[Jpn. J. Parasitol., Vol. 44, No. 3, 254–257, June, 1995]

Case Report

A Case Report of Pulmonary Paragonimiasis with Pulmonary Tuberculosis

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(Accepted June 9, 1995)

Key words: Paragonimiasis; tuberculosis; concurrent infection; immunodiagnosis.

Paragonimiasis is often misdiagnosed as pulmonary tuberculosis because of the resemblance of their clinical manifestations or chest X-ray findings (Davis *et al.*, 1970). Tuberculosis is a cosmopolitan disease, whereas paragonimiasis is a local food-borne zoonotic disease. Therefore, where paragonimiasis is endemic, extreme caution should be paid for the differential diagnosis. When either paragonimiasis or tuberculosis is complicated with the other, the presence of the other disease is sometimes overlooked. A case reported in this study is typical of that the patient was initially diagnosed as tuberculosis (confirmed by the detection of *Mycobacterium tuberculosis* in the bronchial aspirate), and during following-up study, *Paragonimus westermani* eggs were detected in the bronchial aspirate.

Case Report

The patient is a 33 year-old businessman born in Miyazaki City. He lived in Takachiho-Chyo, Nishi-Usuki-Gun, Miyazaki, where paragonimiasis is still endemic, from April 1990 to March 1993. Although he noticed occasional hemoptysis in the middle of April 1993, no abnormalities were found by chest X-ray radiogram until November 1993, when he visited the Department of Radiology, Miyazaki Medical College, for cough and hemoptysis becoming worse. Because *M. tuberculosis* was detected in the aspirates of bronchofiberscopy (Gaffky #2), he was admitted to the regional sanatorium. At the time of admission, a noncavitating nodular lesion (2×1.5 cm) was found in the lingula of the left lung by chest X-ray radiogram (Fig. 1) and computed tomogram (Fig. 2). His laboratory data were as follows; Total white blood cell count: 4,300/mm^3 with 7% eosinophils, the Tuberculin reaction: positive (30×28/30×28 mm), erythrocyte sedimentation rate: 83/119 mm, *M. tuberculosis* bacteria: not detected in the sputum smear. After being treated with antituberculobacili and hemostatic drugs, his symptoms improved, and he had been discharged on January 6, 1994 and followed-up as an outpatient receiving chemotherapy. Although his sputum became free from tubaculobacili by repeated examinations, the nodular lesion in the lung still remained with the size slightly decreased. Because malignancy was suspected, he received bronchofiberscopy on November 14, 1994, and, unexpectedly a few parasite eggs (Fig. 3) were found in the cytological specimen. Parasite eggs were also found in his sputum after dissolution with alkali and concentration by centrifugation (Fig. 4). Their average size was 87.2×48.8 μm (n=10) and have an operculum at one end and were identified as typical *P. westermani* eggs. His serum gave clear positive reactions against *P. westermani* and *P. miyazakii* antigens in a multiple-dot ELISA test with the predominance against *P.*

