

GIT Module 2021-2022

Parasitic Infections of the GIT

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Nematodes of medical importance

Intestinal

Tissue & Blood

Small intestine

□ With tissue stage:

- *Ascaris lumbricoides*
- *Ancylostoma duodenale*
- *Necator americanus*
- *Strongyloides stercoralis*
- *Trichinella spiralis*

□ Without tissue stage:

- *Enterobius vermicularis*
- *Trichuris trichiura*

Large int.

- *Wuchereria bancrofti*
- *Brugia malayi*
- *Loa loa*
- *Onchocerca volvulus*
- *Dracunculus medinensis*
- *Trichinella spiralis*

□ Larva migrans:

- *Ancylostoma spp.*
- *Toxocara spp.*

Ascaris lumbricoides

Pathogenicity & Clinical Features:

- **Ascariasis** – infection of *A. lumbricoides*.
- Majority of infections are asymptomatic.
- Clinical disease is largely restricted to individuals with a high worm load.
- Symptoms divided into three groups: those produced by:
 1. Migrating larvae.
 2. **Intestinal phase.**
 3. **Ectopic Ascariasis.**

Ascaris lumbricoides

Symptoms & Complications

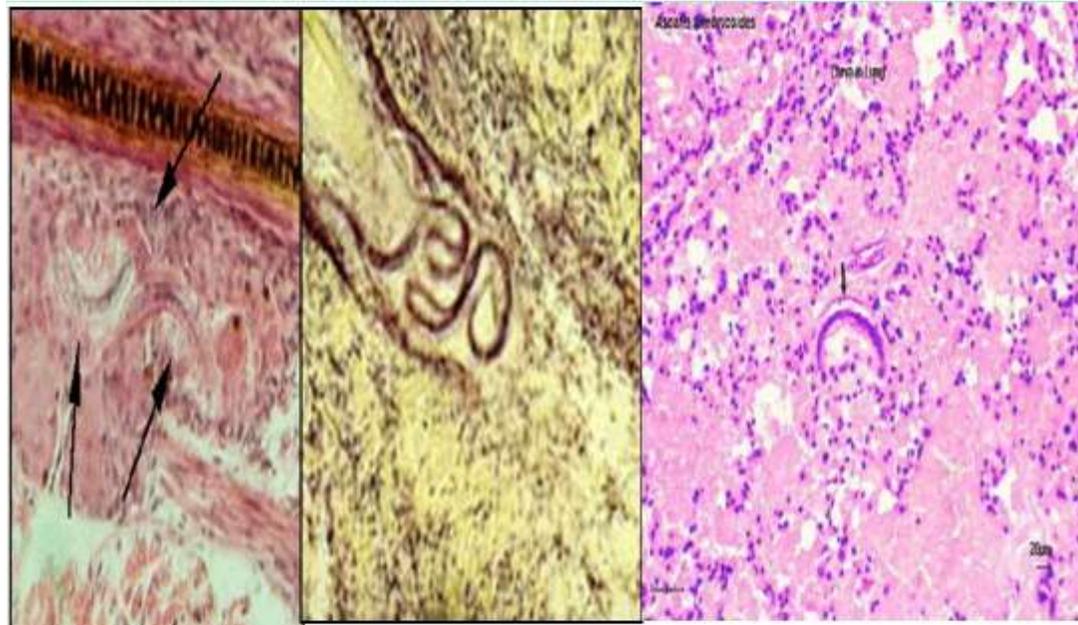
Migrating larvae phase

1- **Pneumonia (loeffler's syndrome)** – fever, cough, dyspnoea, blood tinged sputum that may contain larva, urticarial rash & eosinophilia.

2- **Visceral larva migrans** – if larvae enter systemic circulation (from pulmonary capillaries) to reach other organs like brain, spinal cord, heart, kidney.

