

Paragonimiasis

Paragonimiasis is a foodborne trematode infection that primarily affects the lungs. The trematodes are of the *Paragonimus* genus and there are eight species that can cause significant infection in humans.^[1]

Paragonimus westermani is the most common of these and it is also known as the oriental lung fluke.^[2]

Life cycle^[1]

- Humans become infected by eating raw infected crustaceans, eg crabs, crayfish, or from eating raw/undercooked pork.
- Larval flukes develop in the human intestine and penetrate the intestinal wall, entering the abdominal cavity. They then travel to the liver or the abdominal wall and mature further.
- Adult flukes are then able to penetrate the diaphragm and travel to the pleural space and lungs.
- The adult flukes live in human lungs and deposit eggs into the bronchi. This cycle from ingestion to maturity in the lungs takes 5–6 weeks. The adult flukes can live in the lungs for around 20 years.^[2]
- Humans can then expel the eggs either through coughing or by swallowing the eggs and passing them in faeces.
- The eggs can develop in water until they reach a stage where they are able to invade an intermediate host, which is a species of freshwater snail.
- The eggs mature further, emerge and are then able to invade another intermediate host, the crustaceans. And so the cycle is maintained.
- Animals including pigs, dogs, and feline species can also harbour *Paragonimus westermani*.^[2]

Epidemiology

- *Paragonimus* spp. are distributed throughout the Americas, Africa and Southeast Asia.^[2]
- An estimated 20 million people are infected worldwide.^[1]
- It should be considered in returning travellers and migrants.^[3]

Presentation^[1]

About 1 in 5 people has asymptomatic infection.

Acute phase (can last several weeks)

- Initially there may be abdominal pain, diarrhoea, and urticaria.
- This can be followed by fever, cough, dyspnoea, chest pain, malaise, and sweats.
- Hepatosplenomegaly can occur.^[2]

Chronic phase

- Pulmonary symptoms (usually begin 6 months after infection):
 - Symptoms can be mistaken for tuberculosis, chronic bronchitis or bronchiectasis.
 - Dry cough initially followed by a productive cough with rusty sputum.
 - Chest discomfort may be present.
 - Shortness of breath on exertion.
 - Wheeze may be present.
 - Haemoptysis can sometimes be life-threatening.
 - Finger clubbing may be present.

- Extrapulmonary symptoms:
 - Flukes or eggs can travel to other sites. However, when this takes place completion of the life cycles is not achieved, because the eggs laid cannot exit these sites.^[2] Symptoms can be divided into:
 - Cerebral - the most common extrapulmonary form; resembles meningo-encephalitis acutely; headache, vomiting and seizures can occur in the chronic phase with neurological signs, including facial palsy and hemiplegia.
 - Abdominal - cysts can form in the liver, spleen, intestinal wall, peritoneum or mesenteric lymph nodes. There may be abdominal pain, a palpable abdominal mass and bloody diarrhoea. Renal involvement can cause haematuria and eggs are sometimes found in the urine.
 - Subcutaneous tissues - subcutaneous nodules can contain immature flukes; abscesses and granulomas can form.
 - Miscellaneous - muscle, the testis, the ovary and the spinal cord can become involved.

Differential diagnosis

- Pulmonary paragonimiasis may be mistaken for tuberculosis^[4] ^[5] and in those who have been in an endemic area, it should be considered if there is not a firm diagnosis of tuberculosis and there is failure to respond to antituberculous treatment.

- Other differential diagnoses include:
 - Acute or chronic bronchitis
 - Bronchiectasis
 - Pneumonia
 - Asthma
 - Aspergillosis
 - Histoplasmosis
 - Whipworm infection

Investigations

Egg detection and antibody tests are standard, the latter being preferred due to low rates of egg detection. However, eggs are not present until 2 to 3 months after infection. ^[2]

- Egg detection: ^[1]
 - Sputum, faeces, pleural fluid, [cerebrospinal fluid](#), or pus are examined for worms or eggs.
 - Biopsies from lung, brain, subcutaneous or abdominal nodules or cysts may also reveal eggs or worms.
 - Multiple specimens may be needed before eggs are detected.
 - Try stool examination in children as they tend to swallow sputum.
- Serology:
 - Enzyme-linked immunosorbent assay (ELISA) has been developed to look for the presence of antibodies against lung flukes. ^[6]

- Other blood tests:
 - FBC: white blood count may be normal or slightly raised but there is usually an eosinophilia.^[1]
- Imaging:
 - Changes may be seen on CXR (eg cavitating lesions, nodules, fibrosis, ring shadows) but aren't specific.
 - CT or MRI scanning can be helpful, especially for cerebral infection.^[1] ^[7]
- Other tests:
 - Skin testing is a useful epidemiological tool.^[1] ^[8]
 - Lumbar puncture may be carried out if cerebral infection is suspected.
 - Pleural aspiration: eggs are rarely detected.^[1]
 - Lung biopsy specimens can contain adult worms or eggs.^[1]

Management

- Praziquantel and triclabendazole are the two drugs recommended to treat paragonimiasis. Praziquantel is the most commonly used and has a cure rate of 80-90%.^[1]
- Bithionol is used as an alternative treatment.^[2]
- If there is extrapulmonary disease, lesions need surgical excision.^[1] Laparoscopic approaches may be used.^[9]
- If there is cerebral involvement, medical control of seizures may be required.

Complications^[1]

- Untreated infection can lead to interstitial pneumonia, bronchitis, and bronchiectasis.

- Other complications include bronchopneumonia, lung abscess, pleural effusion, or empyema.
- Cerebral complications include seizures and coma.

Prognosis

- This is good with the correct treatment.
- Untreated cerebral paragonimiasis has a mortality rate of 5%.^[1]
- Untreated pulmonary disease may be self-limiting, with lesions resolving in 5 to 10 years in light infections.^[1]
- Cerebral infections may result in long-term seizures.^[1]

Prevention

- In endemic areas, shellfish and pork must be well cooked.
- Education and changes in habit may help prevention.^[10]

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