GIT Module
2024-2025
Parasitic Infections (1)
(Schistosomiasis & Gastrointestinal hydatidosis)

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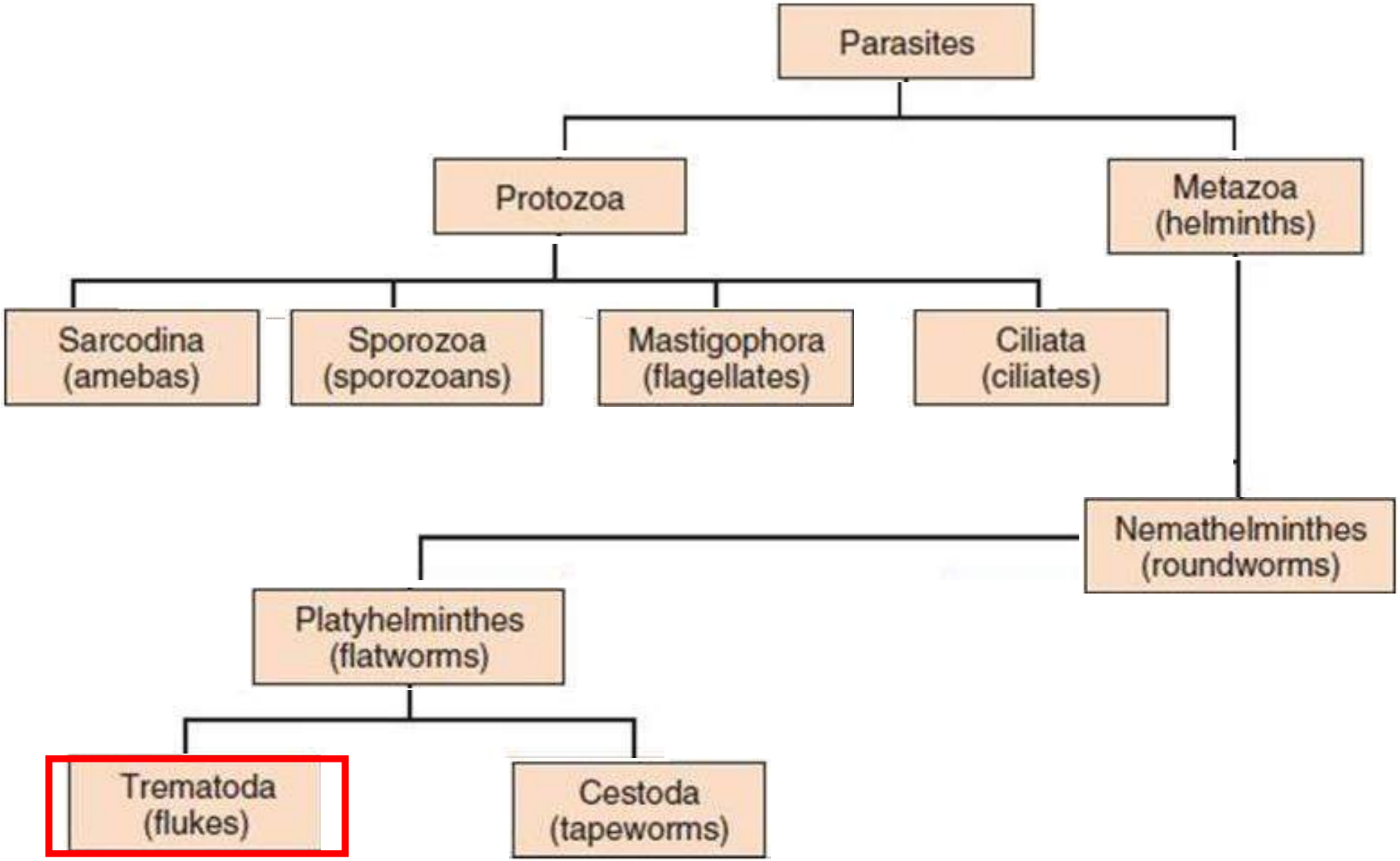
Classification of parasites



Introduction

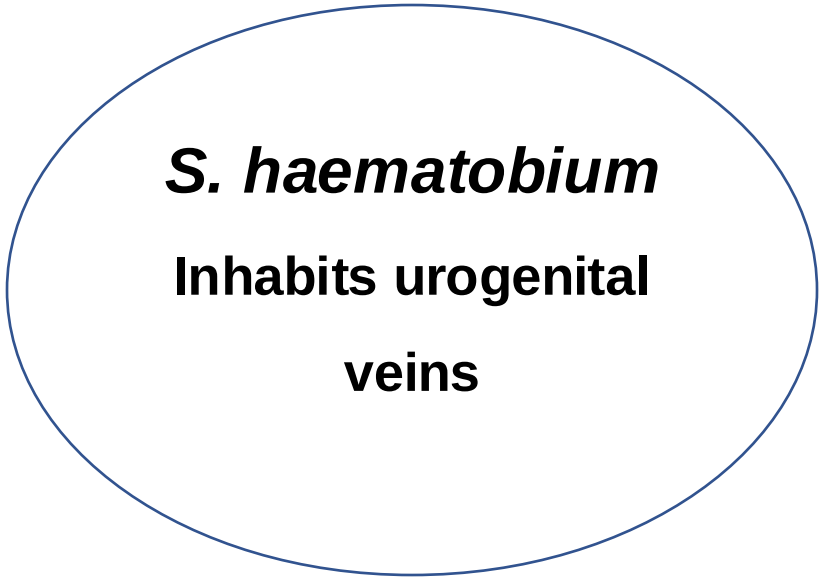
- Schistosomiasis is one of mankind's oldest and most pernicious parasitic infections, currently still affecting more than 200 million people worldwide.
- Disease was named after German Theodor Bilharz who identified adult parasite in the 1851 in an autopsy material at Kasr El Aini Hospital in Egypt , the causative agent of haematuria: Schistosoma worm. The bilhariziasis disease was named after him.

Theodor Bilharz

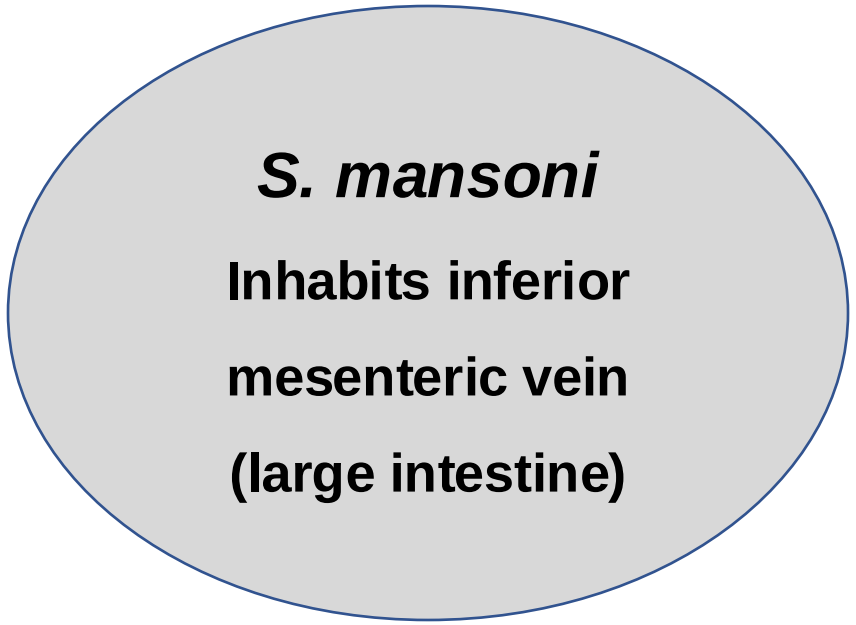
Definition

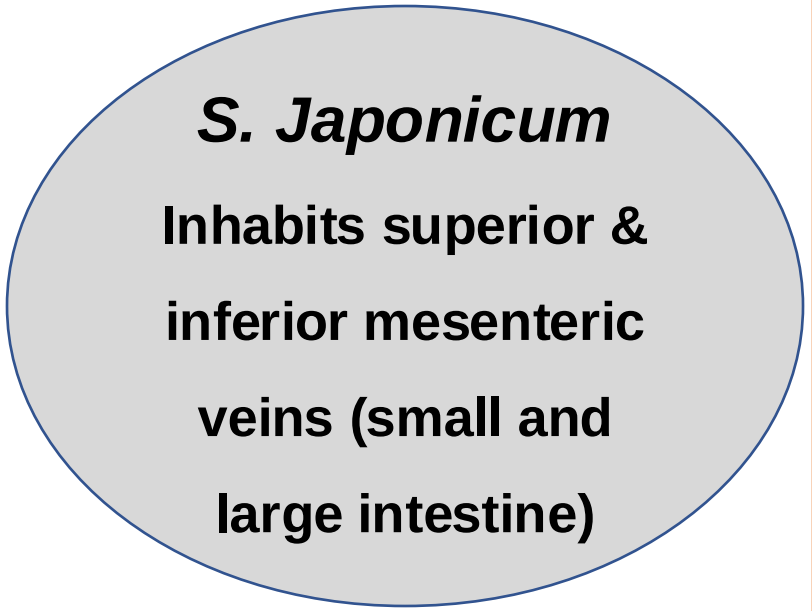
- Schistosomiasis is a chronic and potentially lethal tropical disease, mainly caused by the parasitic blood flukes.

