Fasciolopsis and Other Intestinal Flukes

Intestinal flukes (trematodes) are flat hermaphroditic worms that vary in length from a few millimetres to many centimetres. Approximately 70 species are known to colonise the human intestine, but only a few species are known to cause actual infection.

The most common human intestinal trematode is *Fasciolopsis buski*. The other important intestinal trematodes are *Heterophyes heterophyes*, *Metagonimus yokogawai* and *Echinostoma* spp. [1]

In the genus *Echinostoma*, *E. ilocanum* is the most common organism that causes infection in humans. *H. heterophyes* and *M. yokogawai* are less common causes of human intestinal fluke infection. Other intestinal flukes that rarely cause human intestinal infection include *Gastrodiscoides hominis*, *Phaneropsolus bonnei*, and *Prosthodendrium molenkampi*.

Other trematode infections include *opisthorchiasis* (liver), *Paragonimiasis* (lung) and *schistosomiasis* (blood).

Life cycles

**F. buski**[2]
- Immature eggs are released into the intestine and then the stool. The eggs develop into embryos in water and release miracidia, which invade a suitable snail intermediate host.
- In the snail, the parasites develop into cercariae, which are released from the snail and encyst as metacercariae on aquatic plants.
- Mammals (humans and pigs) become infected by ingesting metacercariae on the aquatic plants. After ingestion, the metacercariae excyst in the duodenum and attach to the intestinal wall. There they develop into adult flukes (20-75 mm by 8-20 mm) attached to the intestinal wall of the host.
- The adults have a lifespan of about one year.

**H. heterophyes and M. yokogawai**[3, 4]
- The cercariae are released from the snail and encyst as metacercariae in the tissues of a suitable freshwater or brackish-water fish (second intermediate host).
- The definitive host (fish-eating mammals and birds) becomes infected by ingesting undercooked or salted fish that contains metacercariae.

**Echinostoma spp.**[5]
- The cercariae leave the snails to encyst in the second intermediate hosts, which can be freshwater snails, fish and tadpoles.
- Humans are infected by ingesting raw or undercooked second intermediate hosts.

Epidemiology

- It is likely that more than the estimated 40-50 million people are infected with intestinal trematodes.
- Humans become infected with intestinal flukes by consuming contaminated food and water that consists of or contains the second intermediate hosts (eg. vegetation, snails and fish).
- Infection with intestinal flukes is rare in the UK and usually only affects people travelling from endemic areas.
- *F. buski* is found in Asia and the Indian subcontinent, especially in areas where humans raise pigs and consume freshwater plants.[2]
- *H. heterophyes* is found in Egypt, the Middle East and the Far East.[3]
- *M. yokogawai* is found mostly in the Far East, but also Siberia, Manchuria, the Balkan states, Israel and Spain.[4]
- *Echinostoma* spp. are found worldwide, but most often in Southeast Asia and in areas where undercooked or raw freshwater snails, clams and fish are eaten.[5]

Presentation

- Most infected people are asymptomatic.
- Individuals with moderate infection present with occasional loose stools, some weight loss, malaise and generalised abdominal pain.
- Severe infection:
  - Initially causes diarrhoea alternating with constipation and hunger.
  - As the infection progresses and the worm burden increases, oedema of the face, abdominal wall, and lower limbs occurs, as well as ascites and generalised abdominal pain.
  - Anorexia, nausea, and vomiting are also common.
  - The diarrhoea persists, becoming greenish-yellow and very smelly.
  - Patients may develop weakness, with grey and harsh skin and oedema of the face and lower extremities.
  - In people infected with *H. heterophyes*, embolisation of the eggs can lead to myocarditis, chronic heart failure, and/or cerebral emboli.
Differential diagnosis

The differential diagnosis depends on the presentation but includes:

- Nematode infections.
- Other causes of trematode eggs in faeces, including liver flukes and lung flukes.
- Other causes of eosinophilia.
- Other causes of malabsorption.
- Gastritis, gastro-oesophageal reflux disease.
- Inflammatory bowel disease.
- Giardiasis.

Investigations

- Stool examination for the ova or adult worms is the investigation of choice.
- Immunodiagnostic methods include intradermal tests, indirect haemagglutination assays, indirect fluorescent antibody tests, and indirect enzyme linked immunosorbent assays (ELISAs). Immunodiagnosis is useful but problems include false positive results after the infection has resolved, cross-reactivity, high costs, and lack of availability at the point of care in remote rural areas.
- Molecular diagnosis (detection of trematode DNA in samples using the polymerase chain reaction) has a high sensitivity and specificity but is unlikely to be used at the point of care in endemic areas in the foreseeable future.
- FBC may show anaemia and eosinophilia.

Management

- Symptoms and infection may resolve without therapy, although treatment can be provided with praziquantel or triclabendazole.[1]
- Treatment may also include antispasmodics to relieve abdominal pain, and iron supplements to treat anaemia (which may require transfusions in severe cases).

Prognosis

- Light infections may resolve spontaneously within one year, even without treatment. However the prognosis may be grave in patients with heavy infection.
- Immunocompromised hosts may be at an increased risk of complications. For example, Gymnophalloides seoi worms were found to penetrate into colonic lymphoid tissue in a patient with colon cancer.
- Death from infection is rare and usually occurs only in persons with a heavy worm burden who present with severe cachexia and prostration. Other intercurrent infection may also cause death.
- In cases of infection with H. heterophyes or M. yokogawai, death may occur after embolisation of the eggs to the heart or brain. Embolisation to the brain and spinal cord can also cause focal neurological disease.

Prevention

- Eliminating the intermediate host snail.
- Proper cleaning and processing of raw vegetables.
- Avoidance of using human or pig excreta as fertilisers.

Further reading & references

- Parasites A-Z; Centers for Disease Control and Prevention
- Fasciolopsiasis; DPDx, Centers for Disease Control and Prevention
- Heterophyiasis; DPDx, Centers for Disease Control and Prevention
- Metagonimiasis; DPDx, Centers for Disease Control and Prevention
- Echinostomiasis; DPDx, Centers for Disease Control and Prevention

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