Parasitic Infections

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Disclaimer

- None of my pronunciations of the words in this presentation should be taken as orthodox.
Parasitism: the relationship between two species in which one benefits at the expense of the other

Parasitic infections are in the differential diagnosis of almost every presenting sign or symptom.
• Prompt treatment → Rapid recovery
• Delay in treatment → Chronic and difficult to treat disease

Osler’s principle: to make the diagnosis, one must think of the diagnosis.

How to avoid missing the diagnosis: starts with travel history
Fever

- Malaria
- Babesiosis
- Trypanosomiasis
- Leishmaniasis
- Toxoplasmosis
- Amebic liver abscess
- Schistosomiasis
Malaria

- Plasmodium falciparum, ovale, vivax, malariae, knowlesi

- endemic in parts of Africa, Asia, Central/South America

- Vector: Anopheles mosquito

- falciparum ➔ most virulent
- ovale and vivax ➔ hepatic phase
The malaria transmission cycle from mosquito to human. RBC, red blood cell.
Malaria continued

- Symptoms: malaise, headache, fatigue, abdominal discomfort, and muscle aches

- Physical findings: cyclic or irregular fevers; shaking chills, mild anemia, hepatosplenomegaly, mild jaundice

- Unexplained fever in patient returning from tropics: malaria until proven otherwise

Diagnosis by visualization of parasites on Field or Giemsa stained thick and thin blood smears

Rapid antigen testing now available
Cerebral Malaria

- Cerebral Malaria: life-threatening complication of *P. falciparum*
- fever, seizures, altered mental status, obtundation, coma
- treatment: IV quinine or quinidine or artesunate

Malaria... Continued

- *P. falciparum*: most deadly form of malaria
- induces the formation of membrane protuberances known as “knobs” which result in an event known as cytoadherence
- Sequestration of RBC in vital organs and interference with microcirculation and metabolism
Malaria continued

Treatment:
Consider the following:
- The infecting plasmodium species
- Clinical status of patient
- Drug susceptibility of infecting species as determined by geographic location
- Combination therapy is standard

- Chloroquine phosphate + primaquine in regions with known sensitivity (Haiti, Dominican Republic, Central America, limited regions of Middle East)

- Uncomplicated malaria in resistant regions: oral quinine and doxycycline

- Complicated infection with resistant P. falciparum: IV quinidine and doxycycline or IV artesunate and doxycycline

**Primaquine is active against parasite dormant in liver**
Babesiosis

-Malaria-like illness increasingly prevalent in NE and NW United States as well as Europe
-Transmitted by *Ixodes scapularis*

-Clinical manifestations: fever/chills, headache, hepatosplenomegaly, anemia, signs of hemolysis

Diagnosis: thick and thin blood smears

-treatment: quinine plus clindamycin
Chaga’s Disease

-caused by protozoan Trypanosoma cruzi
-transmission by insect vectors (reduviid bug)
-endemic throughout Mexico, Central/South America

-fever, hepatosplenomegaly, unilateral periorbital edema
-cardiac disease which may present as chest pain, dysrhythmia, heart failure, abnormal ST segment and T-wave findings on ECG

Diagnosis: serum parasites; IgG antibody for T. cruzi

Treatment: benznidazole and nifurtimox
Schistosomiasis

- Blood fluke infection
- Pruritic dermatitis followed by fever, headache, cough, diarrhea, hepatosplenomegaly, and hypereosinophilia

- Diagnosis: detecting eosinophilia; eggs identified on microscopy of urine or stool

- Treatment: praziquantel
Neurologic Symptoms

- Cerebral Malaria
- Cysticercosis
- Echinococciosis
- African Trypanosomiasis
- Naegleria and Acanthamoeba
Cysticercosis

-caused by larval form of *Taenia solium*

-adult worm matures in small intestine; larval form penetrates gut wall and trophic for CNS, muscle and soft tissue

-ring enhancing lesion on CT w/contrast or MRI

-treatment: Albendazole
Neurocysticercosis
Echinococcosis

-Tapeworm *Echinococcus granulosus*

-ingestion of food/water contaminated by ova from feces of sheep or cattle infected with adult worm

-diaonsis by appearance and localization of cyst on US or CT scan

-Treatment options: albendazole and surgical resection

-cyst should not be aspirated: risk for seeding body with metastatic cysts; spillage of hydatid sand can cause anaphylactoid reaction
King, Charles H, Fairley, Jessica K. Mandell, Douglas, and Bennett’s Principles and Practice of Infectious Diseases. Pages 3227-3236.e1. 2015
Parasites causing CNS symptoms continued...

