

## Pneumothorax Induced by Pulmonary Paragonimiasis: Two Cases Report

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When the juvenile worms of the genus *Paragonimus* migrate and cause defects on the surface of the visceral pleura, pneumothorax can develop. A 34-year-old woman was admitted for pneumothorax with which was developed after she ate raw fish and crab. A 21-year-old male soldier presented with recurrent bilateral pneumothorax without eosinophilia, caused after drinking stream water frequently. In both patients, paragonimiasis was suspected from the computed tomography scan and confirmed by an enzyme-linked immunosorbent assay test of the pleural fluid. When pneumothorax develops in patients who have ingested raw fresh-water crab or stream water, paragonimiasis should always be considered in the differential diagnosis.

Key words: 1. Pulmonary paragonimiasis  
2. Pneumothorax

### CASE REPORTS

#### 1) Case 1

A 34-year-old woman visited the emergency room for dyspnea and chest pain, which had developed two weeks earlier. On the chest X-ray, a moderate amount of pneumothorax with multifocal air-fluid levels was found on the left side. In the peripheral blood test, the white blood cell count was within the normal range with  $9,900 \times 10^3$  cells/ $\mu$ L, but the eosinophil count was elevated by  $2.1 \times 10^3$  cells/ $\mu$ L (21.1%). She had returned from a trip to Japan 15 days earlier, where she had eaten sliced raw fish and raw crab. Chest computed tomography (CT) scan revealed the presence of subpleural bullae and sub-lobular consolidation accompanied with peripheral ground glass attenuations in the lung parenchyma (Fig. 1) along with a moderate amount of hydropneumothorax on the left side, a small amount of effusion on the right side,

and several abscess pockets in the liver, because of which pulmonary paragonimiasis was suspected. A 20-Fr suture rib trocar catheter (Argyle; Covidien, Dublin, Ireland) was inserted into the left pleural cavity. The serum and the pleural fluid were positive for *Paragonimiasis westermani* by a parasite-specific antibody immunoglobulin G (IgG) enzyme-linked immunosorbent assay (ELISA) test. Under the diagnosis of paragonimiasis, the patient was medicated with a 3-day course of praziquantel (Distocid 600 mg) 80 mg/kg divided into 3 doses; she was discharged on the 8th day. Four months later, follow-up chest CT scan revealed that the lesions in the lung and liver were resolved, and the eosinophil count in the peripheral blood was normalized.

#### 2) Case 2

A 21-year-old male soldier visited the outpatient clinic for dyspnea followed by acute chest pain. He had several epi-

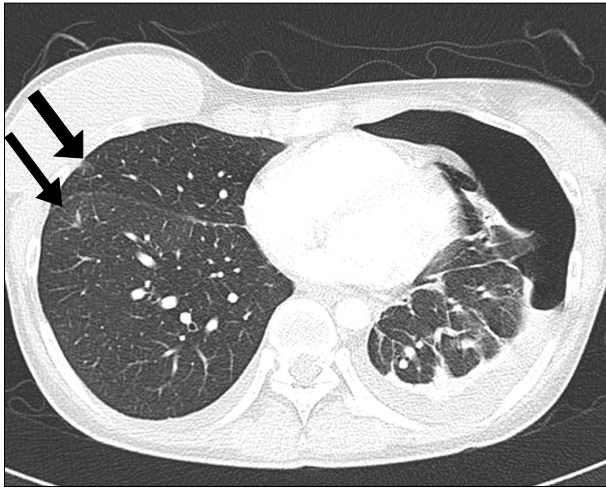
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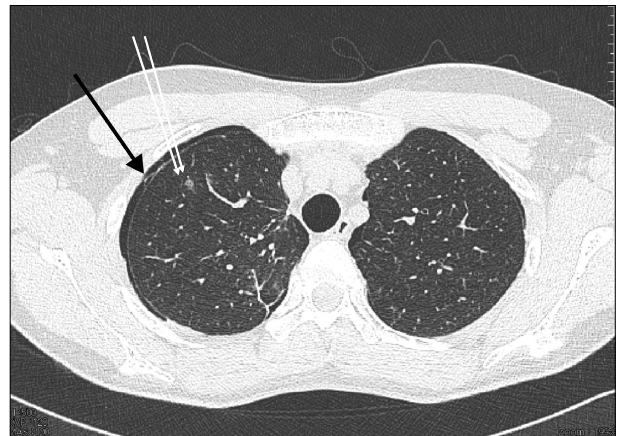
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**Fig. 1.** Chest computed tomography scans of patient 1. A thick arrow indicates the cavitary nodule in the right middle lobe. A thin arrow shows a linear opacity in the right lower lobe. On the left side, a moderate amount of pneumothorax with pleural effusion was noted.

