



## Case report

## Paragonimiasis: A missed diagnosis from Nepal

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## ABSTRACT

Paragonimiasis, or Oriental lung fluke is a parasitic infestation seen in Asia, Africa and South America which is spread by the consumption of crabs and crayfish. To date four cases have been reported from Nepal. Here, we report a case of paragonimiasis in a young male from Kathmandu valley who presented with symptoms of fever, on and off for 1 month, shortness of breath and cough. He was found to have pleural effusion. Sputum examination did not reveal acid fast bacilli, However, based on clinical features, he was started on antitubercular treatment. There was initial improvement, but later, he continued to have cough and hemoptysis over the next 2 years and on subsequent High-Resolution Computerized Tomography (HRCT) he was found to have a cavitory lung lesion in the superior segment of lower lobe of left lung. A possibility of aspergillosis was considered for which he underwent a lobectomy. The gross examination of the lung showed a small cavity measuring 5 mm which revealed on histology a parasitic structure with serous glands within it. In addition, there were many foreign body granulomas with ova within them. A diagnosis of paragonimiasis was made and the patient was started on Praziquantal. He recovered well and is currently asymptomatic. We can learn from this case that the signs and symptoms of paragonimiasis mimic that of tuberculosis and the mistaken diagnosis can lead to unnecessary treatment, prolonged morbidity and loss of time and resources.

## 1. Introduction

Paragonimiasis is a trematodal infection most commonly affecting the lung and pleura. It is more commonly known as Oriental lung fluke and is common in Asia, where around 20 million people are infected, Africa and South America [1]. However, only a handful of cases have been reported from Nepal. It has a complex lifecycle which takes place in three hosts of which humans form the tertiary, definitive host. It spreads to humans by the consumption of crabs, cray fish, snails and other molluscs. The clinical features of the disease usually resemble those of tuberculosis and the disease is common in places where tuberculosis is still highly prevalent. Therefore, the disease is often mistaken for a horse, i.e. tuberculosis, but turns out to be a zebra, i.e. paragonimiasis, which is what happened with our case being discussed below. The disease is usually diagnosed by identification of ova in the sputum or less commonly in the pleural fluid and in stool (when coughed up ova are swallowed). Serological tests, where available, are also useful [2]. It is uncommon for the disease to be diagnosed on histopathology as we describe below.

## 2. Case report

Our case was a 33 years old male, a resident of Kathmandu, who was admitted two and a half years ago with fever on and off for one month, productive cough and shortness of breath. He was of average weight, was non-vegetarian, with history of consumption of crabs and snails over the last three years. He was found to have pleural effusion on ultrasound. Laboratory reports at the time showed leukocytosis, 15,400/cu mm with normal differential counts and a raised ESR of 25 mm in 1 hour. CRP was positive. The peripheral blood smear did not show any abnormal cells and liver function test and renal function test were also normal. Sputum test was negative for acid fast bacilli (AFB) or parasitic structures. Pleural fluid was tapped under image guidance and sent for biochemical, microbiological and cytological evaluation. It showed raised protein (6.4g/dL) and Lactate dehydrogenase (LDH) (1243IU/L). No organisms were found. The cell count was low but consisted predominantly of lymphocytes. Based on these finding, even though no definite proof of tuberculosis was found, patient was started on antitubercular treatment. Initially the patient showed improvement.

However, about one year later patient presented again to the hospital

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with cough, heaviness in chest and hemoptysis. HRCT chest showed a small irregular cavitory lesion measuring  $18 \times 14 \times 15$  mm with small fluid level in the superior segment of lower lobe of left lung. The cavity was surrounded by ground glass density, multiple small nodules and linear streaks extending to the pleura in the medial aspect. No abnormal enhancement was seen on the contrast enhanced images (Fig. 1).

Overall impression was of pulmonary TB. His laboratory tests showed a normal complete blood count but raised ESR, 49 mm in 1 hr. His lipid profile was deranged but otherwise, renal and liver function tests were normal. Patient also underwent bronchoscopy which did not reveal any additional abnormality. Sputum, bronchial brushing and bronchoalveolar lavage were also examined, all of which were negative for any organisms and for malignant cells. This time sputum examination by geneXpert, i.e. (Polymerase chain react) was also done which also did not reveal any tubercle bacilli. Mantoux test was positive with an induration of 21 mm. Patient was sent home with antibiotics and reassurance and kept on follow up.