African Trypanosomiasis

- caused by *Trypanosoma brucei gambiense* and *rhodesiense*
- endemic in limited areas of West and East Africa
- transmitted by the *Tsetse* fly
- Causes cerebritis; symptoms of severe headache, lethargy/sleepiness, altered mental state
Parasites causing CNS symptoms continued...

**Naegleria and Acanthamoeba**

- Free-living freshwater amebae
- Infect people swimming and diving in ponds and lakes
- Invade through olfactory neuroepithelium or compromised corneal epithelium
- Mobile amebae identified in CSF
- Treatment with amphotericin B and miconazole together

Naegleria fowleri
- Enter through the olfactory neuroepithelium causing primary amebic meningoencephalitis (PAM) in healthy individuals
- Trophozoites in CSF and tissue Flagelated forms in CSF

Balamuthia mandrillaris
- Enter through lower respiratory tract or through ulcerated or broken skin causing granulomatous amebic encephalitis (GAE) in individuals with compromised immune system
- Cysts and trophozoites in tissue

Treatment with amphotericin B and miconazole together
Dermatologic Symptoms

- Scabies
- Bed bugs
- Cutaneous Leishmaniasis
- Cutaneous larva migrans
Scabies

- Mite infestation (sarcopes scabiei)
  - commonly interdigital web spaces, flexion areas of wrists, axillae, buttocks, lower back, penis, scrotum, and breasts
  - most infections from direct contact; fomites can transmit infection

- Crusted Scabies – occurs in immune suppressed patients

- 5% permethrin cream topically overnight on day 0 and 7
Bed Bugs

-caused by cimex lectularius
-may spread during travel on clothing, bedding, laundry, etc.
-hidden during day and feed at night

-presents as erythematous, edematous, pruritic papules. May appear in linear distribution (breakfast, lunch, dinner sign).

-appearance of lesions depends on degree of patient’s sensitization

-symptomatic treatment (topical steroids and antihistamines)
-eradication of infestation
Cutaneous Leishmaniasis

-Leishmania braziliensis/mexicana/tropic/major

-transmitted by the female sandfly

-major cause of painless chronic ulcerating lesions worldwide

-skin papules and nodules which develop painless central ulceration and a raised border
Gastrointestinal symptoms

- Giardia lamblia
- E. histolytica
- Cryptosporidium
- Enterobius vermicularis
E. histolytica

- fecal/oral transmission

- cyst is infectious

- trophozoite is the tissue invasive stage

- diagnosis by fecal antigen detection

- treatment of intestinal infection with nitroimidazole derivatives
Intestinal amebiasis
**Giardia Lamblia**

- **Most frequently** diagnosed intestinal parasitic disease in the United States and among travelers with chronic diarrhea

- Diagnosis with fecal antigen test

- Treatment: **metronidazole**
**Ascaris lumbricoides**

- Soil transmitted helminth (parasitic worm)

- Most common human worm infection worldwide

- Treatment with antihelmintics is effective in eliminating infection
Ascaris lumbricoides roundworms - post-surgery in resected bowel

Image by Dr. Vikas Arora, India
Anemia

- Whipworm and Hookworm
- Tapeworm
- Malaria
Whipworm and Hookworm

- *Trichuris trichiura* (whipworm)
- *Necator americanus* (hookworm); *Ancylostoma duodenale* (hookworm)

- Larvae penetrate human skin usually when someone barefoot walks on contaminated soil
- Adult worm penetrate intestinal mucosa causing ongoing luminal blood loss
- Diagnosed by stool O&P
- Treatment of choice: Mebendazole and albendazole
Conclusions

- Travel history is essential in diagnosing parasitic infections
- Treatment of many parasitic infections results in rapid recovery
- Parasitic infections remain a significant cause of morbidity and mortality worldwide
- https://www.youtube.com/watch?v=8OiCicBW-4Q
References


- King, Charles H, Fairley, Jessica K. Mandell, Douglas, and Bennett’s Principles and Practice of Infectious Diseases. Pages 3227-3236.e1. 2015