- Schistosomes have evolved to develop and live in their infected hosts, with untreated infections generally persisting for 3–10 years and a minority of infected individuals developing life-threatening pathology .

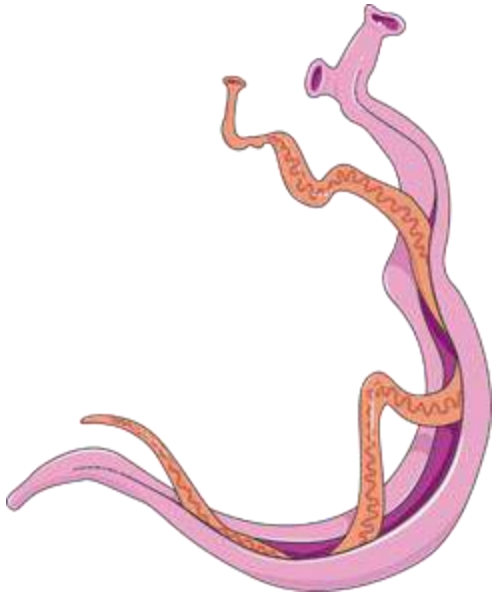


Schistosoma species





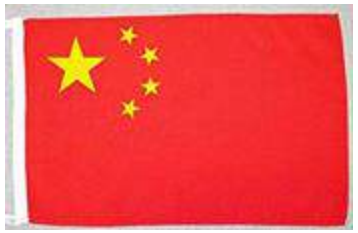
Trematodes (Flukes)



	Flukes	Schistosomes
Shape	Flat and leaf-shaped	Elongated and cylindrical
Sexes	hermaphroditic	Separate sexes
Egg	operculated	Nonoperculated
Transmission	ingestion	Skin penetration
Infective stage	metarcercaria	Cercaria
Intermediate host	2	1

Schistosomes(Blood flukes)

Trematoda (flukes)



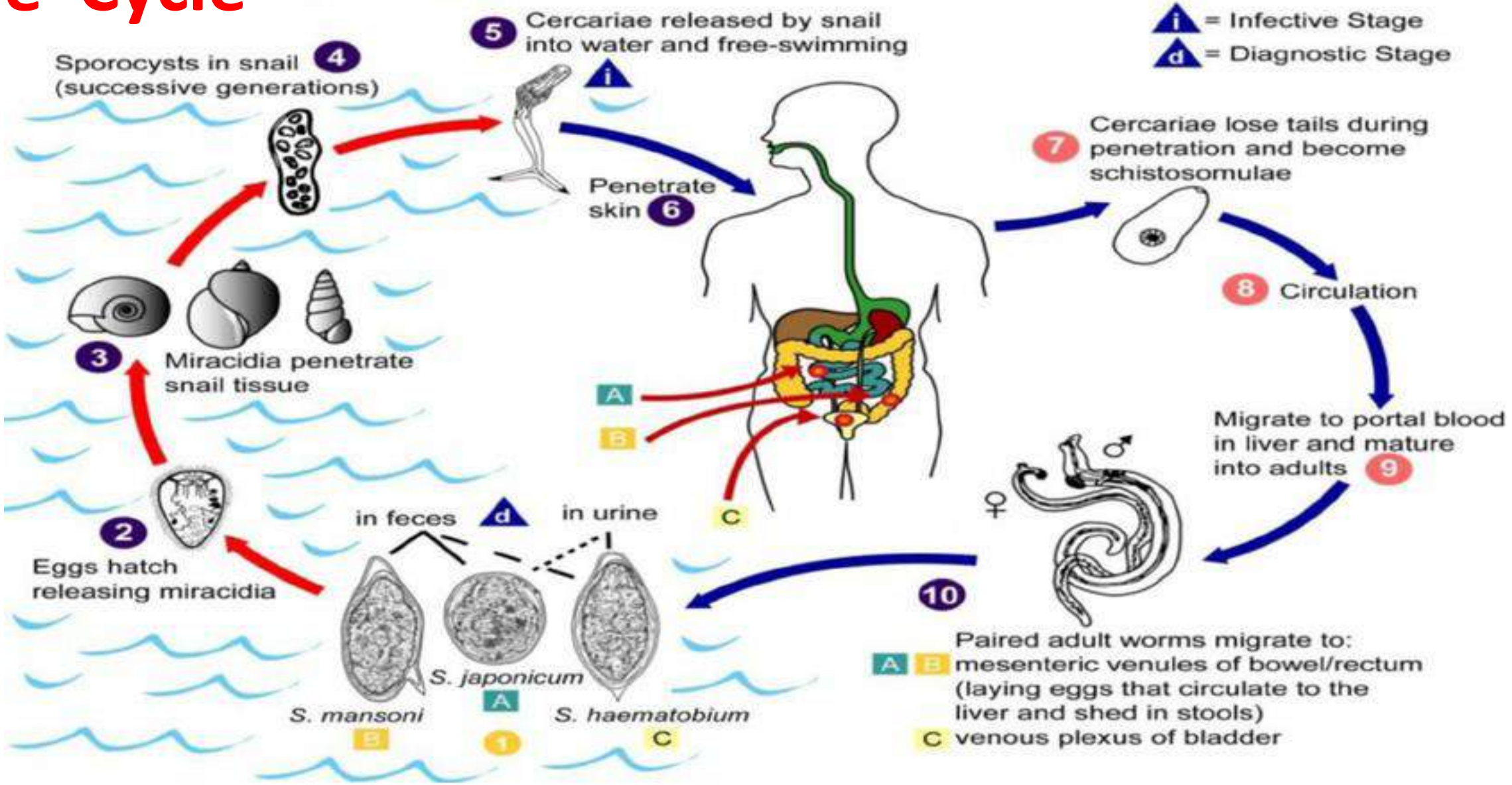
S. Japonicum

S. mansoni

(Nile delta)

Schistosomiasis (Bilharziasis)

Life Cycle



Intestinal Schistosomiasis (Bilharziasis)

❖Caused by *S. mansoni* and *S. japonicum.*

S. mansoni

❖**Geographical distribution:** Nile Delta, Africa, Middle East, South America.

❖**D.H:** Man

❖**Reservoir hosts (R.H)** : Monkeys & rodents.

❖**Habitat:** Small branches of inferior mesenteric vein of rectum &pelvic colon.

❖**Maturation** of adult worm occurs in intrahepatic branches of portal vein.