Intestinal phase

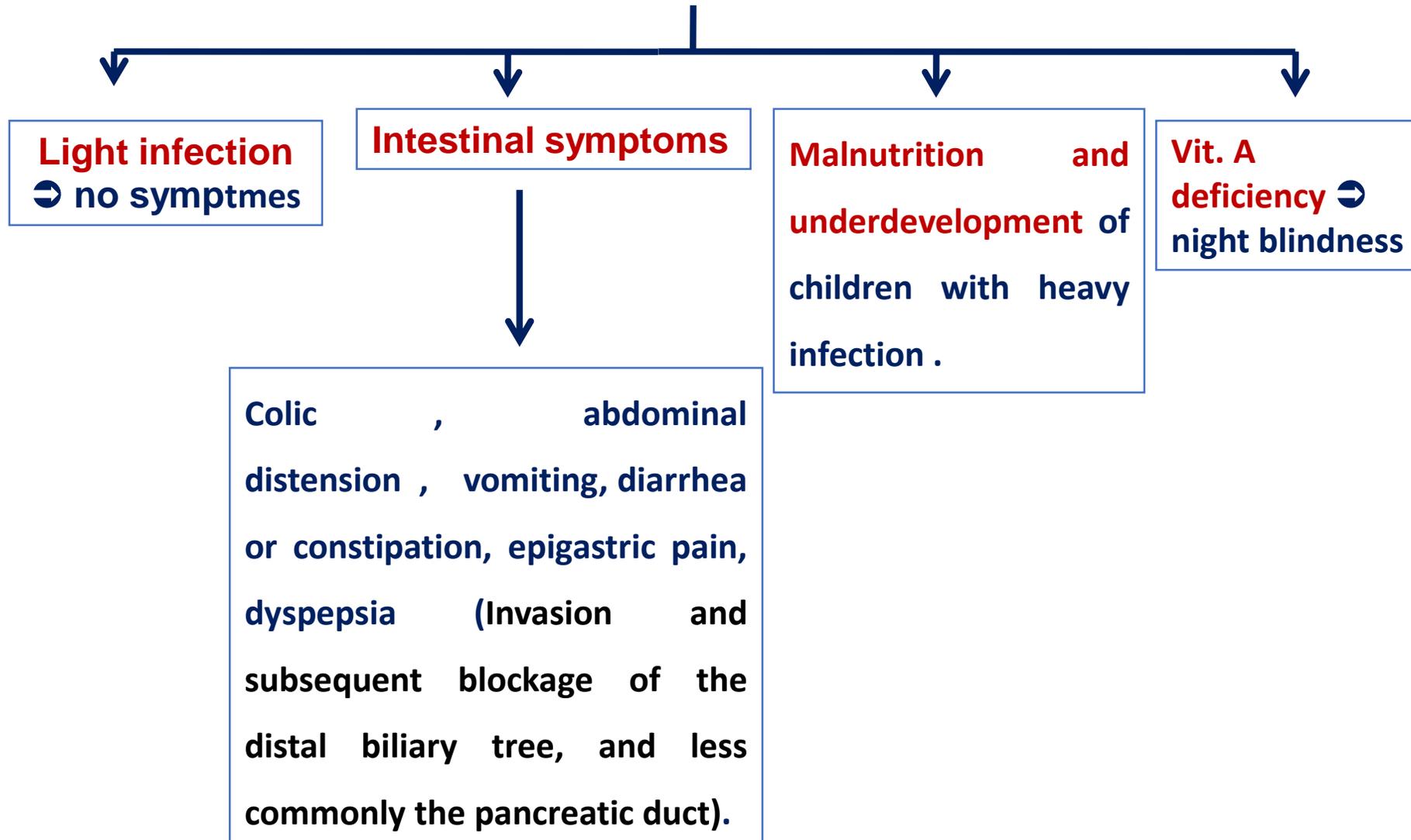
Ectopic Ascariasis



Loeffler's syndrome: Larvae in lung
pnumonia,cough ,bloody sputum

Ascaris lumbricoides

Intestinal phase



Ascaris lumbricoides

Ectopic Ascariasis

Due to migration of worm up into the stomach. It may :

- be vomited out,
- pass up through the esophagus at night & comes out through mouth or nose,
- enter larynx to cause asphyxia.
- migrate to other organs and cause **appendicitis**, cholecystitis, biliary colic, cholangitis, pancreatitis

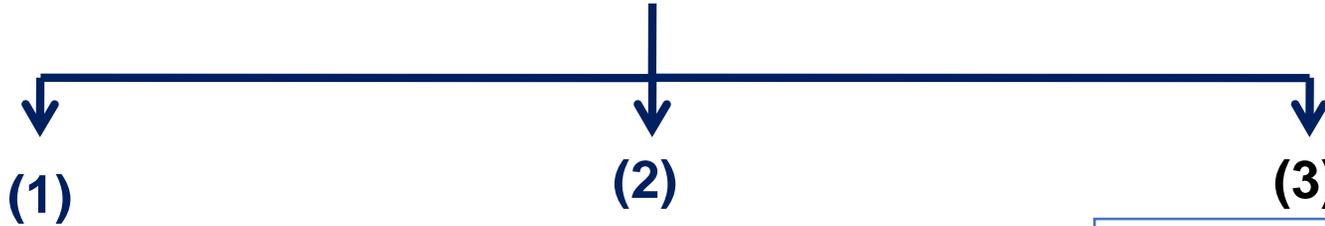
Due to downward migration:

- Obstruction of the appendix ➔ appendicitis.
- Anus ➔ may pass with or without defecation.



