بسمة الله الرحمن الرحيم
Paragonimiasis

Paragonimus westermani

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Objectives

1. Overview on paragonimiasis.
2. Geographical distribution.
3. Morphology of *Paragonimus westermani*.
4. Life cycle.
5. Pathogenicity & clinical picture.
6. Diagnosis of paragonimiasis.
7. Treatment of paragonimiasis.
8. Prevention and control.
Overview

• *Paragonimus westermani* is parasitic Trematoda.

• It infects human´s lungs after eating infected raw or undercooked crab or crayfish.

• It causes paragonimiasis.

• Serious form of the disease occurs when parasite travels to CNS and striated muscles.
Paragonimus westermani (Oriental lung fluke)

Geographical distribution:
- Primarily in Far East.
- South America and occasionally Central Africa.
**Adult morphology:**

1) Ovoid, thick, reddish brown.
2) Size: 0.5 – 1.5 cm.
3) Suckers: equal oral & ventral suckers.
4) Digestive system: 2 simple tortuous intestinal caeca.
5) Genital system:
   - Testes: deeply lobed situated side by side.
   - Ovary: large, lobed and the uterus coils opposite to it.
**Egg:**

**Size:** 100 × 50µ.

**Shape:** ovoid.

**Shell:** thick shell with **flat operculum**.

**Colour:** Golden brown.

**Contents:** immature **miracidium**.
Cercaria:
- **Microcercous**, with knob like tail.
- It penetrates the crustaceans 2nd I.H. → encysted metacercaria.

Encysted metacercaria:
- 0.25 mm, has 2 suckers and primitive gut.
- Requires 6-8 wk to become infective.
Cercariae of *Paragonimus westermani*
Life cycle:

Habitat: in pairs encapsulated in pockets of Lungs.

Definitive host: man.

1st I.H. → snail, *Melania (Semisulcospira)*.

2nd I.H. → crab and crayfish.

Reservoir host: carnivores as dog, fox, wolf, tiger and pig.

Infected stage: encysted metacercaria in muscles, gills, legs and viscera of crabs and crayfish.
Mode of infection:

- By eating raw or insufficiently cooked or pickled infected crabs or crayfish.

-Metacercariae excyst in S.I. → penetrate intestinal wall → peritoneum, grow for 1 wk → young flukes → penetrate diaphragm & pleural cavity → lung, forming cystic cavities → mature.

- Life cycle is completed in 6-8 months.
life cycle of *Paragonimus westermani*
• Eggs escape from pulmonary pockets → bronchioles → coughed out with sputum, or swallowed and pass with feces.

• Egg requires from 15 days to several wk in water to mature and miracidium hatches.

• Miracidium enters the snail I.H. → sporocyst → rediae → cercariae in 3-5 months.

• Cercariae → penetrate 2nd I.H. → encysted metacercariae.
Pathogenesis and clinical picture:

**Disease**: paragonimiasis.

- Worms → inflammatory reaction → granulomatous reactions → fibrotic encapsulations of parasites →

  a- Picture of generalized or localized diffuse fibrosis.

B - Pneumonia and tubercles like abscesses.
Clinically:

- The disease has **insidious onset**.
- There may be initial episodes of: **chills, fever, chest pain, persistent cough and hemoptysis**.
- Blood- stained golden-brown sputum.
- **Pulmonary complications**: pneumonia, bronchitis, lung abscess, and pleural effusion.
- **Cerebral complications**: seizures & coma.
- **G.I.T. complications**: abdominal pain & mucosanguinous diarrhea.
**Diagnosis:**

I- Clinical.

II- Laboratory:

1- Characteristic immature eggs in **feces, sputum** or in **aspirated pleural effusion**.

2- Immunodiagnostic tests as ELISA to detect early, chronic and ectopic infection.

3- Eosinophilia (20 – 25 %).
4-Plain x-ray chest and computerized tomography may show nodular shadows & cavities.

Chest radiograph shows massive empyema causing almost complete “white-out” of the lung.

Picture simulating P.T.B.
5-Biopsy may allow confirmation.

Hemorrhagic holes in visceral pleura (white arrows) and adult worms acquired from holes (black arrows). Bump of visceral pleura in subpleural worm cyst (red arrow).

Eggs of Paragonimus taken from lung biopsy stained with H & E.
Treatment:

• Praziquantel is the drug of choice.

• Surgical excision of extrapulmonary lesions.
Prevention and control:

• Avoid eating raw, inadequately cooked or freshly salted crabs or crayfish.

• Fully cook crustacean:
  - Heat water to 55°C for 5 min

• Freeze fish:
  - -20 °C for 7 days or -35°C for 15 hours

• Health education & treatment of cases.

• Snail control.

• Sanitary disposal of human sputum & stool.
Thank you