Stages of disease

Eggs in Stool

Miracidium

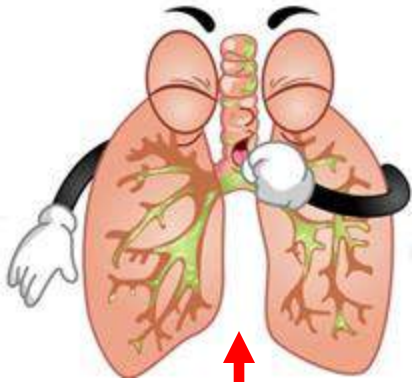
Biomphalaria alexandrina

Furcocercus Cercaria

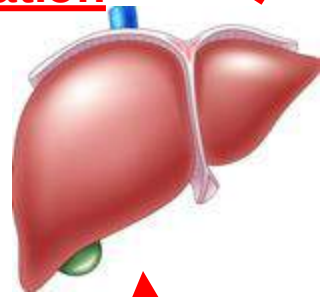
- Proteolytic enzymes
- Surface tension
- Tail

1- Stage of invasion

Blood

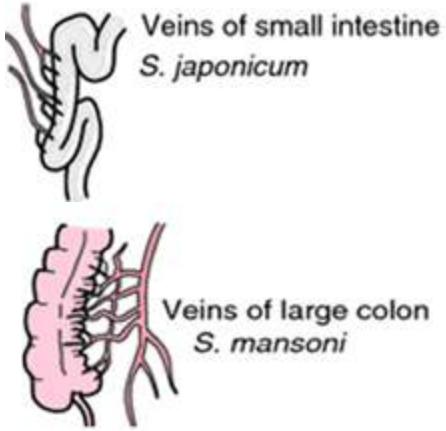


2- Stage of migration



2- Stage of migration

3- Stage of egg deposition



4- Stage of tissue reaction, repair and fibrosis

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

1- Stage of invasion

Manifestations

- Skin lesion due to cercarial penetration.
- Local dermatitis, irritation, itching and papular rash.

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

2- Stage of migration

❖**Lung :** Irritation due to passage of schistosomulum causing minute haemorrhage, cough, sputum, dyspnea and eosinophilia, and pneumonitis.

❖**Liver :** Enlarged tender liver and spleen.

❖**Toxic symptoms:** Due to metabolic products of maturing parasites causing fever, anorexia, headache, malaise and muscle pain.

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

3- Stage of egg deposition (acute schistosomiasis)

- The development of schistosomes into sexually mature, egg-producing adults occurs within the portal vein (~3–5 weeks post infection).
- Once sexual maturity is reached, worm pairs migrate toward the mesenteric vessels .
- Adult S. mansoni worms reside deep within the mesenteric veins of the intestine, where they feed on blood and acquire nutrients necessary for growth
- Each worm pair produces ~300 eggs daily.

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

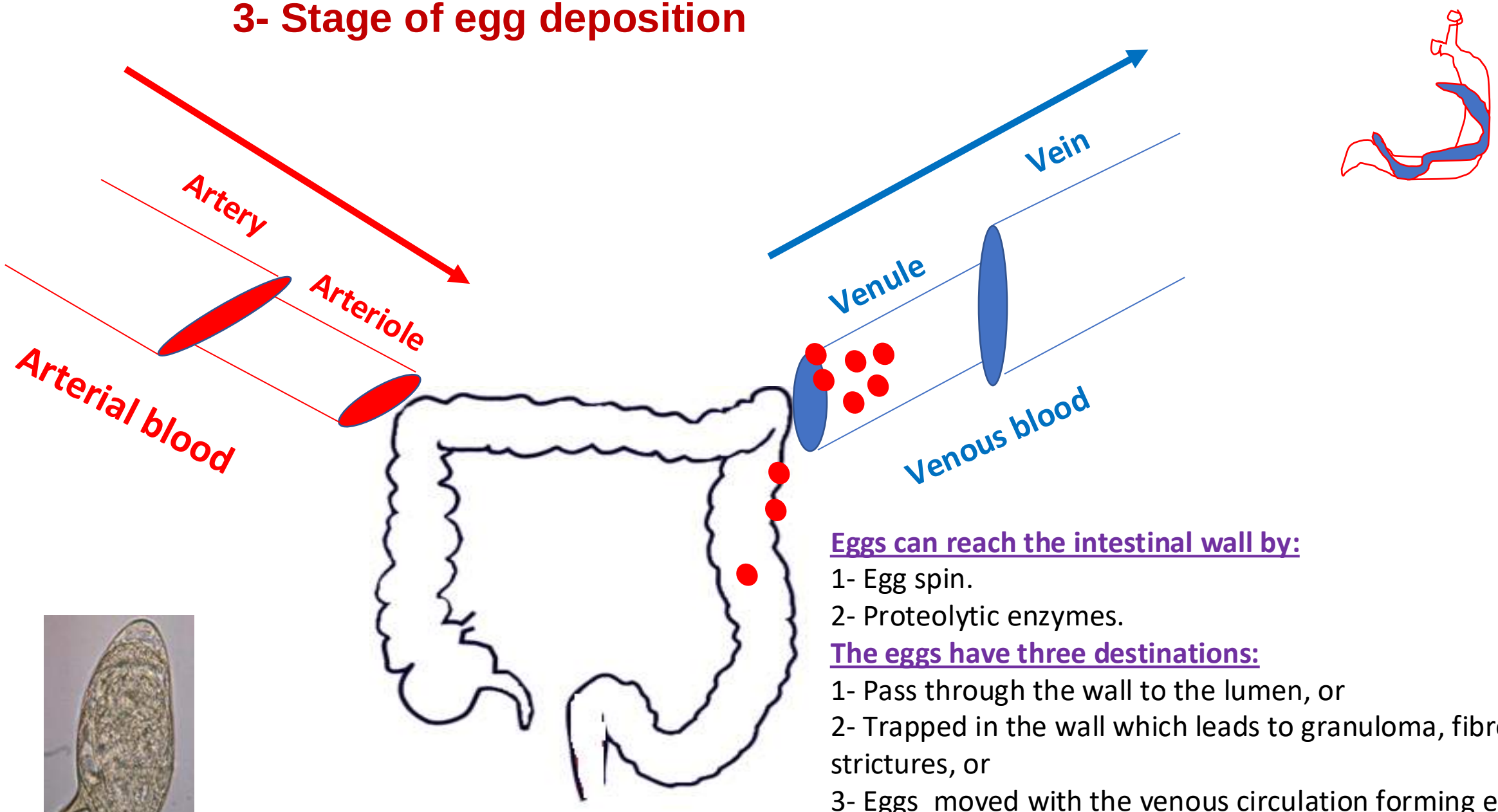
3- Stage of egg deposition (acute schistosomiasis)

- Finally, egg aggregation supports extravasation by releasing proteases creating channels from the intravascular to intraluminal space .
- **Eggs deposited in the pelvic colon and rectum. Expulsion of eggs in stool causes tissue damage and hemorrhage.**

Symtome

- ❖Abdominal pain.
- ❖Frequent motion, dysentery with blood and mucus in stools.

3- Stage of egg deposition



Eggs can reach the intestinal wall by:

1- Egg spin.

2- Proteolytic enzymes.

The eggs have three destinations:

1- Pass through the wall to the lumen, or

2- Trapped in the wall which leads to granuloma, fibrosis, and strictures, or

3- Eggs moved with the venous circulation forming embolism. (Liver, lung, CNS, skin, ….)

Intestinal Schistosomiasis (Bilharziasis)

Stages of disease

4- Stage of tissue reaction, repair and fibrosis (chronic or late stage)

❖Trapped eggs in the intestinal wall➲ formation of polyps, granuloma, papillomata and sandy patches.

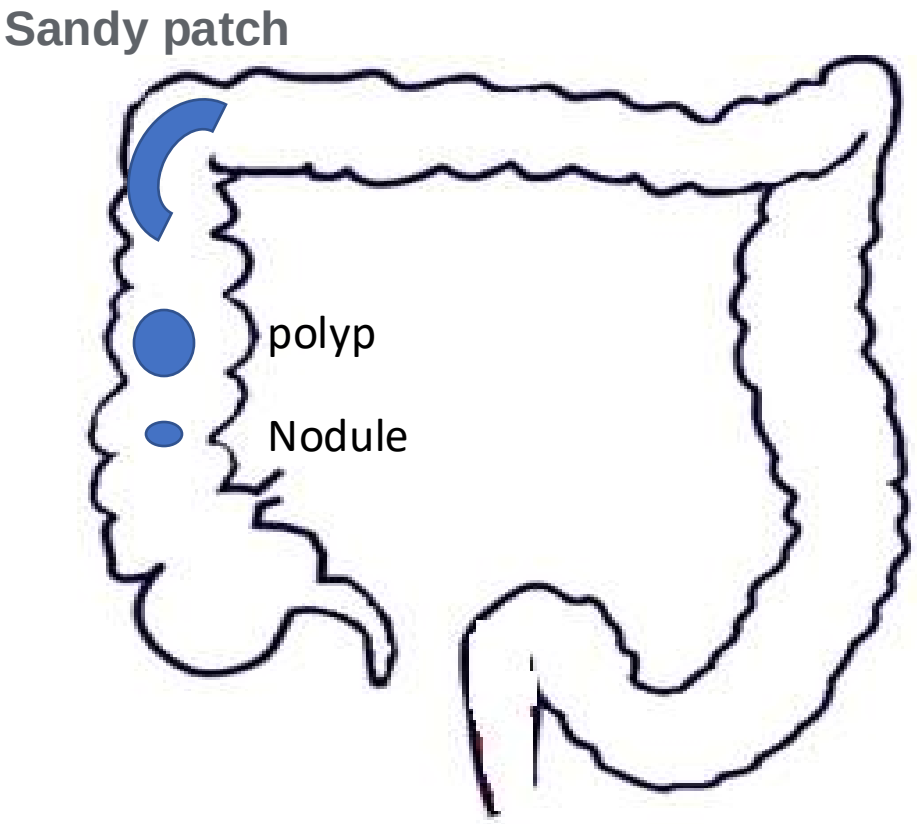
❖Later on, the intestinal wall becomes fibrosed and thickened➲ stricture of the wall.

