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First case report of paragonimiasis in a Malaysian man

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Abstract. Paragonimiasis is an infection caused by *Paragonimus*, a lung fluke and is acquired by eating raw or undercooked crustaceans containing the infective metacercariae. Herein, we report a case of paragonimiasis in a Malaysian man who presented with incidental findings from chest radiographs. Examination of his biopsied lung tissue and sputum specimen revealed *Paragonimus* sp. eggs, whereas stool examination showed the presence of *Giardia* cysts. Patient was succesfully treated with praziquantel and metronidazole respectively.

INTRODUCTION

Paragonimus is a lung fluke, endemic in Japan, Korea, Taiwan, China and Southeast Asian countries. It is also distributed in the Americas and Africa. Human acquires infection after ingesting inadequately cooked or pickled crustaceans containing the infective metacercariae. The metacercariae excyst in the duodenum and the larvae penetrate the intestinal wall and migrate to the abdmonial cavity, diaphragm and pleural cavity to the lungs. The larvae mature in the lungs to adults. The adult worm is coffee bean shaped about 10 mm long, 5 mm broad and 4 mm thick. They live in the lungs usually in pairs in cystic spaces that communicate with bronchi. Adults in cystic cavities in lungs lay eggs which are excreted in the sputum. Eggs may be swallowed and are passed out in stool. Time from infection to oviposition is between 2-3 months. Patients with paragonimiasis may present with cough, chest pain, dyspnoea and haemoptysis. Chronic cases may mimic symptoms of pulmonary tuberculosis (Mahmud *et al*., 2018).

CASE REPORT

A 46-year-old Malaysian man who lived and worked in Singapore, was incidentally found to have a left lung consolidation on a chest X-ray done for a pre-employment medical check-up in September 2018. He gave a 6 months history of intermittent dry cough, typically nocturnal. However, there was no haemoptysis, breathlessness, fever or weight loss. He was an active smoker, and worked in the food and beverage industry. He gave a history of travel to Guang Tze, China in March 2018 where he had consumed shell fish and raw oysters. He also had a history of consuming raw sea water blood clams and raw seafood from various other locations in China and Singapore. He did not recall having any symptoms of gastroenteritis.

On examination, he was comfortable, not tachypnoeic, pink and not jaundiced. There was no palpable cervical lymphadenopathy and no skin lesions seen. Lung examination revealed reduced breath sounds over the left lower zone. His abdomen was soft, not tender and there were no masses palpable. Cardio-

vascular examination was unremarkable. In Singapore, he had a Mantoux test done which was 17 mm and showed evidence of post inflammatory blistering. His chest X-ray showed a left lower zone consolidation (Figure 1). A CT thorax showed bilateral hilar lymphadenopathy with consolidations over the medial segment of the right middle lobe (Figure 2). Apical segment of the left lower lobe showed cavitation. Three pleural masses were also noted. Blood investigations showed an elevated eosinophil count (6.4%) and total IgE (> 2000 IU/mL). Screening for HIV, syphilis, Hep B and A were all negative. Sputum for acid fast bacilli (AFB) and cultures were negative.

He returned to Malaysia for a CT guided lung biopsy which was done at a private hospital. Bacterial culture and examination for acid fast bacilli from the biopsy were negative. Histopathology result from the biopsy showed parasitic infection of the lung. He was then referred to the Infectious Diseases Unit in University Malaya Specialist Centre (UMSC). The lung biopsy sample was examined by the University Malaya Medical Centre (UMMC) Parasitology Diagnostic Unit and *Paragonimus* sp. eggs were seen in the lung tissue (Figure 3A). Examination of a routine sputum sample of the patient showed *Paragonimus* sp. eggs (Figure 3B). Stool examination revealed the presence of *Giardia* cysts but negative for *Paragonimus* eggs. The patient was started on treatment for paragonimiasis with praziquantel 1800 mg 3 times a day for 2 days. Giardiasis was treated with metronidazole 500 mg 2 times a day for 1 week. Repeated sputum examination at 1 week and 1 month post treatment were negative for *Paragonimus* eggs. Full blood count at follow-up showed resolved eosinophilia and patient was clinically well. A repeat stool examination was negative for *Giardia* cyst.

