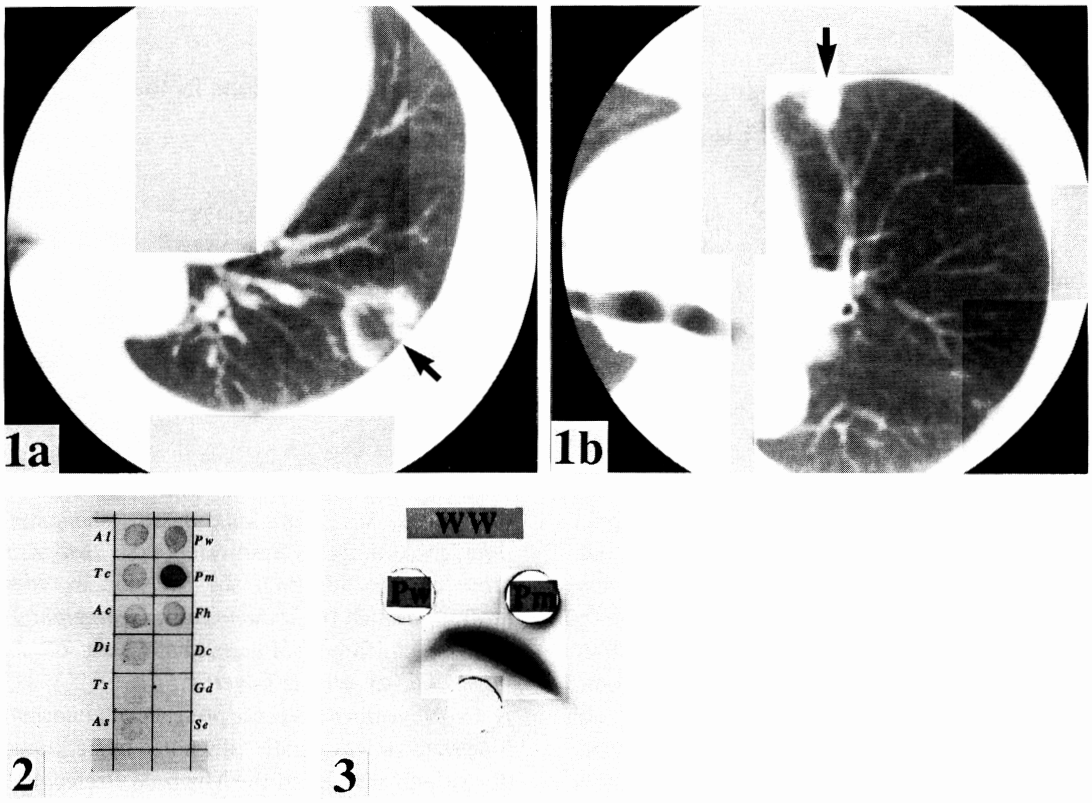

Fig. 1 Computed tomograms showing cavitating lesion in S_9 (Fig. 1a) and S_3 (Fig. 1b) of the left lung of the patient.

Fig. 2 The dot-ELISA showing strong positive reaction against *P. miyazakii* antigen. *Al*: *Ascaris lumbricoides, Tc*: *Toxocara canis, Ac*: *Ancylostoma caninum, Di*: *Dirofilaria immitis, Ts*: *Trichinella spiralis, As*: *Anisakis simplex, Pw*: *Paragonimus westermani, Pm*: *P. miyazakii, Fh*: *Fasciola hepatica, Dc*: *Dipylidium caninum, Gd*: *Gnathostoma doloresi, Se*: *Spirometra erinacei.*

Fig. 3 The Ouchterlony's double diffusion test in agar showing specific and cross-reactive precipitin bands against *P. miyazakii* (Pm) and *P. westermani* (Pw) antigens. WW: whole worm extract antigens.

serodiagnosis for paragonimiasis miyazakii was further confirmed by an ELISA inhibition test (Fig. 4). She was successfully treated with two series of prazyquantel administration at a dose of 75 mg/kg for 2 days. The lung lesions almost disappeared and the serum antibody titer significantly decreased within 3 months; IgG-ELISA value (O.D. at 405 nm) of $\times 100$ diluted patient's serum against *P. miyazakii* antigen was 0.77 ± 0.03 before treatment and 0.41 ± 0.02 after treatment.