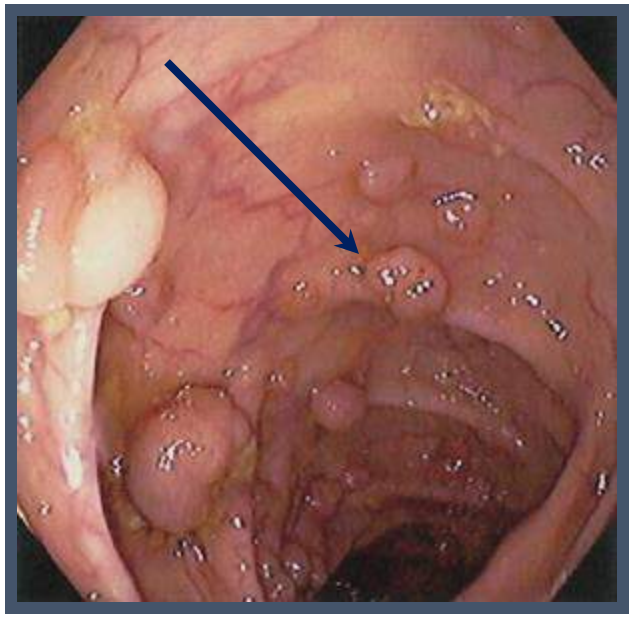
❖Sinuses or fistula can occur.

❖Rectal prolapse.

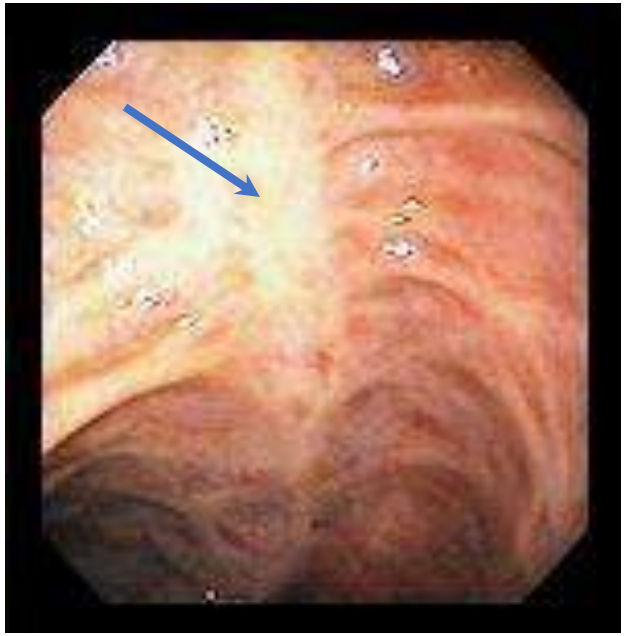
❖ The fibrotic complications that follows granuloma resolution is the main cause of pathology and lethality in schistosomiasis.

4- Stage of tissue reaction, repair and fibrosis (chronic or late stage)





