Short Report: Different Chest Radiographic Findings of Pulmonary Paragonimiasis in Two Endemic Countries

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Abstract. We compared the chest radiographic findings of patients with pulmonary paragonimiasis in the Lao People's Democratic Republic (PDR) with a report from Korea. The clinical and radiological characteristics of 50 confirmed Laotian pleuropulmonary paragonimiasis patients were studied between March 2003 and June 2007. In 49 patients, the chest radiographs showed abnormal findings (98%). Pulmonary parenchymal abnormalities were found in all 49 patients, whereas pleural effusion was only found in 11 patients (22%). The three most common intraparenchymal findings were multiple small cysts (90%), irregular linear densities (68%), and nodular opacities (40%). The numbers of patients who had these three findings were significantly different from the Korean report ($P < 0.001$). In conclusion, radiographic findings of pulmonary paragonimiasis may vary among countries.

INTRODUCTION

Pleuropulmonary paragonimiasis is a food-borne parasitic disease of the lungs caused by the lung fluke *Paragonimus westermani* or other species of *Paragonimus*. Human infections occur when raw or incompletely cooked freshwater crabs or crayfish infected with metacercariae are ingested.¹ The juvenile worms excyst from the metacercariae and pass through the intestinal wall, peritoneal cavity, diaphragm, and pleural cavity to finally enter the lung parenchyma, where they mature to adult flukes.

The disease is common in limited areas of Asia such as Korea, Japan, and Lao People's Democratic Republic (PDR). People in these countries habitually eat raw or undercooked freshwater crab or crayfish.^{2,3} Patients with paragonimiasis may be seen in almost every part of the world because of extensive travel, people migration, and the popularization of ethnic food.⁴

Chest radiography is a useful tool for the diagnosis of pleuropulmonary paragonimiasis. Clinical features and chest radiographs might be different among endemic countries. Here, we compared the chest radiographic findings of patients with paragonimiasis in Lao PDR with those in Korea.

MATERIALS AND METHODS

All 50 patients with pulmonary paragonimiasis at the Institut de la Francophonie pour la Médecine Tropicale (IFMT) Center in Lao PDR between March 2003 and June 2007 were included in the study. The diagnosis was based on the detection of the characteristic *Paragonimus* eggs in a fresh sputum smear (Figure 1).

The demographic data and clinical symptoms of the patients were recorded. The chest radiographs of all patients were reviewed and classified into parenchymal and pleural abnormalities. The results were compared with a previous report⁵ by χ^2 or Fisher exact statistics where appropriate.

RESULTS

Of 50 patients, 26 were men (52%). The average age was 28 years (range = 4–75). The presenting symptoms were chronic cough (100%), hemoptysis (82%), pleuritic chest pain (70%), dyspnea (50%), and fever (4%).

Chest radiographs showed abnormal findings in 49 patients (98%). Pulmonary parenchymal abnormalities were found in all 49 patients, whereas pleural effusion was only found in 11 patients (22%).

The most common parenchymal finding was multiple small cysts (0.5–2 cm in size). The cysts were found in 45 patients (90%) and were mainly located at the perihilar area and both lower lobes. Irregular linear densities and nodular opacities were found in 34 (68%) and 20 (40%) patients, respectively. The prevalence of these three findings was significantly different from a previous report on patients with paragonimiasis in Korea⁵ (Table 1).

Furthermore, a minority of our cases presented some abnormal lung parenchymal findings including fibrosis, fibronodular lesions, and calcification. Patients with pleural effusion also had parenchymal lesions. No pneumothorax or hydropneumothorax was found. Unilateral pleural effusion was more

FIGURE 1. *Paragonimus* sp. egg in sputum specimens; unstained smear, $\times 400$.

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TABLE 1
Chest radiographic findings in 50 and 36 patients with paragonimiasis in Lao PDR and Korea, respectively

Findings	Present study (%)	Korea study ⁵ (%)	P value
Pulmonary lesions	49 (98)	26 (72)	< 0.001
Multiple small cysts	45 (90)	2 (5)	< 0.001
Irregular linear densities with ill-defined opacities	34 (68)	6 (17)	< 0.001
Nodular opacities	20 (40)	14 (39)	< 0.001
Fibrosis	4 (8)	0	0.136
Fibronodular infiltration	3 (6)	0	0.261
Calcification	2 (4)	0	0.507
Mass	0	1 (3)	0.419
Airspace consolidation	0	4 (11)	0.028
Pleural effusion	11 (22)	7 (19)	0.796
Unilateral	7 (14)		
Bilateral	4 (8)		
Hydropneumothorax	0	3 (8)	0.070
Normal chest X-ray	1 (2)	3 (8)	0.304

common than bilateral pleural effusion (seven versus four patients). Figures 2–4 show the parenchymal and pleural findings of three patients.

DISCUSSION

The majority of publications on radiographic findings of paragonimiasis are from Korea. We compared our results with a report of 36 patients with paragonimiasis from Korea.⁵ Our results document that lung parenchymal radiographic abnormalities were the most common findings of paragonimiasis in Lao as well as Korea (98% and 72%). However, the patterns of intraparenchymal abnormalities of our patients were different from the Korean report. There were more patients with multiple cysts, irregular linear lesions, or nodular opacities ($P < 0.001$) in the present study. These radiographic findings

FIGURE 3. A chest radiograph reveals bilateral pleural effusion with multiple irregular subpleural linear densities at the right middle and right lower lung field, which may represent worm migratory tracts.

may represent the larvae, their tracks, or the reaction from the host responses.⁶

Although the larvae need to pass pleural space before entering the lungs, we found pleural effusion in only 22% of our patients. This finding was similar to a report from Korea that found pleural effusion in 19% of patients with paragonimiasis. However, pleural effusion was found in up to 60% in other case series.^{2,6} The radiographic clue for paragonimiasis is the combination of pleural effusion and multiple cysts,

FIGURE 2. A chest radiograph shows multiple, small nodular opacities with multiple, cystic lesions at the right upper lobe and left mid lung. Also note the multiple, small cysts perihilar and in both lower lobes.

FIGURE 4. A chest radiograph shows bilateral pleural effusion, more on the right side, with a small, irregular subpleural linear density at the right mid lung.

irregular linear lesions, or nodular opacities in the lung parenchyma. A history of eating raw freshwater crab or crayfish is also helpful.

The differences of the radiologic findings of pulmonary paragonimiasis between these two countries may be attributed to the causative *Paragonimus* species. In Laos, the most frequently isolated species are *P. heterotremus*, *P. harinasutai*, and *P. bangkokensis*,⁷ whereas in Korea, *P. westermani*, *P. pulmonalis*, and *P. iloktsuenensis* prevail.⁸ The late access to healthcare in Laos may be another explanation. Some patients experienced symptoms for several years before admission, which consequently made cases in Laos more advanced.

In conclusion, the present study indicates that chest radiographs of patients with paragonimiasis may vary among endemic areas, particularly in the parenchymal findings.

Received February 10, 2010. Accepted for publication April 2, 2010.

Acknowledgments: The authors thank the Laotian patients in the Vientiane and Attapeu provinces as well as the IFMT staff and technicians for their technical assistance. This study was conducted as a practical field training for the master course in tropical medicine delivered by the IFMT, with financial support from the Agence Universitaire de la Francophonie and the French Ministry of Foreign Affairs (programme Corus n°16390188). We also would like to thank the Office of the Higher Education Commission, Ministry of Education and the Research and Diagnostic Center for Emerging Infectious Disease, Khon Kaen University, Thailand.

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