Ascaris lumbricoides

Complications



The products of living or dead worm ➔ **allergic manifestations** (urticaria & asthma) & **nervous irritability** (insomnia and convulsion).

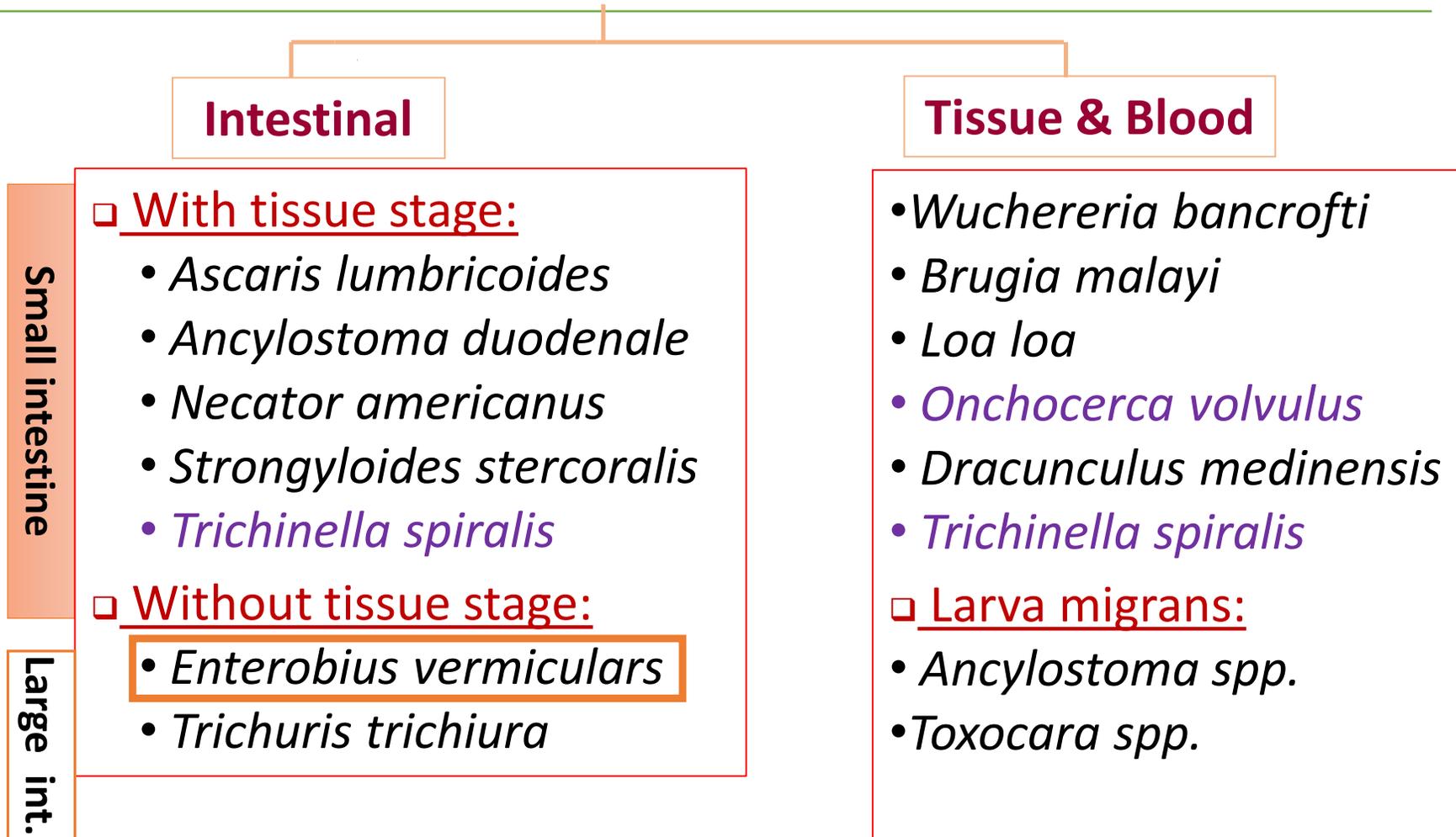
Intestinal obstruction

Perforation of the intestinal wall ➔ **peritonitis**

Treatment

- **Mebendazole/ Albendazole** – drug of choice but contraindicated in pregnancy & heavy infection
- **Piperazine citrate** - suspected intestinal or biliary obstruction since this drug paralyzes worms to aid expulsion.
- **Levamisole**