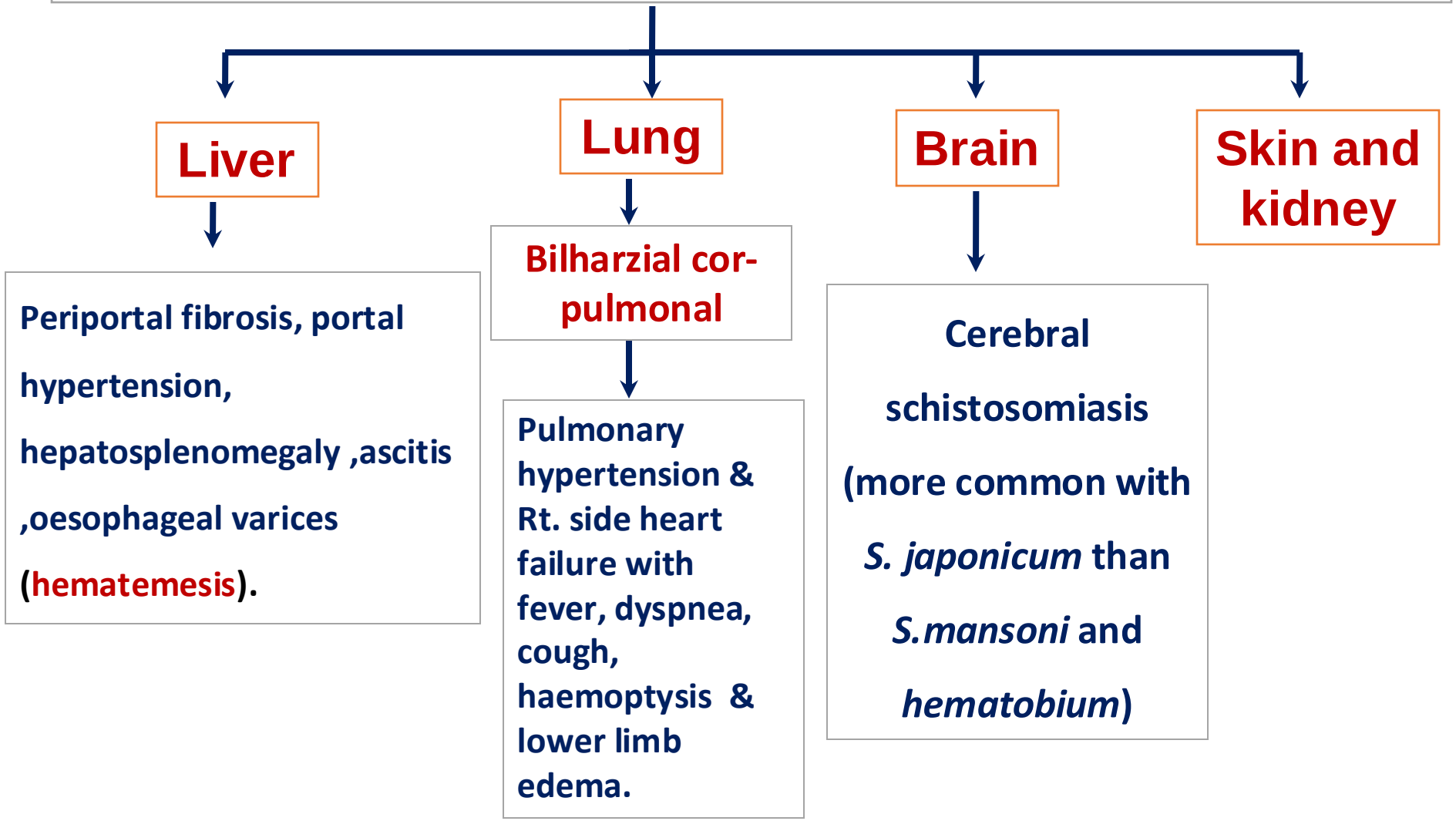
Intestinal polyp



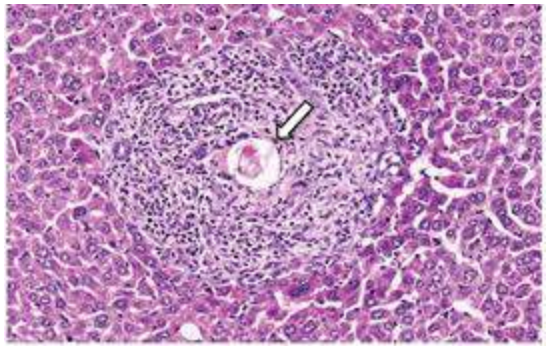
Intestinal fibrosis

EGGS THAT FAIL

Some eggs are swept back into the blood stream to different organs:-

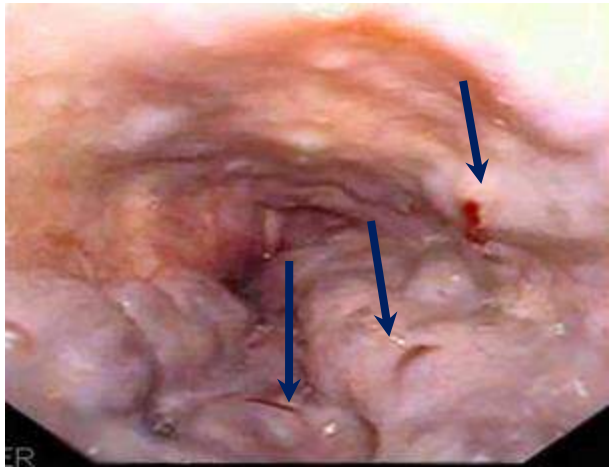


EGGS THAT FAIL



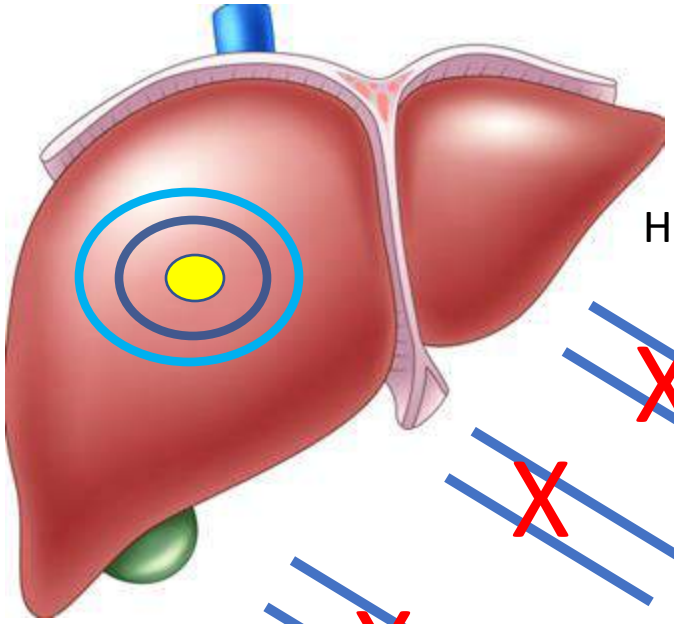
Hepatic granuloma

Fibrosed liver



Esophageal varices

Egg embolism

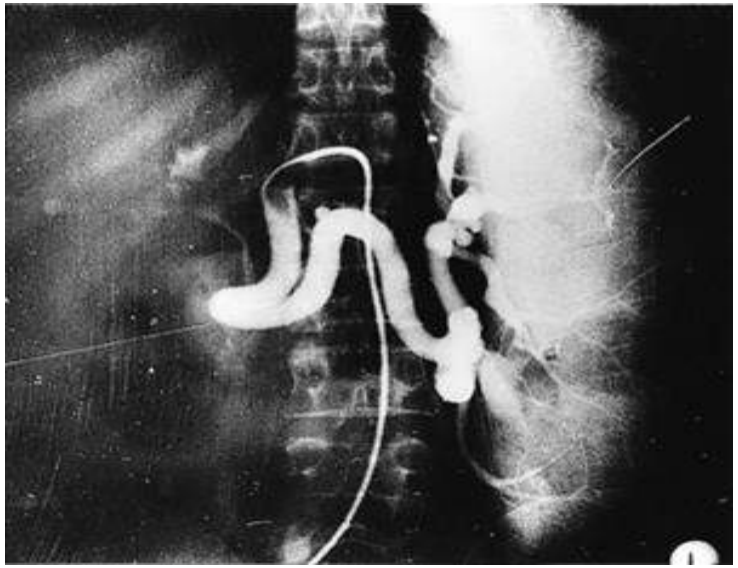


Hepatomegaly

Splenomegaly

Esophageal varices

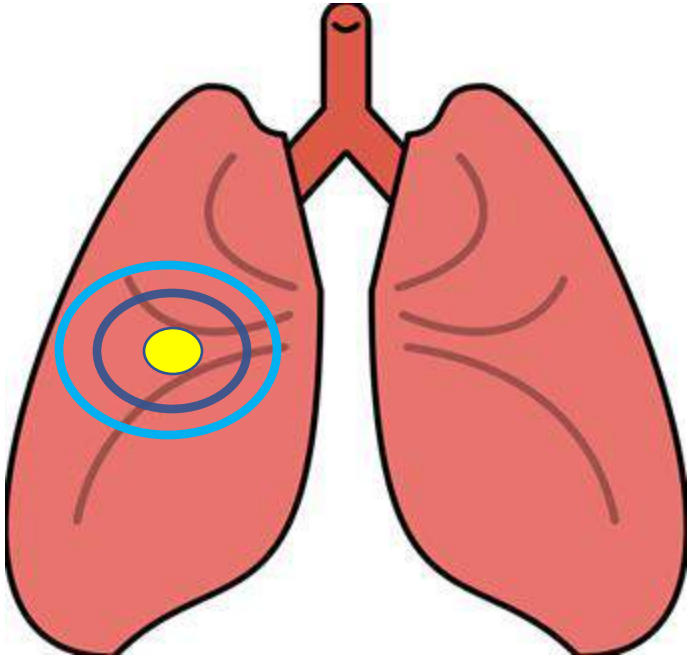
Ascites



splenomegaly

Ascites

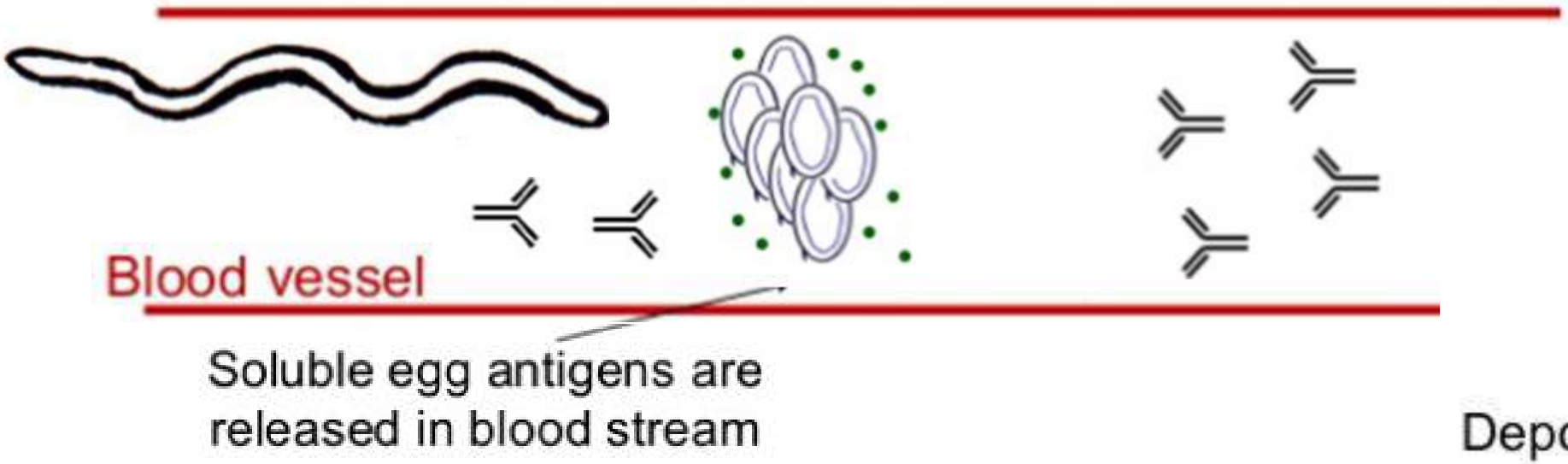
EGGS THAT FAIL



- The embolism goes and blocks the lung arterioles
- This will cause granuloma and fibrosis
- This will cause back pressure in the heart leading to congestive right sided heart failure (called **Cor pulmonale)**.
- This lead to body edema