However, his symptoms got worse with increasing hemoptysis and fever and the patient was suspected to have aspergillosis in the cavitory lesion identified by HRCT and so he underwent a lobectomy. Gross examination of the lung showed a shiny pleura and spongy brown cut surface. A tiny cavitory lesion measuring 5 mm was identified. Representative sections were taken. Hematoxylin and eosin stained sections revealed a parasitic structure within the cavity with a thick cuticle and some serous glands within the body cavity. The cavity had denuded epithelium and was lined by palisading histiocytes. There was dense lymphohistiocytic infiltration along with few eosinophils and many foreign body granulomas. Within these foreign body giant cells, multiple refractile oval to angulated ova were identified. These structures were positive on Periodic acid Schiff (PAS) stain (Figs. 2 and 3).

The surrounding lung parenchyma showed mild edema. With these findings a diagnosis of paragonimiasis was made. Species identification was not possible. Serological tests were not available for confirmation.

### 3. Discussion

Paragonimiasis, more commonly known as Oriental Lung Fluke, is caused by a trematode species of the genus *Paragonimus*. The disease is

endemic in many parts of Asia, Africa and South America. In Asia, the most common cause is *P. westermani* however, *P. heterotremus* has been increasingly detected as an important cause of infection in humans [3].

The parasite is spread to humans by consumption of undercooked crabs or cray fish. It utilizes two intermediate hosts and completes the life cycle in wild mammals or humans as final definitive hosts. The first intermediate host is usually a fresh water molluscan such as those of species *Semisulcospira*, *Oncomelania*, *Brotia*, and *Thiara* which are infected by ciliated miracidia hatched from ova discharged in sputum or faeces of the definitive host. In the snail host, the miracidium develops into a mother sporocyst which produces asexually, first and second generations of rediae, which finally develop into cercariae. The development from miracidium to cercariae in the snail takes about 9–13 weeks. The second intermediate host or the crab hosts are infected with cercariae either by ingestion of the snail hosts or free cercariae directly entering through the soft tissue of the crab host. Common crab or cray fish species that act as second intermediate host include *Potamiscus*, *Potamon*, *Paratelpusa* and *Camberoides* respectively. The cercariae develop to metacercariae which remains encysted in the liver, gills, intestine, skeleton muscles and sometimes, in the heart of the crab host. Finally, the definitive hosts i.e. humans or other mammals such as tigers, civet cats, toddy cats, dogs, mongooses, rats are infected by consumption of metacercariae within the crab/cray fish. The metacercariae ingested by the definitive hosts excyst larvae in the small intestine, penetrate through the intestinal wall and reach the abdominal cavity in 3–6 hours. From the abdominal cavity it usually traverses the diaphragm to reach the pleura and lung causing pleuropulmonary paragonimiasis. Here, the worm matures and lives in pairs within a capsule and lays eggs. Extrapulmonary paragonimiasis may occur in other abdominal organs and skeletal muscle if instead of the lungs the larvae traverse elsewhere. Generally, the time taken from infection to laying eggs has been estimated to be from 65 to 90 days. Chronic infection can persist from a few months to decades [4].

Typically, signs and symptoms include cough, hemoptysis and chest pain. Because of these features cases are often misdiagnosed as tuberculosis. Other possible symptoms include fever, abdominal pain, diarrhea and lumps in the skin and soft tissue. Our patient had features of pleuropulmonary paragonimiasis which overlap with tuberculosis.