DISCUSSION

Paragonimiasis is a food borne parasitic disease (Keiser and Utzinger, 2009). At least 10 different species of lung flukes, all belonging to the genus *Paragonimus* are

Figure 1. Chest X-ray showing left lower zone consolidation.

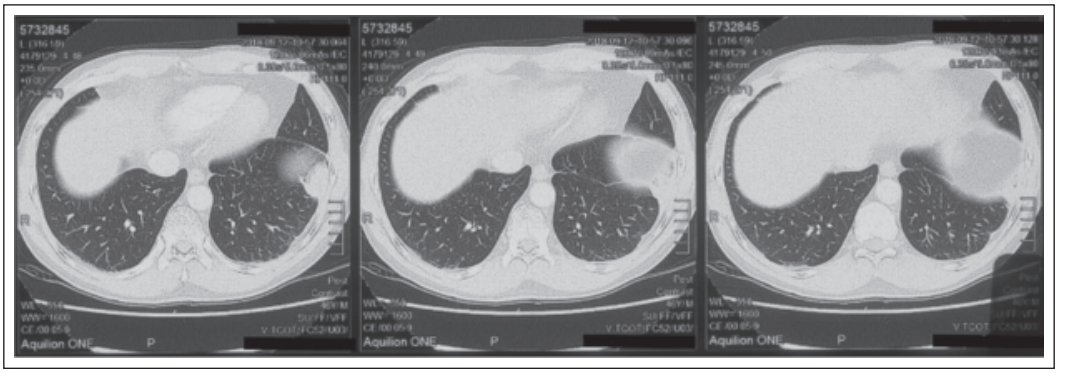

Figure 2. CT thorax shows bilateral hilar lymphadenopathy with consolidations over the medial segment of the right middle lobe.

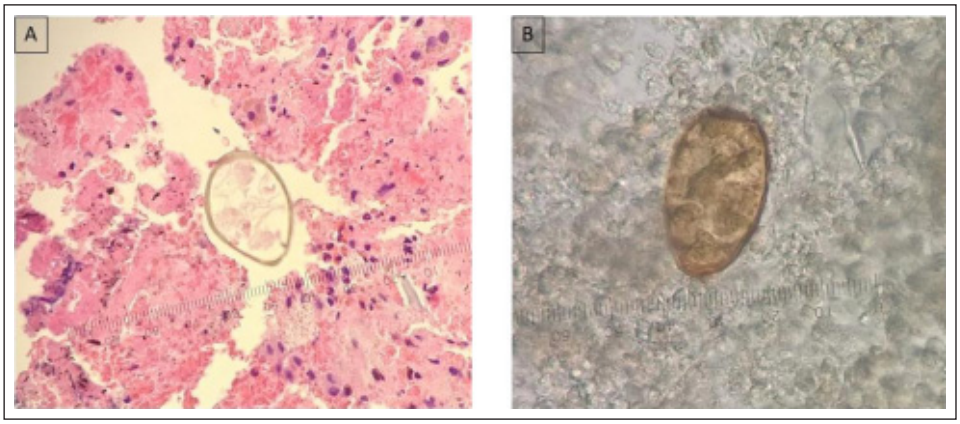

Figure 3. Egg of *Paragonimus* in (A) lung biopsy tissue (62 µm x 46 µm); (B) sputum sample (76 µm x 46 µm) (x40 magnification).