Katayama Syndrome

- Occurs mainly in S. japonicum infection
- Due to laying large number of **eggs antigens.**
- The patient suffers from: Fever, chills, diarrhoea, generalized lymphadenopathy Eosinophilia.
- Thus also called acute toxoemic schistosomiasis.



immune complex
↓
Circulate in blood
↓
Deposited in the tissues
↓
Tissue damage

Clinical picture

Stages	Clinical aspect	Manifestations
Late manifestations	**1. Chronic Intestinal schistosomiasis**	**Oviposition** in the mesenteric plexus → diarrhoea with blood and mucus (schistosomal dysentery)
	2. Chronic hepatosplenic schistosomiasis	**Granuloma Formation** in the liver → periportal fibrosis → Obstruction of the portal venous branches → portal hypertension →hepatomegaly & splenomegaly
	3. Advanced complications	Hypersplenism → Anaemia + thrombocytopenia Extensive periportal fibrosis → Hepatic failure Portal hypertension → Opening of porto-systemic collateral → oesophageal varices → fatal haematemesis Egg embolism → Lung & CNS Ascites due to hypoproteinaemia + portal hypertension

Clinical picture summary

Stages	Clinical aspect	Manifestations
Early	**1. Cercarial dermatitis**	At the penetration sites of cercariae → itching & papular eruption
	2. Schistosomular migration	**Migration** of schistosomula→ **lungs**: pneumonitis (fever, cough and haemoptysis) and →**liver** (tender hepatomegaly)
	3. Acute schistosomiasis (Katayama syndrome)	It occurs when worms mature in the liver, migrate to the small venules and begin to lay eggs. There is fever, abdominal pain, diarrhoea, wheezing, urticaria, marked eosinophilia, sometimes lymph node enlargement and hepatosplenomegaly.

Laboratory diagnosis

Direct

1) Detection of eggs in the stool by direct smear or concentration .

2) Thick faecal smear .

3) Rectal swab.

4) Rectal biopsy or liver biopsy in chronic stage

Indirect

1) Intradermal test.

2) Serological tests :

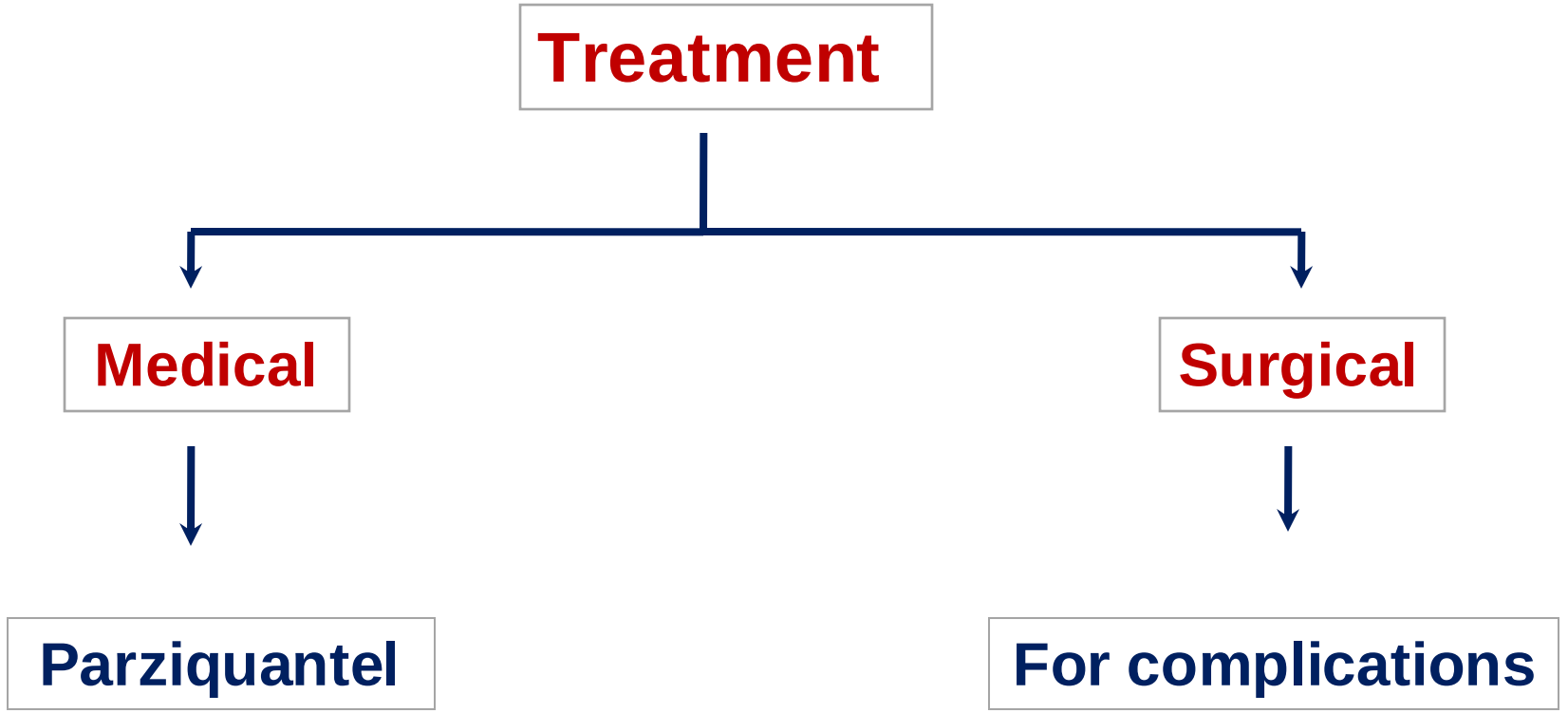
IHAT, CFT, and ELISA.

3) Recently: Detection of circulating *Schistosoma* antigens by using of monoclonal antibodies