Nematodes of medical importance



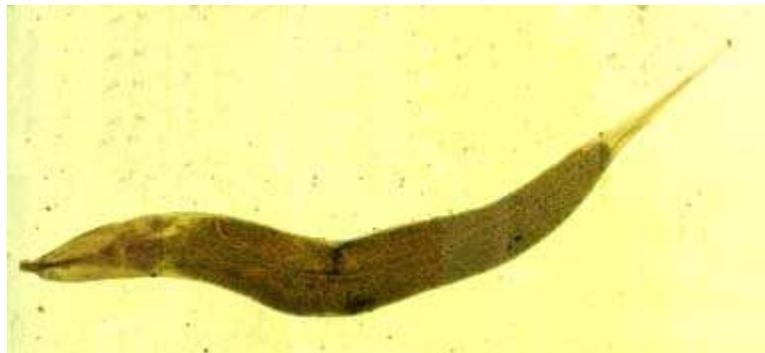
Enterobius vermicularis (Pin Worm)

Geographical Distribution:-

- Cosmopolitan more common in temperate and cold climates than in warm climates.

Habitat:

- Adult: small intestine (terminal ileum).
- Gravid female: Caecum and rectum.
- Eggs : In feces or deposited on perianal skin.



Enterobius vermicularis (Pathology)

Pathology:

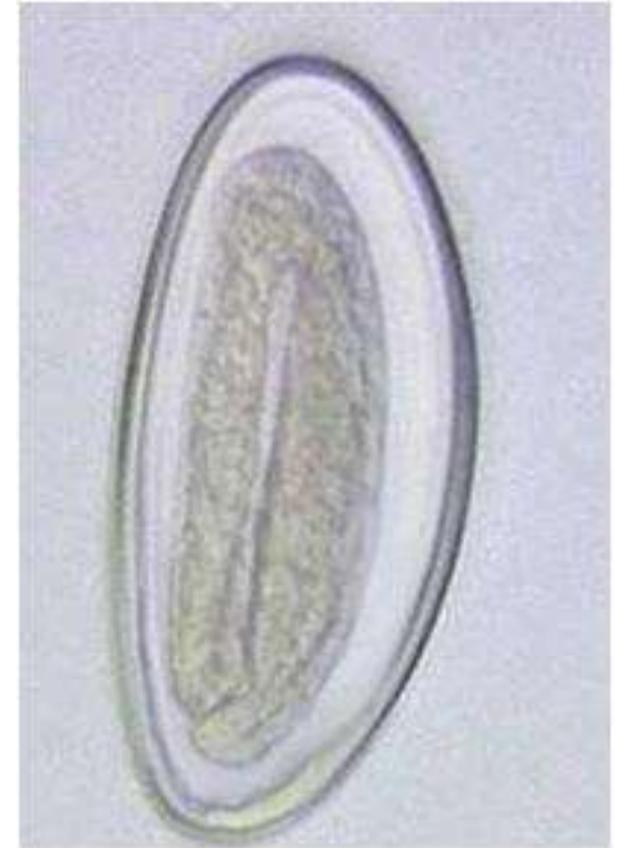
- Its infection rarely causes serious symptoms.
- Due to migration of worm - Perianal, perineal & vaginal itching (pruritis) worsens at night.
- Insomnia and restlessness
- Worms in the appendix can cause appendicitis.

Prevention and Control:

- Treating all members of a family in which infection has occurred.
- Washing of the anal skin each morning soon after waking.
- Washing of clothing worn at night.

Laboratory Diagnosis:

- Finding eggs from perianal skin using cellulose adhesive tape.
- Finding eggs and adult worms in the faeces.



Trichuris trichiura (The Whipworm)

Clinical features and Pathology:

- Infection – Trichuriasis
- Symptoms depend on worm burden:
 - Light infections:- Less than 10 worms – asymptomatic
 - Heavier infections:-
 - Chronic diarrhea
 - Intestinal ulceration with blood and mucus being passed in the feces
 - Iron deficiency anemia
 - Failure to develop at the normal rate.
 - Weight loss
 - Prolapse of the rectum.
- Laboratory Diagnosis:-
 - Finding the characteristic eggs in the faeces.