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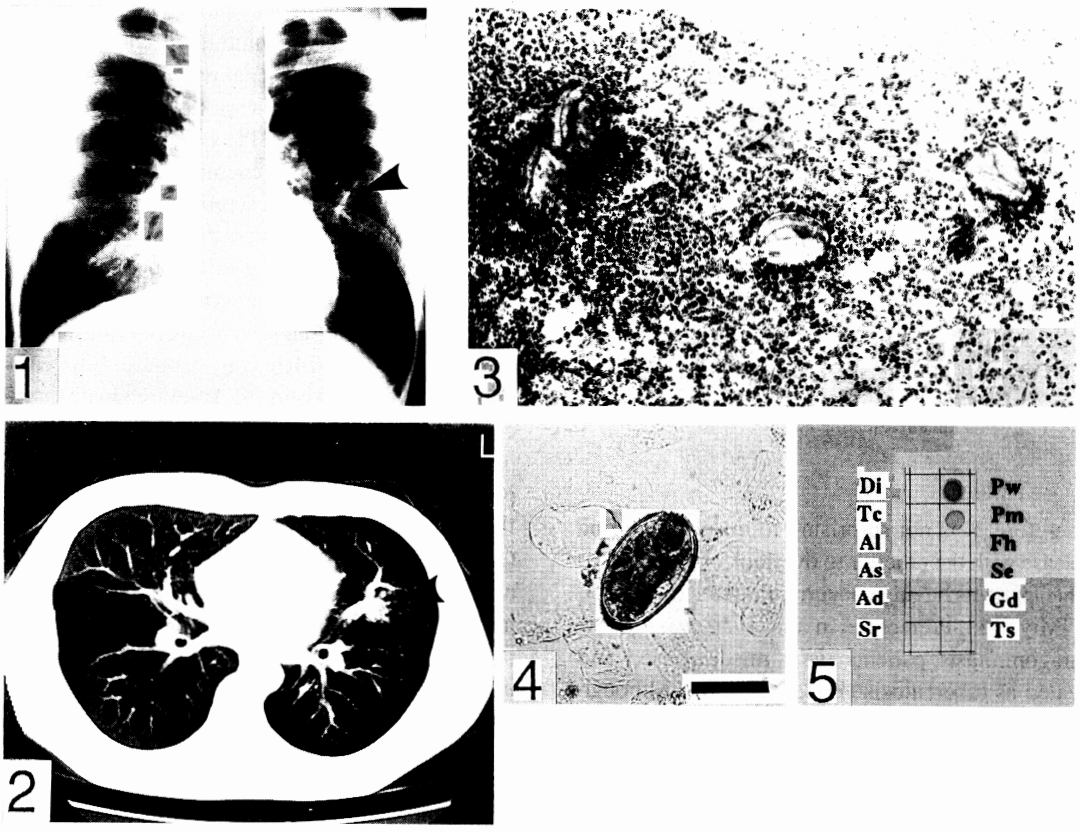

Fig. 1 Chest radiogram showing nodular lesion (arrow head) in the left lingulae.
Fig. 2 Computed tomogram of the lung lesion (arrow head).
Fig. 3 A smear of the bronchial aspirate from the patient showing *Paragonimus* eggs.
Fig. 4 An egg isolated from the sputum of the patient.
Scale bar = 50 μm.
Fig. 5 Multiple-dot ELISA showing positive reactions of the patient's serum against *P. westermani* and *P. miyazakii* antigens. Di: *Dirofilaria immitis*, Pw: *Paragonimus westermani*, Tc: *Toxocara canis*, Pm: *Paragonimus miyazakii*, Al: *Ascaris lumbricoides*, Fh: *Fasciola hepatica*, As: *Anisakis simplex*, Se: *Spirometra erinacei*, Ad: *Ancylostoma duodenale*, Gd: *Gnathostoma doloresi*, Sr: *Strongyloides ratti*, Ts: *Trichinella spiralis*.

westermani antigen (Fig. 5). He was treated with praziquantel (Biltricide®, Beyer; 75 mg/kg/day) for 3 days. The nodular lesion disappeared within three months and the specific serum antibodies reduced after the treatment (ELISA O.D. value of 1:2700 diluted serum before treatment: 0.579; 2 months after treatment: 0.340). Eosinophilia was not observed during the period examined except for transient increase in eosinophil numbers shortly after praziquantel treatment (Fig. 6). In spite of low levels of eosinophilia, total serum IgE remained elevated at least for three months after the diagnosis of paragonimiasis (Fig. 6).

Discussion

The present case demonstrates the difficulty to diagnose paragonimiasis when complicated with tuberculosis. Tuberculosis used to be a nation-wide health problem in Japan and paragonimiasis is still endemic in Miyazaki Prefecture, although the latter is rather a local food-borne zoonotic parasitosis.