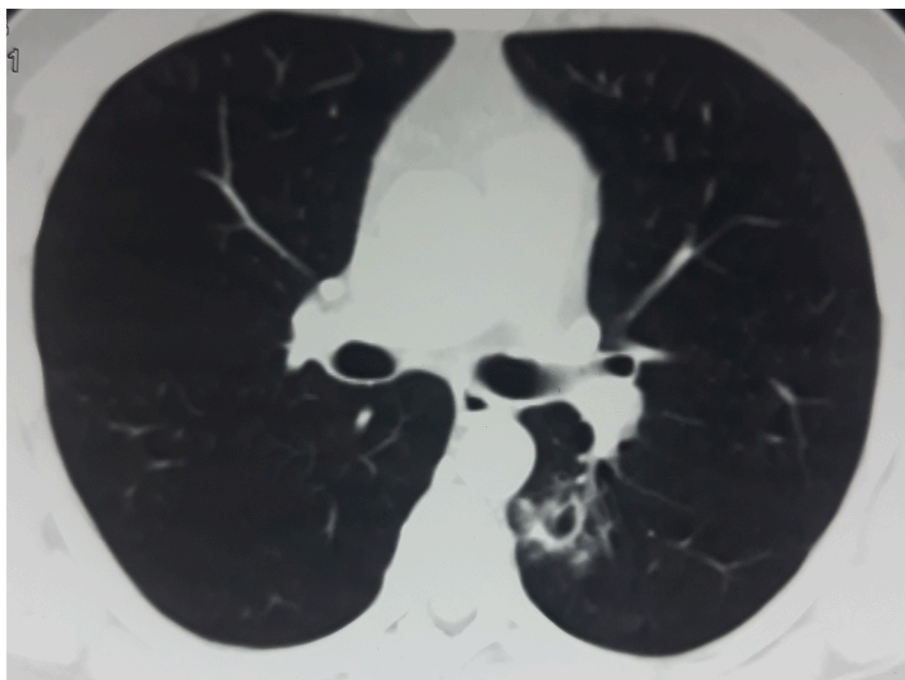


Fig. 1. CT Lung window showing a cavitating lesion, small nodules and linear streaks extending to the pleura.

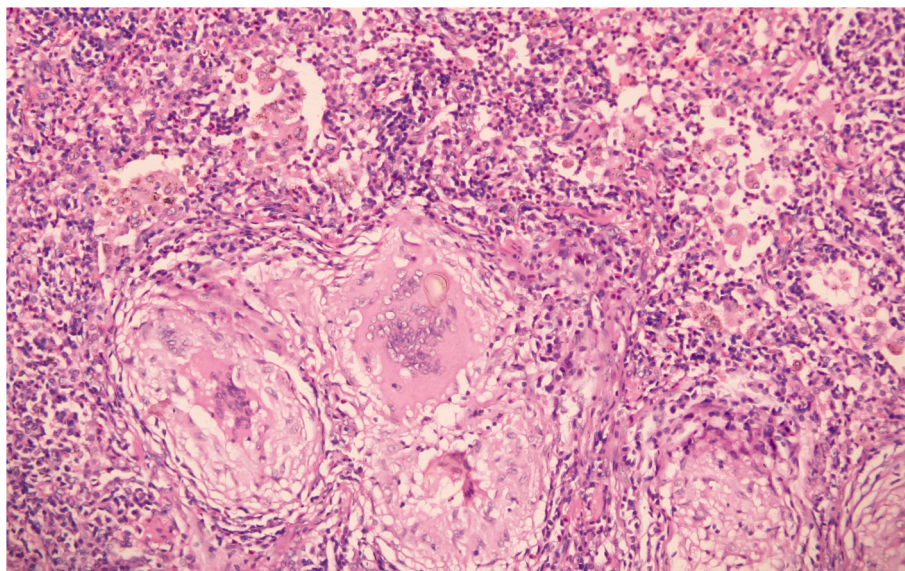


Fig. 2. Foreign body Granulomas with refractile ova within them (H and E x200).

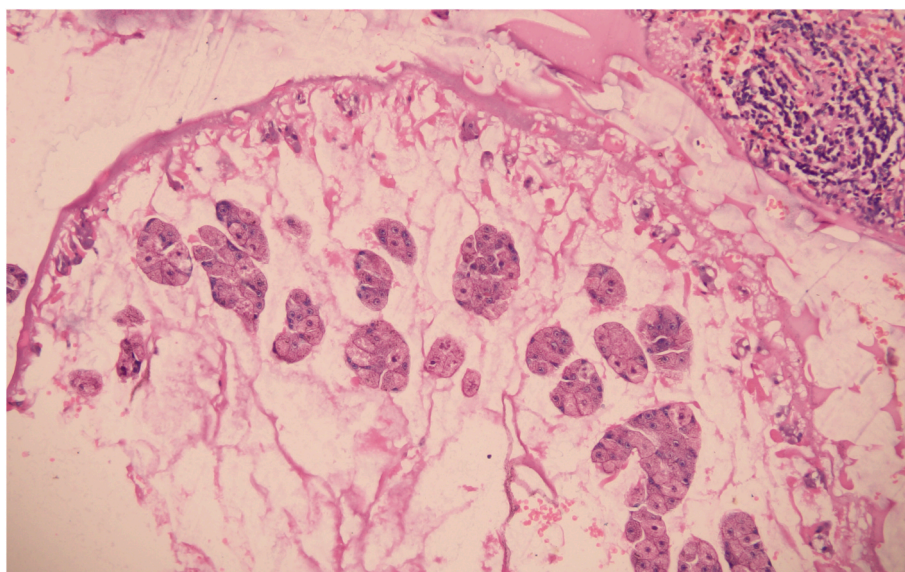


Fig. 3. Section of the worm within the cavity (H and E x200).