Strongyloides stercoralis (The dwarf thread worm)

Habitat: Has both free living and parasitic generations

- Parasitic Adults: **buried** in the mucosal epithelium of the small intestine of man.
- Rhabditiform larvae: Passed in the faeces and external environment.
- Filariform larvae: soil and water (the infective stage).

Strongyloides stercoralis (The dwarf thread worm)

Clinical feature and Pathology

- Causes strongyloidiasis.
- The female adult worm by their invasion of the intestine cause inflammatory changes in the mucosa of small intestine leading to the development of gastrointestinal symptoms.
- It is usually asymptomatic, in symptomatic cases shows the following phases:
 - A. Cutaneous phase:** Infection caused by large number of larva produce itching and erythema at the site of infection within 24 hours of invasion.
 - B. Pulmonary phase:** The migratory larva in the lung produces a considerable degree of host damage and injury to the alveoli and bronchial epithelium thereby producing bronchopneumonia and full blown pneumonitis.

Strongyloides stercoralis (The dwarf thread worm)

C. Intestinal phase: Invasion by adult worms may produce abdominal pain and mucus diarrhea. Indigestion, nausea vomiting and anemia may also occur. Heavy infection especially in children may result in malabsorption, steatorrhea and dehydration.

Laboratory Diagnosis

- Finding the larvae in faeces or in duodenal aspirates using direct or concentration method.
- In hyper-infection syndrome the larva may be found in sputum and in other specimens.



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Ancylostoma duodenale

- ❑ **Geographical distribution:** Cosmopolitan, widely distributed in tropical and subtropical countries.
- ❑ **Habitat:** Small intestine and particularly jejunum.
- ❑ **D.H:** Man.

Pathogenesis and symptomatology

Disease: Ancylostomiasis

1-Skin invasion (ground itch)

It is a **cutaneous lesion** produced as a result of penetration of human skin by **filariform larva** of *A. duodenale*.

The most common sites are usually **between the toes**, dorsal surface of the **foot** and inter digital spaces of **hands**.

Clinically: Local dermatitis with irritation and itching followed by erythema, oedema and papular rash → vesicles or pustules due to 2ry bacterial infection.

2-Larval migratory phase

To the lung
(verminous pneumonia or
loeffler's syndrome)

Symptoms include fever, cough,
dyspnea, haemoptysis and high
eosinophilia.

To general circulation

In heavy infection only, migrating hookworm
larvae may pass to the left side of the heart
⇒ general circulation ⇒ distributed to
different tissues of the body ⇒ eosinophilic
granulomatous lesions around the larvae
(visceral larva migrans).

3- Intestinal phase

Injury of the mucous membrane by cutting teeth and plates at the site of attachment ⇒ ulceration that may be infected ⇒ **nausea, vomiting, pain, flatulence, constipation or diarrhea with black or red stool.**

Anaemia ⇒ hypochromic microcytic iron deficiency & anaemia (due to blood loss).
Causes:
1-Each parasite sucks about 0.5 cc of blood daily.
2-Bleeding at the site of attachment due to the effect of anticoagulant secreted by the cephalic glands).

Hypoproteinaemia, nutritional oedema and signs of avitaminosis are due to impairment of food absorption and blood loss.

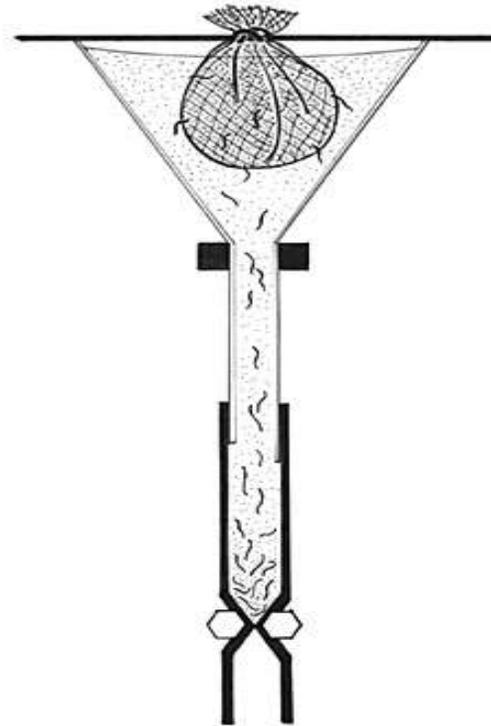
Retardation of physical, mental and sexual development in heavily infected children.