known to infect humans (CDC, 2017). *Paragonimus westermani* is the best known lung fluke affecting humans. There are no recognisable symptoms during the larval migration phase from the intestine to the lungs. As the parasite matures in the lungs, the host tissue develops an inflammatory reaction. At this stage, patient may present with fever. Inflammatory reaction to the worms and eggs causes peribronchial granulomatous lesions, cystic dilatation of the bronchi, abscess and pneumonitis (Mahmud *et al*., 2018). Cough develops with production of blood tinged sputum which may contain numerous dark brown eggs. Haemoptysis may occur after bouts of coughing accompanied by severe chest pain (Markell *et al*., 1999). Pulmonary paragonimiasis may be asymptomatic or can present with serious disease in cases of heavy infection. The clinical picture of chronic paragonimiasis resembles chronic bronchitis or tuberculosis (CDC, 2017). Paragonimiasis may also be extrapulmonary. Ectopic sites include abdomen, central nervous system (Mahmud *et al*., 2018) and the pericardium (Sah *et al*., 2017; Sah *et al*., 2019). Typical of helminthic parasitic infections, blood examination normally shows elevated eosinophils and total IgE (Nakamura-Uchiyam *et al*., 2001; Zhou *et al*., 2016). This patient's eosinophil counts was only slightly elevated. It has been observed that only about 80% of patients with paragonimiasis present with eosinophilia (Sohn *et al*., 2009). Normal eosinophilia counts are usually seen in patients with parenchymatous lesions (Sohn *et al*., 2009) or in chronic infectious conditions (Saeki *et al*., 2015). Other than intermittent cough, this patient was asymptomatic. The only findings were incidental from his chest X-ray and CT scan of the thorax.

Chest radiograph findings are normal in 10-20% of people infected with paragonimiasis (Singh *et al*., 2005). Others may show patchy infiltrates with nodular cystic shadows or calcification, cavities, hilar enlargement, pleural thickening and effusions (Markell *et al*., 1999; CDC, 2013). Differential diagnosis of cavitating lung infiltrates include pyogenic abscess, pulmonary tuberculosis, nocardiosis, fungal infections and parasitic diseases of the lungs (Singh *et al*., 2005). There has been many instances whereby pulmonary paragonimiasis have been misdiagnosed as tuberculosis (Nagakura *et al*., 2002; Tan *et al*., 2005). Radiographic findings including CT scans in paragonimiasis may also be confused with chest cancers (Zhou *et al*., 2016; Kagawa, 1997).

Diagnosis of paragonimiasis is routinely made when its eggs are detected in sputum or faeces via microscopic examination. In this case, *Paragonimus* eggs were seen in sputum and also in the patient's lung biopsy specimen. Serodiagnosis is useful in cases

of light infection or extrapulmonary paragonimiasis. However, this method is not always available in diagnostic labs of non-endemic countries such as Malaysia.

Praziquantel is the drug of choice for paragonimiasis and is given orally at a dosage of 25 mg/kg, 3 times per day for 2 consecutive days (CDC, 2013). Paragonimiasis can be prevented by making sure that crabs, crayfish and other fresh water crustaceans are adequately cooked prior to consumption. This infection can be controlled by regulating the fresh water snail population which acts as the first intermediate host and ensuring all infected patients are treated (Mahmud *et al.*, 2018).

This patient was infected with *Giardia* but was aymptomatic. Generally, asymptomatic persons who excrete the organism do not need treatment, except in situations to prevent the transmission of the infection such as in daycare setting, in food handlers and household contacts of pregnant women and immunocompromised individuals (Bartlett *et al.*, 1991; Gardner and Hill, 2001; Kimberlin *et al.*, 2018). This patient was treated for asymptomatic *Giardia* infection since he was working in the food and beverage industry and was at high risk of transmitting the infection.

This case report highlights the importance of a thorough history which includes travel and dietary history to formulate a differential diagnosis and aiding clinicians in carrying out appropriate investigations to get a correct diagnosis and initiate prompt treatment. The introduction of foreign food cultures may expose foodborne parasitic infections to people from non-endemic countries. It is imperative that lung fluke is considered in the differential diagnosis of patients with history of travelling to endemic regions presenting with symptoms or radiological features resembling pulmonary tuberculosis or malignancy.

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