Miyazaki Prefecture is one of the famous endemic areas of paragonimiasis in Japan and more than 300 cases were found during the late 1950s to the early 1960s (Hayashi, 1978). All these previously reported cases were identified as paragonimiasis westermani infected by eating and/or cooking freshwater crabs, *E. japonicus,* or flesh of wild boars, *S. scrofa leukomistax.* A few sporadic cases recently found in this area (Matsuoka *et al.*, 1986; Ichiki *et al.*, 1989; Nawa, 1991), including cases of ectopic infections (Ogata *et al.*, 1989; Nabeshima *et al.*, 1991) were also identified as paragonimiasis westermani. In contrast, human cases of paragonimiasis miyazakii have never been found in

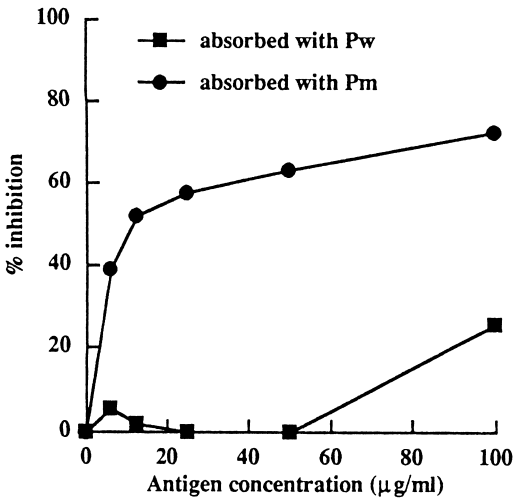

Fig. 4 ELISA inhibition test.
Various concentrations of *P. miyazakii* (●) and *P. westermani* (■) antigens were added to ×100 diluted patient's serum. After incubation at 4°C overnight, antibody titers against *P. miyazakii* antigen were measured by ELISA.

this area, although the incidence of *P. miyazakii* metacercariae in freshwater crabs, *G. dehaani,* was relatively high (Imai *et al.*, 1984) and the adult worms were occasionally found in the wild animals (Ashizawa *et al.*, 1975; 1977) in Miyazaki Pref. As far as we could gather, the patient reported here is the first confirmed case of paragonimiasis miyazakii found in Miyazaki Pref. Already Norimatsu (1991) reported 4 cases of paragonimiasis miyazakii found in Kagoshima Pref. Therefore, the southern part of Kyushu District should be considered as the endemic area of this disease.

As the chest roentgenographic findings of paragonimiasis, pulmonary infiltration with nodular or cavitating lesions are considered as the characteristic feature of paragonimiasis westermani, whereas pneumothorax and pleural effusion are considered to be typical to paragonimiasis miyazakii (Yoshida, 1991). However, recently the cases opposing to these features have been accumulated (Matsuoka *et al.*, 1986; Ichiki *et al.*, 1989; Norimatsu, 1991). The case reported here also showed nodular and cavitating lesions caused by *P. miyazakii* infection. Therefore, the chest roentgenographic findings are, as they are alone, no longer applicable for the differential diagnosis between paragonimiasis westermani and miyazakii (Norimatsu, 1991). Instead, immunoserological methods such as an Ouchterlony's double diffusion test seem to be helpful for this purpose (Araki, 1991). In the present study, identification of the causative parasite was successfully carried out by using three different ways of immunodiagnostic methods, dot-ELISA, Ouchterlony's double diffusion in agar and ELISA-inhibition test. The results reported here clearly demonstrate the advantage of immunoserological diagnosis.

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