Notebook

GIT Module
2024-2025
Parasitic Infections (2)

Ascaris lumbricoides

- **Geographical Distribution:**
  - Cosmopolitans: *A. lumbricoides* is one of the commonest and most wide spread of all human parasites.
- **Habitat:**
  - Adult: In the small intestine.
  - Egg: In the faeces.
- **Morphology:**
  - Adult: colour: pinkish.
  - Male: size: about 15-30 cm with curved tail and two spicules of unequal size.
  - Female: size 20-40 cm , with a straight tail.
- Infective form: Embryonated egg

Enterobius vermicularis (Pin Worm)

Geographical Distribution:-

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

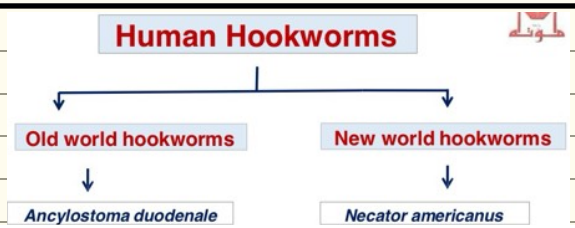
Habitat:

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

Trichuris trichiura (The Whipworm)

Habitat: Adult: large intestine (caecum) and vermiform appendix

- Eggs : In the faeces



Ancylostoma duodenale

- **Habitat:** Upper part of the small intestine
- **D.H:** Man
- **D.S:** Egg
- **I.S:** Filariform larva
- **Mode of infection:** Penetration of the skin or mucus membrane of the mouth

General features

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).

It is the initial developmental larval stage (first and second) of soil-borne nematodes

- **Habitat:** Upper part of the small intestine
- **D.H:** Man
- **R.H:** Dogs and monkeys
- **D.S:** Rhabditiform, filariform larvae and adults
- **Mode of infection:** Skin penetration-autoinfection

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.

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.

Symptoms & Complications

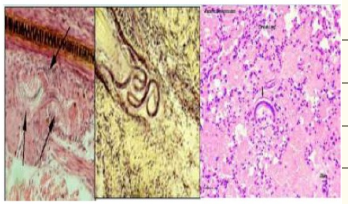
Migrating larvae phase

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

Intestinal phase

- Light infection ➲ no symptoms
- Intestinal symptoms: Colic , abdominal distension , vomiting, diarrhea or constipation, epigastric pain, dyspepsia (due to anti-pepsin & anti- trypsin substances produced by adults that interfere with protein and fat digestion)
- Malnutrition and underdevelopment of children with heavy infection .
- Vit. A deficiency ➲ night blindness

3) Complications

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

(2) Intestinal obstruction

(3) Perforation of the intestinal wall ➲ peritonitis

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.

Pathogenesis and symptomatology

Disease: Ancylostomiasis

Skin penetration 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.
- Characterized by erythema, popular rash, vesicles and pustules with secondary bacterial infection

Migratory phase

- Verminous pneumonia or Loeffler's syndrome which is manifested by fever, cough, dyspnea, and hemoptysis with eosinophilia.
- Eosinophilic granuloma and abscess formation in different organs when larvae are distributed through the circulation to other organs.

Intestinal phase

- Nausea, vomiting, diarrhea and abdominal pain
- Anaemia (microcytic hypochromic) due to blood suction by worms and bleeding at the attachment sites (worm release anticoagulant) that may lead to anemic heart failure
- Hypoproteinemia and nutritional deficiency that leads to growth retardation

Human Hookworms

- **Old world hookworms** ➲ *Ancylostoma duodenale*
- **New world hookworms** ➲ *Necator americanus*

Pathogenesis and symptomatology

Enterobius vermicularis (Pin Worm)

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.**

Strongyloides stercoralis (The dwarf thread worm)

Pathogenesis and symptomatology

Disease: Strongyloidiasis

Skin penetration

- Ground itch
- Larva currens It occurs when the filariform larva penetrates the perianal region with external autoinfection causing linear or tortuous urticarial lesions over the trunk, thigh and buttocks. Go back to blood (autoinfection)

Migratory phase As *Ancylostoma*

Larva currens

Intestinal phase

- Nausea, vomiting and profuse watery diarrhea
- Epigastric pain and ulceration in the mucosa
- Malabsorption

Disseminated strongyloidiasis

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GROUND ITCH: after infection, patients may get a mildly itchy rash that often occurs at the site of larval skin penetration, usually on the feet. This may spread to the buttocks and waist areas.

26

Hyper infection syndrome and Disseminated stronyloidiasis

In immunocompromised patients the parasite produces massive number of rhabditiform larvae that develop into filariform larvae in the intestinal lumen (autoinfection)➲ Hyperinfection syndrome

Larvae penetrate the intestinal wall ➲ reach the circulation ➲ different organs as brain, lung, liver and kidney (dissiminated strongyloidiasis)

This condition is fatal and death occurs due to:

❶Massive increase of intestinal worm burden ➲ intestinal perforation, peritonitis and paralytic ileus.

❷Invasion of CNS ➲ meningitis& brain abscess.

❸Respiratory failure.

❹Septicaemia due to larval migration from the intestine.

Paralytic ileus occurs when the muscle contractions that move food through your intestines are temporarily paralyzed. It's a functional problem of the muscles and nerves that mimics an intestinal obstruction even when nothing is obstructing them. Food becomes trapped in the intestines, leading to constipation, bloating and gas.