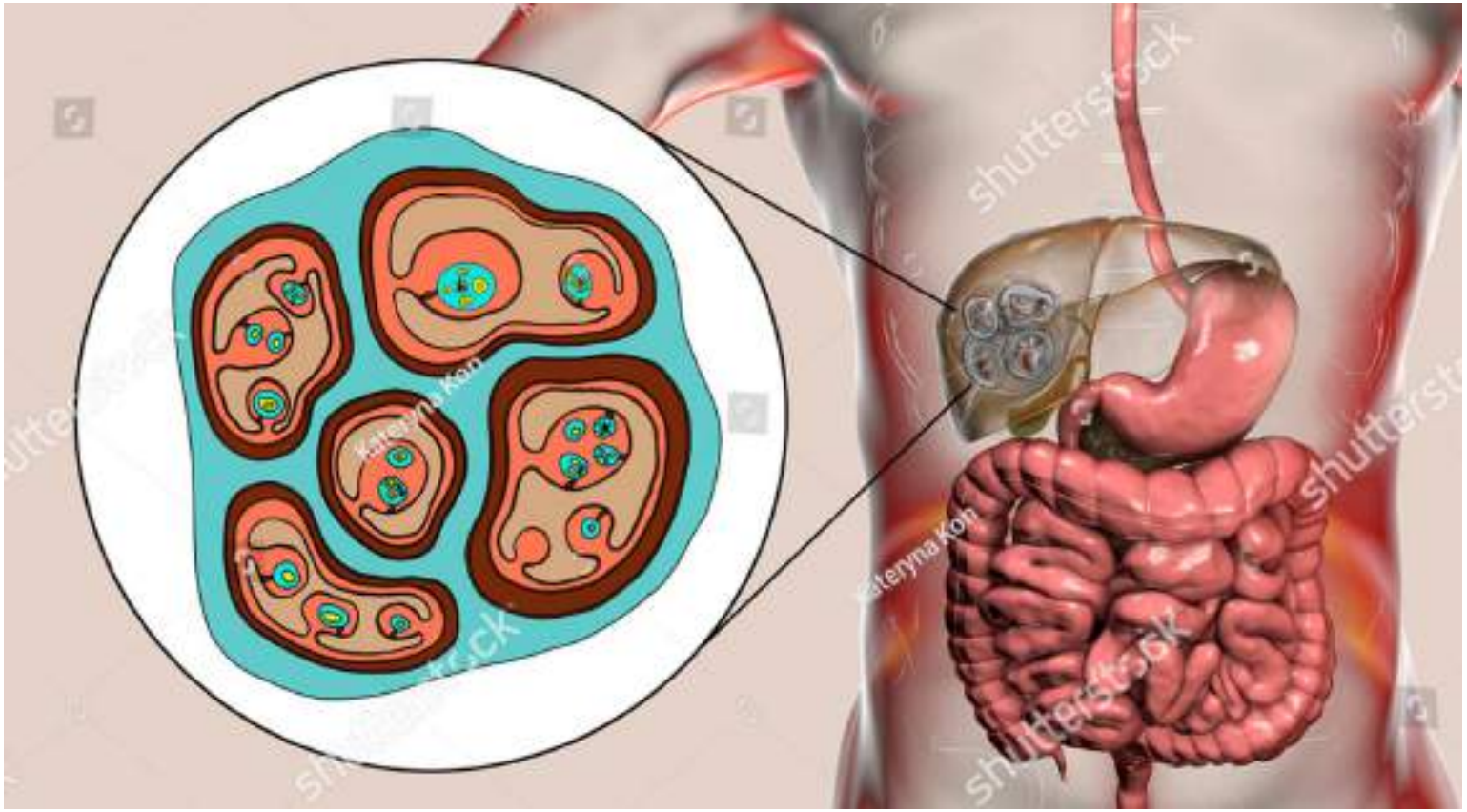
4) Anaemia:-

- Iron deficiency anaemia due to blood loss.
- Haemolytic anaemia due to hyper-splenism.

6) Eosinophilia


Treatment
Medical
Surgical
Parziquantel
For complications

Gastrointestinal hydatidosis

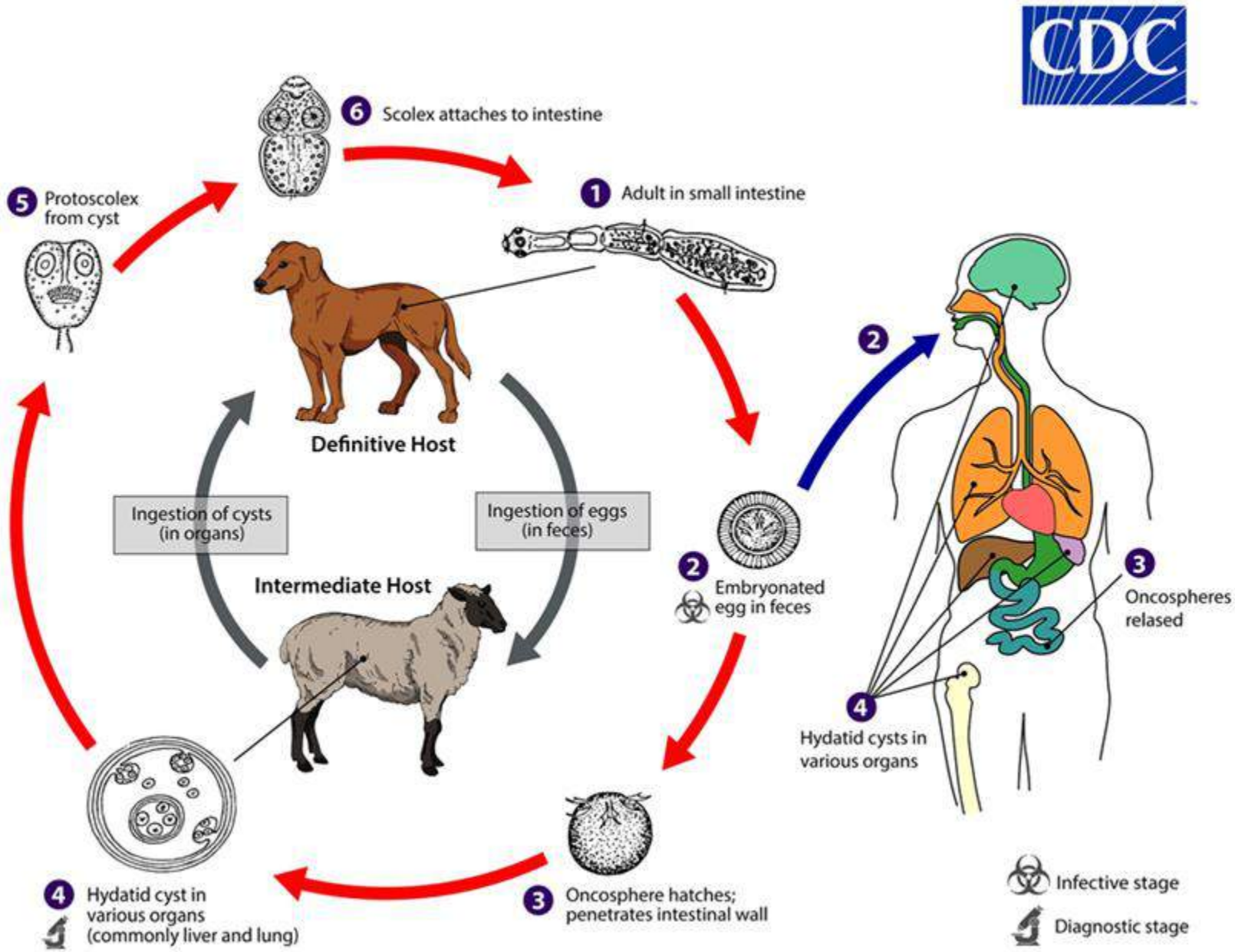


Hydatid cyst disease (Cystic Echinococcosis or Hydatidosis)

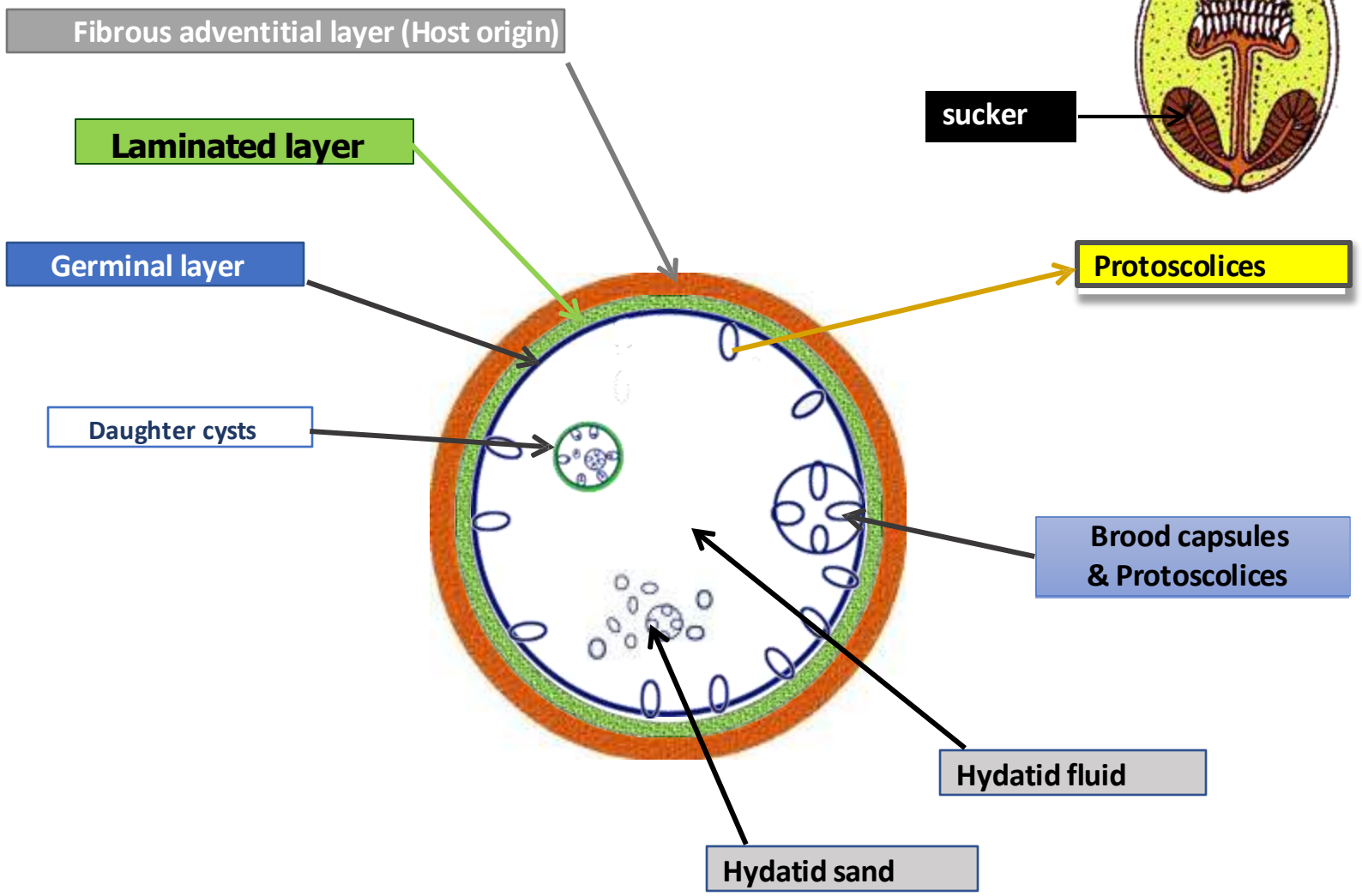
- It is a parasitic infection of both humans and other mammals such as sheep, and cattle with hydatid cysts, the larval stage of *Echinococcus* granulosus.