A complete blood count in cases of paragonimiasis usually shows leukocytosis and eosinophilia. In our case, complete blood count did not show eosinophilia, which was odd. All cases of paragonimiasis reported so far in Nepal had raised total count and eosinophilia [5].

In our case, initial chest X-ray showed pleural effusion but did not show other typical features of tuberculosis. The contrast enhanced CT scan of the patient after 2 years showed thin walled cavitating lesion with small fluid level within and surrounding ground glass density, small nodules and thin linear streaks extending to the pleural surface in the medial aspect of the superior segment of left lower lobe. The differentials of cavitating lesions considered were infected pneumatoceles, bacterial infections, typical or atypical tubercular, fungal or parasitic infestations and non-infectious causes including septic emboli, post traumatic pneumatocele and malignancy [6]. In our case, the imaging features of a solitary thin walled lesion with surrounding nodules limited the differential to a benign infective cause most likely tubercular, being extremely common in this subcontinent and lung fluke being the 'zebra', or the much less likely diagnosis in terms of prevalence. Another typical

feature described is "worm nodule," consisting of a pulmonary nodule with partial surrounding ground-glass density and linear opacity connecting the nodule to the pleural surface. The linear opacities represent the tracks of the excysted metacercaria as they penetrate the diaphragm and visceral pleura to burrow into lung parenchyma. In the lungs, cavity forms around the organism near bronchioles, where it lays eggs which may be coughed, swallowed and passed in stools, completing the life-cycle or end up in pleural space inciting inflammatory response [7].

Based on the above mixed findings, our patient was also suspected to have tuberculosis. His ESR was raised and Mantoux test was positive. After over a year of antitubercular therapy, he was operated for aspergillosis. Diagnosis of paragonimiasis was made after histopathological evaluation.

Paragonimiasis is believed to be fairly common in Nepal, with certain communities having traditional practice of eating crabs and crayfish for medicinal or social reasons [8]. However, only a handful cases have been reported. Because our country suffers immensely from Tuberculosis, with 31,723 incident TB cases (new and relapse)

registered at the National Tuberculosis program in the year 2017/2018 [9]; and the symptoms of paragonimiasis overlap with those of tuberculosis, many of cases of paragonimiasis are misdiagnosed and therefore mistreated as tuberculosis. This leads to extended morbidity, loss of time and money in the treatment of these patients in addition to the side effects for antitubercular drugs. In our case the patient was misdiagnosed further as possible aspergillosis and even underwent surgery.

The points to consider in this case were that the sputum test was negative for Acid fast bacilli, GeneXpert was also negative and his illness continued in spite of antitubercular therapy. These findings were important clues indicating that this was not Tuberculosis and should not have been overlooked.

#### 4. Conclusion

Paragonimiasis is fairly common problem in Nepal. It is seen in patients who have history of consumption of crabs and cray fish, which is done in many parts of Nepal. The clinical features of the disease resemble those of tuberculosis, however the disease should be suspected on the basis of history of consumption of the above items, hematological parameters of a parasitic infestation and an unresponsiveness to antitubercular treatment. Rarely, as seen above, we are able to observe the morphology of the parasite and its ova in the lung. A serological test if available can assist in the diagnosis. Mistaking the disease for Tuberculosis, which occurs in most cases, leads to extended morbidity, unnecessary treatment with antitubercular drugs, loss of time and money. All this can be avoided with a timely, correct diagnosis which can be made by paying attention to finding such as complete blood count, which would show leukocytosis and eosinophilia, a negative sputum test for AFB, negative GeneXpert and a positive finding of ova or even larvae in the sputum. A high index of suspicion should be kept before labeling patients as tuberculosis.

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#### Author contribution

Shreya Shrivastav: Conception and design of the study, acquisition of data and figures, drafting, editing and revision.

Anamika Jha: Acquisition of figure, drafting, editing, revision.

#### Declaration of competing interest

Authors do not have any conflict of interests.

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