Laboratory diagnosis

Stool examination for egg detection by different methods:

- **Direct smear.**
- **Concentration methods**
- **Faecal cultures.**
- **Stoll's counting technique for determination of the intensity of infection.**

Examination of stool for larvae by Baermann's technique



Blood examination for anaemia

Treatment

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graph TD; A[Treatment] --> B[Supportive treatment:]; A --> C[Mebendazole (Drug of choice)]; A --> D[In severe anaemia, blood transfusion may be needed];
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Supportive treatment:

- High protein diet.
- Vitamins & iron.

Mebendazole

(Drug of choice)

In severe anaemia,
blood transfusion may
be needed

Strongyloides stercoralis
(Dwarf thread worm)

Mode of infection

•Penetration of the skin or mucous membrane of mouth by infective filariform larvae.

Autoinfection (common in immunocompromised persons)

Internal

Where rhabditiform larvae may develop to filariform larvae (I.S) into the lumen of the small intestine, then penetrate the intestinal mucosa to reach the circulation.

External

Filariform larvae (I.S) come out the anus and penetrate the perianal skin to reach the circulation and complete the cycle

Pathogenesis and symptomatology

Disease: Strongyloidiasis or Cochin – China diarrhea

1-Skin invasion (ground itch)

Ground itch

At the site of larval penetration →
Local dermatitis with irritation and itching followed by erythema, oedema and papular rash →
vesicles or pustules due to 2ry bacterial infection.

Larva currens (racing larva)

It occurs when the **filariiform larva** penetrates the **perianal region** with external autoinfection causing linear or tortuous urticarial lesions over the trunk, thigh and buttocks & rapidly disappeared.

First was described in 1876, identified in the feces of French colonial troops suffering from diarrhea in Cochin-China.

2-Larval migratory phase

To the lung

To general circulation

Verminous pneumonia or (Loeffler's syndrome)

Symptoms include fever, cough, dyspnoea, haemoptysis and high eosinophilia .

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Occasionally in heavy infection, migrating filariform larvae may pass to the left side of the heart
⇒ general circulation ⇒
distributed to different tissues of the body ⇒ eosinophilic granulomatous lesions around the larvae (**visceral larva migrans**).

3-Intestinal phase

Light infection:

Usually
asymptomatic

Penetration of the
intestinal mucosa by the
adult worm produces
ulceration, mucosal
oedema, bleeding and
may be perforation.

Heavy infection:
Epigastric pain and
tenderness (duodinitis),
nausea, vomiting and
watery mucus diarrhea
(Cochin-China diarrhea)
alternates with
constipation.

In chronic cases
there is mucosal
atrophy with
fibrosis.

Disseminated strongyloidiasis (Hyper infection syndrome)

In immunocompromised patients the parasite produces massive number of rhabditiform larvae that develop into filariform larvae in the intestinal lumen (autoinfection) ⇒ penetrate the intestinal wall ⇒ reach the circulation ⇒ different organs as brain, lung, liver and kidney.

This condition is fatal and death occurs due to:

- ① Massive increase of intestinal worm burden ⇒ intestinal perforation, peritonitis and paralytic ileums.
- ② Invasion of CNS ⇒ meningitis & brain abscess.
- ③ Respiratory failure.
- ④ Septicaemia due to larval migration from the intestine.

Laboratory diagnosis

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graph TD; A[Laboratory diagnosis] --> B[Direct methods]; A --> C[Indirect methods]; B --> D["• Stool examination for rhabditiform larvae by direct smear and concentration methods.  
• Stool culture .  
• Duodenal aspiration reveals rhabditiform larvae.  
• Sputum examination or culture: during disseminated disease, all stages may be present in lung (rhabditiform larvae, filariform larvae, adults)."]; C --> E["• Eosinophilia (10-40%)  
• Serological testes (CFT, IHT, ELISA)"];
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Direct methods

- Stool examination for rhabditiform larvae by direct smear and concentration methods.
- Stool culture .
- Duodenal aspiration reveals rhabditiform larvae.
- Sputum examination or culture: during disseminated disease, all stages may be present in lung (rhabditiform larvae, filariform larvae, adults).

Indirect methods

- Eosinophilia (10-40%)
- Serological testes (CFT, IHT, ELISA)

Treatment

- **Mebendazole.**
- **Ivermectin.**
- **Antihistaminic and antibiotics for cutaneous lesions.**