- Man is an intermediate and blind host for *Echinococcus granulosus*

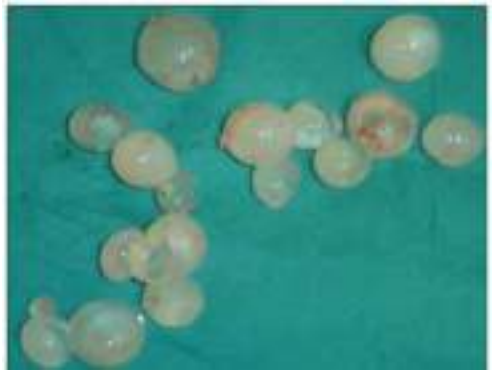
Echinococcosis

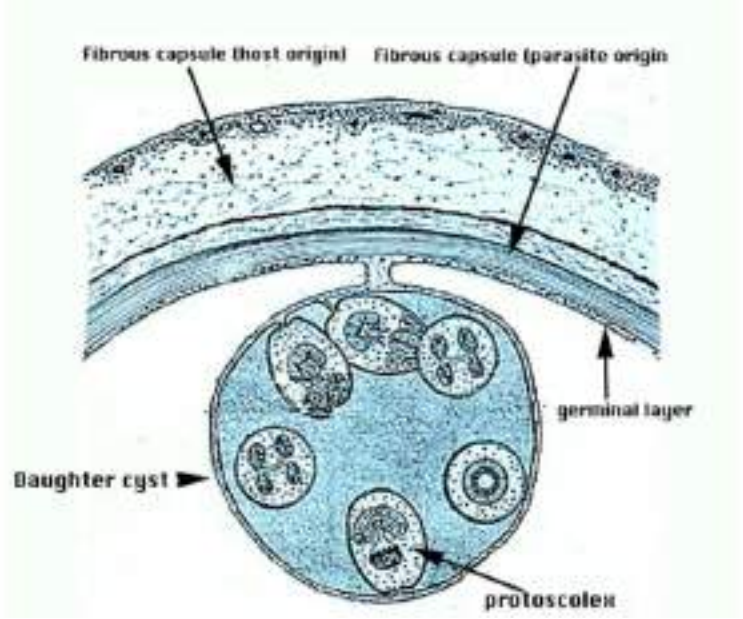


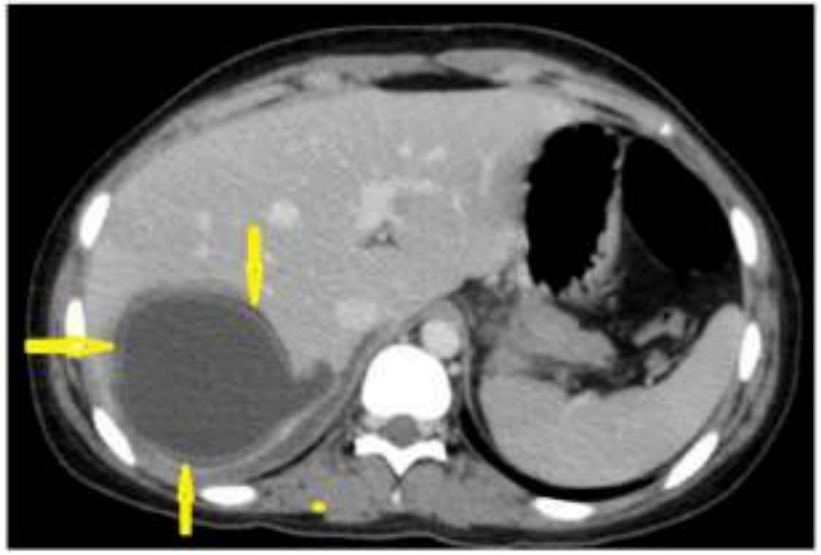
Unilocular hydatid cyst



Hydatid cyst







Contrast-enhanced computed tomography of a 15-year-old female presenting with abdominal pain showing a well-circumscribed, unilocular, non-enhanced cystic lesion in the right lobe of the liver with typical “double-wall sign” of hydatid cyst (arrows).

Pathogenesis & Symptomatology

Local inflammatory reaction around the hydatid cyst, ending in formation of a fibrous capsule which may become calcified or even ossified.

The symptoms depend on the size & site of the cyst.

Large sized cysts pressure atrophy of affected organs:-
Liver (70%) enlargement and dysfunction (fever, pain and jaundice).
Lung (20 %) pain, cough and dyspnea.
Brain epilepsy.
Eye protrusion of the eye ball.
Bones Pain& spontaneous fracture.
Kidney membranous nephropathy.

Spontaneous rupture of cyst into peritoneal cavity or pleura may lead to severe allergic reaction **(anaphylactic shock)** or secondary cysts.

Diagnosis

Clinical

- History of contact with dogs.
- Slowly growing cystic tumor.

Laboratory

Direct

- X-ray for calcified cyst.
- Ultrasonography, CT scan and MRI.
- Scolices in sputum or urine due to rupture of the cyst in bronchus or urinary tract.
- Puncture or aspiration of hydatid fluid
  - ➲ may lead to anaphylactic shock due to leakage of the fluid.

Indirect

- Eosinophilia.
- Intradermal test(Casoni test).
- Serological tests.
- PCR

Treatment

1) **Surgical removal of the cyst:** The most efficient treatment but it may cause mortality (2%) and recurrence of the disease (2 - 25%).

2) **Medical treatment:**

Indications: In inoperable cases and before and after surgery.

- Albendazole (Drug of choice).
- Mebendazole.
- The combination of ABZ and Praziquantel (PZQ) may provide synergistic effect and better efficacy.

3) Percutaneous treatment (PAIR): In three steps:

Puncture (P) and needle aspiration (A) of the cyst.

Injection (I) of a scolicidal solution usually hypertonic sodium chloride solution or ethanol and left for 5 - 30 minutes. Cyst-re-aspiration (R) and final washing.

- ✓This procedure is indicated in inoperable cases and who have drug resistance (no response to medical treatment).

Case study

- A 24-year-old man presented to the hospital complaining of a swelling in the right upper quadrant of his abdomen. Clinical examination revealed the presence of a mass on the right side of the abdomen that elicited a thrill on palpation. Blood examination revealed eosinophilia. Abdominal ultrasound showed a medium-sized cyst with heterogenous contents occupying the right liver lobe.

CASE SUMMARY

A 21-year-old male who suffered from chronic diarrhea and abdominal pain. Physical examination found no abnormalities, blood tests were normal, and stool examination was negative. A colonoscopy revealed a nodular terminal ileal mucosa, two cecal polypoid lesions with no particular surface pattern, and millimetric erosions in the rectum. The presence of *Schistosoma* eggs with thick peripheral capsules and viable embryos inside and numerous eosinophils surrounding the egg capsule were observed on histopathological examination. The patient received praziquantel, and his symptoms were resolved.

Conclusion

- Colonic schistosomiasis should be considered as a differential diagnosis, especially in endemic countries. Endoscopy and histopathological examination can confirm the diagnosis, and antihelminthics are an effective treatment.