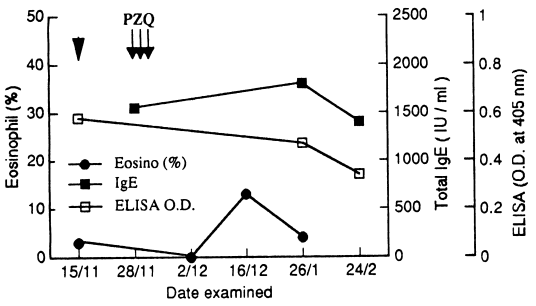

Fig. 6 Kinetic changes of eosinophilia (●), total serum IgE (■) and ELISA values (□) of the patient after diagnosis of paragonimiasis (arrow head).
PZQ: praziquantel treatment.

Therefore, it is not surprising to misdiagnose one disease with the other or to overlook one of the two when patients having concurrent infections. In fact, in Miyazaki Prefecture in the 1950–60s, a few paragonimiasis patients were misdiagnosed and treated as tuberculosis (Hayashi, 1978). Although the prevalence of both diseases drastically decreased by the 1970s, they are still sporadically found in Miyazaki Prefecture (for paragonimiasis: Nawa 1991; for tuberculosis: Annual Report of Health Surveillance, Miyazaki Prefecture, 1993). Though the frequency of concurrent infection with these two pathogens is assumed to be extremely low today, caution must be always paid for the presence of covered infection. The patient reported here is such a rare case infected with both pathogens one after the other.

In the present case, a lung lesion was first found with the detection of tuberculobacili in the sputum. Even after chemotherapy for tuberculosis, the lung lesion remained almost unchanged for several months. Bronchofiberscopy was performed under a suspicion of malignancy. Unexpectedly, *Paragonimus* eggs were detected but no malignant cells were found. The lung lesion was completely disappeared after chemotherapy for paragonimiasis. Such a clinical course imply that *Paragonimus* worm(s) might have migrated into the previously formed tuberculomatous lesion, or alternatively, *Paragonimus* worm(s) was responsible for the lung lesion, and tuberculobacili might be present in an undetectable site.

Eosinophilia and/or elevation of total serum IgE are characteristic for helminthiasis and are the most important clues to suspect parasitic infections. In the present case, eosinophilia was marginal or within normal level throughout the course examined except transient rise after chemotherapy for paragonimiasis. Although total serum IgE level elevated, this was examined only after the diagnosis of paragonimiasis. These made it difficult to suspect the concurrent presence of paragonimiasis with tuberculosis until parasite eggs were directly shown in the smears of broncho-fiberscopy aspirate. Both eosinophilia and high serum IgE level frequently associate with paragonimiasis (Nawa, 1991) and these phenomena agree with the fact that eosinophilopoietic cytokine, IL-5, and IgE-inducing cytokine IL-4, are both produced by Th2 cells (Mosmann and Coffman, 1989). However, dissociation of eosinophilia and elevation of IgE is sometimes observed in parasitic infections (Ogata *et al.*, 1995). Related to this, while *Paragonimus* antigen contain eosinophil chemotactic factors (Hamajima *et al.*, 1986), *M. tuberculosis* antigen, as the form of Freund's complete adjuvant, stimulates the production of eosinophil chemotactic suppressor factors (Hirashima *et al.*, 1984a, b). Such suppressive mechanisms might have operated in the present case to cause the dissociation of eosinophilia and IgE level.

In conclusion, physicians as well as parasitologists, especially who are working in an endemic area of paragonimiasis, should be aware of the presence of such complicated cases with great difficulty of diagnosis.

Acknowledgements

The authors wish to thank Prof. M. Hirashima, Department of Immunopathology, Kagawa Medical School, for his valuable discussion. Excellent technical assistance by Ms. Ayumi Tanaka in immunoserological diagnosis for parasitic diseases is gratefully acknowledged.

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