Ascaris lumbricoides

Laboratory Diagnosis

- Macroscopic - Direct detection of worm/s in stool or vomit
- Microscopic – direct examination of stool following floatation method: **bile stained eggs.** (eggs may not be seen at least 40 days after infection)
- Blood examination – **eosinophilia**.
- Others:
  - Imaging – large collections of worms in abdomen
  - ultrasonography - to diagnose hepatobiliary or pancreatic ascariasis
  - Serology (Ab detection)

Enterobius vermicularis (Pin Worm)

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.

Laboratory diagnosis

Trichuris trichiura (The Whipworm)

- **Laboratory Diagnosis:-**
  - Finding the characteristic eggs in the stool.

Ancylostoma duodenale

Laboratory diagnosis

- **Fresh stool examination for egg detection by different methods:**
  - Direct smear.
  - Concentration methods
- **Blood examination for anaemia**

Strongyloides stercoralis (The dwarf thread worm)

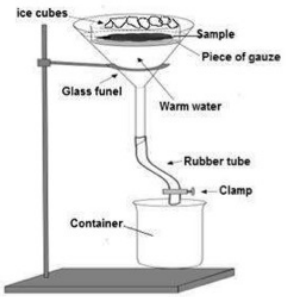
Laboratory diagnosis

Direct methods

- Stool examination for rhabditiform larvae by direct smear and concentration methods as bearman's technique.
- Stool culture to detect free living adults
- Duodenal aspiration or enterotest reveals larvae and adults.
- 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)



Ascaris lumbricoides

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

Enterobius vermicularis (Pin Worm)

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Treatment

Trichuris trichiura (The Whipworm)

Ancylostoma duodenale

Treatment
Albendazole

Supportive treatment:
-High protein diet.
-Vitamins & iron.

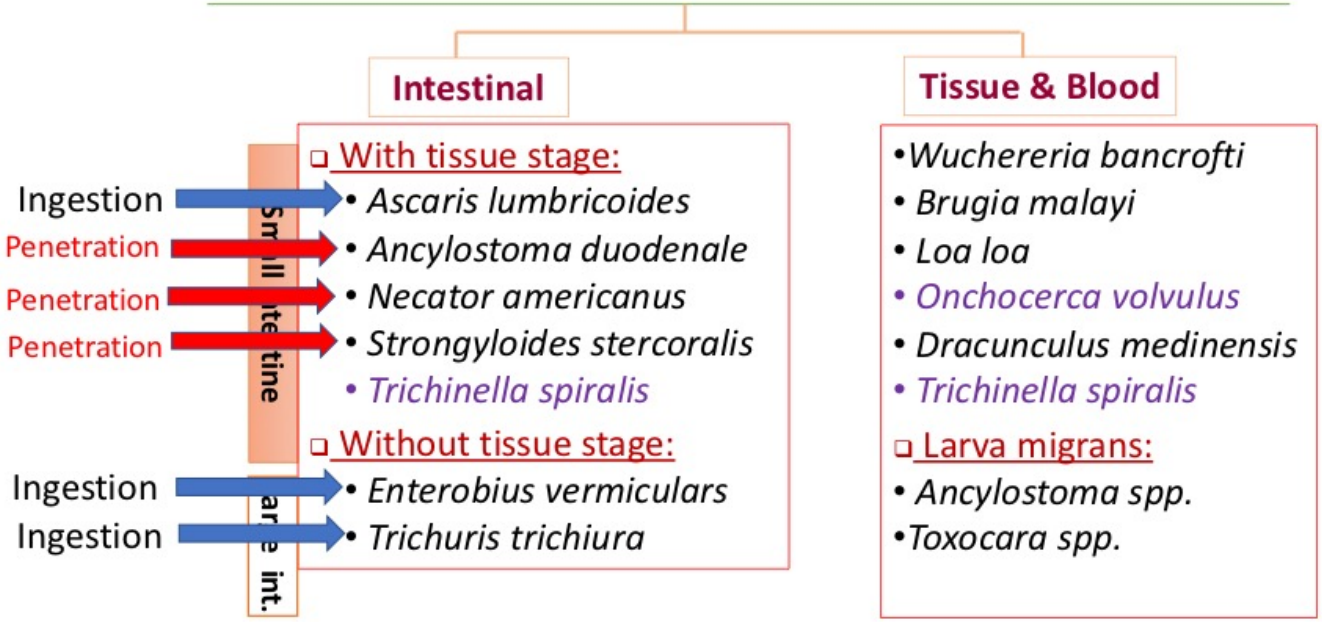
In severe anaemia, blood transfusion may be needed

Strongyloides stercoralis (The dwarf thread worm)

Treatment

- Ivermectin (drug of choice).
- Mebendazale.
- Antihistaminic and antibiotics for cutaneous lesions.

Nematodes of medical importance



Infection. Bacteria? Virus? Parasites?

Normal White Blood Cell Distribution

White blood cell line	*Normal percentage of total leukocyte count*
Neutrophils	40 to 60
Lymphocytes	20 to 40
Monocytes	2 to 8
Eosinophils	1 to 4
Basophils	0.5 to 1

WBC count = 4000-1000 cell /µl Blood

Neutrophils ↑ In Bacterial infections

Lymphocytes ↑ In Viral Infections

Eosinophils ↑ In Parasitic infections, Asthma, Allergies

Basophils ↑ In Parasitic infections

Infection. Bacteria? Virus? Parasites?

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WBCs ↑ Neutrophils ↑ Acute Bacterial infections

WBCs ↑ Lymphocytes ↑ Acute Viral Infections

WBCs ↓ Neutrophils ↑ Chronic Bacterial infections

WBCs ↓ Lymphocytes ↑ Chronic Viral infections

Monocytes and Eosinophils ↑ In Parasitic infections

Hope it is useful

Done by : Raghad Mrayat