Lecture – 7

Trematodes
(Schistosomiasis and Fascioliasis)

Microbiology Team 430

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Schistosomiasis (bilharziasis)

Schistosomiasis *is a parasitic infection caused by Schistosoma Mansoni (eggs found in stool) and Schistosoma haematobium (eggs found in urine). They are found in snails as* ***cercariae*** *and live in water. Cercaria gets inside humans by penetrating the skin (infective stage). Inside humans they go to liver and become adults and migrate down the portal vein, and reach the main branches to produce eggs which are deposited in the liver leading to granuloma and then fibrosis.*

Pathogens

Schistosomas:

- ***S. mansoni*** *(to veins draining the large intestine → GIT complications)* ***eggs found in stool***
- ***S. haematobium*** *(to veins draining the urinary bladder → urinary system complications)* ***eggs found in urine***
- *S. japonicum found in south east Asia (to veins draining small intestine)*

  - *S. mansoni its egg lateral spine*
  - *S. haematobium its egg terminal spine*

Life cycle (Mansoni/Haematobium)

Eggs pass in stool/urine → contaminate water and hatch to become miracidia → penetrate snail tissue (intermediate host) and develop into cercaria → ***cercaria*** *are released in water again and start the infective stage by penetrating human skin → enter the blood circulation and go to the liver (****they become adults in liver****) → enter the portal vein (then mesenteric venules/venous plexus of bladder) and start producing eggs (some eggs go back to the liver causing granuloma and some appear in stool/urine) → eggs back into water*

Eggs *are responsible for the formation of granulomas and then fibrosis of the liver, they are found in stool / urine and hatch in water*
Cercaria *grow in snails and it is the infectious stage by penetrating the skin*
Adults *grow in liver and they produce eggs*

Pathophysiology

Eggs in liver → delayed hypersensitivity reaction → granuloma formation → fibrosis → long-term complications:

- Hepatomegaly
- Splenomegaly
- Portal hypertension leading to esophageal varices (if ruptured causes hematemesis)

Note that what cause the pathological conditions are the eggs not the adult worm.

Clinical presentation *(3 stages)*

Schistosoma haematobium Causes urinary schistosomiasis	***Schistosoma mansoni*** Causes intestinal schistosomiasis
1. Prepatent period 10-12 wks - *Schistosome dermatitis (swimming itch)* **2. Egg deposition and extrusion:** - *Painless haematuria* - *Inflammation of bladder and burning micturition* **3. Tissue proliferation and repair:** - *Fibrosis, papillomata in the bladder and lower ureter leading to obstructive uropathy.* - *Periportal fibrosis* - *Lung and CNS involvement*	**1. Prepatent period** 5-7 wks - *Schistosome dermatitis (swimming itch)* **2. Egg deposition and extrusion:** - *Dysentery (blood and mucus in stools)* - *Hepatomegaly and splenomegaly* **3. Tissue proliferation and repair (fibrosis):** - *Papillomata in intestine* - *Periportal fibrosis,hematemesis* - *Lung and CNS involvement.*

Prepatent period: the period from infection of skin until appearance of eggs
Egg deposition and extrusion: the period during eggs pass through stool/urine
Tissue proliferation and repair (fibrosis): it takes several years

Diagnosis

Schistosoma haematobium	***Schistosoma mansoni***
1. *Parasitological:* - ***Examination of urine (eggs in urine)*** ***2.*** *Immunological* - *Serological tests (Ag → active, Ab → previous)* ***3.*** *Indirect:* - *Radiological* - *Cystoscopy (tissue biopsy and examine at cellular level)*	***1.*** *Parasitological* - ***Examination of stools (eggs in stool).*** ***2.*** *Immunological* - *Serological tests* ***3.*** *Indirect:* - *Radiological* - *endoscopy*

Radiology CT scan shows dilated portal vein

Treatment

- *Praziquantel is the drug of choice*

Fascioliasis

Fascioliasis *is a parasitic infection caused by Fasciola hepatica. They live in water as cercariae and develop into metacercariae attached to aquatic plants.* ***Metacercariae*** *"infective stage" are transmitted in humans* ***by eating aquatic plants****, but the infection is more prevalent in herbivore "cattle". This infection causes liver damage and* ***bile duct obstruction****.*

Pathogen

- *Fasciola hepatica (2-3 cm)*

Life cycle

Eggs pass in stool → Contaminate water and hatch to become Miracidia → Penetrate snail tissue (intermediate host) and develop into cercaria → Cercaria move into aquatic plants and develop into metacercaria → ***Metacercaria transmitted to humans/herbivore by eating contaminated aquatic plants*** *→ Metacercaria enter the* ***duodenum*** *→* ***Migrate to liver and bile duct to become adults*** *→ produce eggs and appear in stool → eggs back into water*

Eggs *are found in stool, and hatch in water.*
Cercaria *they grow in snails.*
Metacercaria *are found in aquatic plants, and transmitted to humans/ herbivore by eating the plants.*
Adults *grow in liver and bile duct (cause liver damage and bile duct obstruction) and they produce eggs*

Clinical presentation

- ***True infection*** *(By eating* ***Metacercaria*** *in contaminated water plants)*

Cause mainly biliary obstruction and liver damage.

- ***False infection*** *(By eating animal liver containing eggs)*

Eggs will appear in stool, but there will not be any infection or complications.

To distinguish between true and false infections (<u>besides that, in the false infection there are no complications</u>)
You ask the patient to come after few days, and to stop eating liver. Repeat stool exam, and there will be no eggs

Diagnosis

- ***Eggs in stool*** *(true infection or false infection?)*
- ***Duodenal aspirate*** *(we will find metaciracria in duodenum)*

Treatment

- *Triclabendazole is the drug of choice*

Summary

1. *Schistosomiasis is caused by infection of S. Haematobium, S. Mansoni, S. japonicum*
2. *Eggs hatch in water, and cercaria develop in snails (intermediate host).*
3. *Infective stage of Schistosomiasis* ***is penetrating human skin by cercaria***

And this will cause Schistosome dermatitis (swimming itch)

4.

	S. Haematobium	***S. Mansoni***
Route	*veins draining the* ***urinary bladder***	*veins draining* ***large intestine***
Complications	- *Haematuria* - *Inflammation of bladder*	- *Dysentery* - *Hepatomegaly and splenomegaly*
Diagnosis	*Eggs in urine*	*Eggs in stool*

5. *Adult grow in liver and produces eggs which causes:*

Deposition of eggs in liver tissue →cellular reaction (delayed hypersensitivity) →Granuloma → fibrosis → long-term complications which are:

- *Hepatosplenomegaly*
- *Periportal fibrosis (portal hypertension)*
- *Esophageal varices → hematemesis*

6. ***Eggs are responsible for the pathological condition not adults***
7. *Praziquantel is the drug of choice for Schistosomiasis.*

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1. *Fascioliasis is caused by* ***Fasciola hepatica***
2. *Eggs hatch in water, cercaria develop in snails (intermediate host),*

   And Metacercaria develop in aquatic plants
3. *Infective stage of Fascioliasis is by* ***eating contaminated water plants (Metacercaria)***
4. *Metacercariae exist in the duodenum then migrate to liver to become adults*
5. ***Adults are responsible for the true infection which causes biliary obstruction and liver damage***
6. ***False infection is by eating animals liver*** *containing Fasciola eggs and disease* ***does not*** *occur,*

   But eggs pass in stool (diagnostically there is an infection, but it is a false infection)
7. *Diagnosis of fasciola hepatica is done by finding eggs in stool or duodenal aspirate.*
8. *Triclabendazole is the drug of choice for fascioliasis*