sodes of pneumothorax on both sides even after thoracoscopic surgery. Chest X-ray revealed a moderate amount of pneumothorax on the right side, which was the second event of pneumothorax after repeated thoracoscopic surgery performed 4 years and 3 months earlier. On the left side, a small amount of pneumothorax was also detected and the patient had undergone thoracoscopic surgery 10 months previously. A 7-Fr two-lumen central venous catheter (Arrow International Inc., Reading, PA, USA) was inserted into the right pleural cavity and conventional thoracotomy with chemical pleurodesis was planned. In the high-resolution CT, subpleural nodules and ground glass attenuations in both lungs were newly detected (Fig. 2). The patchy ground glass attenuation increased in extent as compared to 4 months earlier. Radiologically, pulmonary paragonimiasis was suspected, but laboratory studies did not show any abnormal findings in the peripheral blood and the parasite-specific antibody IgG was negative in the serum. However, the ELISA test for *Paragonimiasis westermani* in the pleural fluid was positive. The patient had eaten crabs preserved in soy sauce a month earlier, but he insisted that they were sea crabs. However, he had drunk stream water frequently during outdoor military drills. Under the diagnosis of paragonimiasis, he was treated with a 3-day course of praziquantel (Cisticid 600 mg) 80



**Fig. 2.** Chest high-resolution computed tomography (HRCT) of patient 2. A single arrow indicates the newly developed bulla, and a double arrow shows the cavitary nodule in the right upper lobe, which was not identified on the previous HRCT conducted 4 months earlier. A small amount of pneumothorax with pleural effusion was also noted.

mg/kg divided into 3 doses. The pathologic samples obtained through previous operations were reviewed again, but there were no abnormal findings except the presence of bullae. Two months later, he underwent a chest CT scan; the results revealed that the bilateral pneumothorax was resolved and previously noted patchy ground glass attenuations, subpleural nodules, and cavitary nodules in both the upper lobes were improved with small residual opacity.

## DISCUSSION

Human infections with the *Paragonimus* species have been reported mainly in eastern Asia, when they consume living metacercariae in tissues of crayfish or crab, or in the fingers and utensils of the persons preparing the meals. The incidence of pulmonary paragonimiasis in Korea has decreased rapidly since the 1970s due to population reduction of the intermediate hosts through industrialization and changes in dietary habits. Survey data from the 1990s indicated that the prevalence of human paragonimiasis had fallen to approximately 1/100th of that in the early 1970s [1]. Nowadays, according to the increasing prevalence of outdoor living and widespread encampment in Korea, the risk of parasite infection caused by accidental eating of undercooked freshwater

crab or crayfish may be growing. Moreover, classic symptoms such as chronic cough with rusty-brown sputum, hemoptysis, pleurisy, and fever [2] are common in respiratory disease. Eosinophilia is known as the characteristic feature of parasite infection in 70% to 80% of patients [2-4], but Tomita et al. [5] reported that a normal or marginal level of eosinophilia could be observed due to the low intensity of infection or earlier diagnosis. Because eosinophile count differs from patient to patient [4] and according to the main location of lesion [5], and even disappears in the chronic phase [6], immunodiagnosis is the only reliable way to diagnose paragonimiasis [4]. Radiologic manifestation of pulmonary paragonimiasis varies with the stage of the disease. Early findings include pneumothorax or hydropneumothorax, focal airspace consolidation, and linear opacities. Later, thin-walled cysts, dense mass-like consolidation, nodules, or bronchiectasis may appear [7]. It is often confused with tuberculosis or lung cancer [5]. Therefore, paragonimiasis should be included in the differential diagnosis when a pulmonary or pleural lesion is detected in patients who have lived in or traveled to paragonimiasis-endemic areas, such as Korea, China, and Japan [5]. Moreover, in order to lower the high recurrence rate in secondary pneumothorax [8], treatment for the underlying pulmonary disease should be accompanied.

In these cases, the patients were diagnosed by the secondary spontaneous pneumothorax induced by paragonimiasis, but their clinical manifestation was different and they had mixed radiological lesions. Paragonimiasis should always be considered in the list of differential diagnosis, when pneumothorax is developed in patients who have a risk of eating raw fresh-water crab or drink stream water, and it is necessary to

perform a chest CT scan and ELISA test to confirm the diagnosis.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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