Ascaris Lumbricoides

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Synonyms and related keywords: A lumbricoides, roundworm, intestinal roundworm, human parasite

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Background: Estimates suggest that 1 in 4 of the world’s population, or more than 1 billion people, are infected with the intestinal roundworm *Ascaris lumbricoides*. The vast majority of infected people are asymptomatic. Patients who are newly infected may have pulmonary symptoms (eg, cough, wheezing) and eosinophilia due to larval migration through the lungs. Later, abdominal symptoms may develop because of the mechanical effects of the relatively large adult worm. Patients in this later stage do not demonstrate eosinophilia.

Pathophysiology: The adult *A lumbricoides* is a large, cream-colored worm. Adult males are 15-30 cm in length, and adult females are 20-35 cm in length. Adult females lay about 200,000 eggs per day, making diagnosis by stool examination easy. Adult worms can live in the small intestine for 6 months or longer. After molting in the soil, passed eggs become infective in 3 weeks if circumstances are ideal. Once ingested, infective eggs hatch, releasing small larvae that promptly penetrate the intestinal wall. They ultimately are carried to the pulmonary bed where they are filtered out and penetrate the alveolar wall. After a few days, they migrate up the respiratory tree only to be swallowed into the intestinal tract. Here they mature, copulate, and begin the cycle anew. Adult worms may migrate, causing mechanical symptoms. Freshly passed eggs are not yet infective. From egg ingestion to new egg passage takes approximately 2 months.

Frequency:

- **In the US:** Occurrence is uncommon. Approximately 4 million people in the United States are infected, mostly in the rural southeast.

- **Internationally:** In developing countries, more than 1 in 4 people are infected (eg, Southeast Asia [73% infected], Africa [12%], Central/South America [8%]).

Mortality/Morbidity: Infection with *A lumbricoides* is very rarely fatal, but death may occur because of mechanical
intestinal obstruction. A case of relapsing pneumothorax resulting from inflammation due to migrating *A lumbricoides* larvae has been described in a child. Worm passage (from above or below) may cause significant consternation in patients and/or parents.

**Race:** No racial predilection is known; however, a genetic predisposition has been described in a study of families in Nepal.

**Sex:** Males are more likely to be infected because boys, it is believed, eat more dirt than girls do.

**Age:** Children, because of their habits (eg, directly or indirectly consuming soil), are more commonly and more heavily infected than adults.

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**History:** Most patients are asymptomatic. To become infected, a patient needs to consume soil contaminated 2-3 weeks before with infected feces. Infected patients are not directly contagious. Symptoms can be broken down into 2 categories: early (larval migration) and late (mechanical effects).

- **Early (4-16 d after egg ingestion)** - Symptoms of the tissue-migratory phase include the following:
  - Fever
  - Cough
  - Wheezing

- **Late (6-8 wk after ingestion)** - GI symptoms resulting from mechanical irritation include the following:
  - Vague abdominal complaints (ie, cramping, nausea, vomiting)
  - Small bowel obstruction (mostly in children)
  - Pancreatitis (secondary to worm migration)
  - Cholecystitis (secondary to worm migration)
  - Appendicitis (less common, secondary to worm migration)

**Physical:**
- Passage of adult worm from mouth or anus
- Wheezing (early infection)
- Mild abdominal tenderness (established infection)

**Causes:** Ascariasis is caused by direct or indirect consumption of soil that has been contaminated by infected feces. To cause infection in humans, the feces must have been infected at least 2-3 weeks prior to ingestion; only after that interval do the eggs become infective (ie, embryonated).

**Differentials**

- Anaphylaxis
- Appendicitis, Acute
- Asthma
- [Bowel Obstruction, Large]
- [Bowel Obstruction, Small]
- Cholangitis
- Cholecystitis and Biliary Colic
- Cholelithiasis
- Hookworm
- Pancreatitis
- Pneumothorax, Iatrogenic, Spontaneous and Pneumomediastinum
- Strongyloides Stercoralis

**Other Problems to be Considered:**

- Tropical pulmonary eosinophilia

**Lab Studies:**

- Early infection (larval migration)
  - CBC - Eosinophilia
- Sputum smear - Larvae
- Stool examination normal

- Established infection (adult/GI phase)
  - Stool for ova and parasites
  - Characteristic eggs are seen easily on stool examination. (Each female produces 200,000 eggs per day. No stool concentration technique is necessary.)

**Imaging Studies:**

- Early infection (larval migration) - Patchy infiltrate may be seen on chest radiograph.
- Established infection (adult/GI phase) - Adult *A. lumbricoides* may be seen on abdominal radiograph (best if contrast given).

**Emergency Department Care:**

- Early infection (larval migration)
  - Symptomatic treatment with inhaled beta-agonists
  - Steroids may worsen symptoms. (This has been reported for strongyloidiasis.)
  - Unclear if antihelminthic therapy effective against larvae

- Established infection (adult/GI phase)
  - Effective antihelminthic therapy is available (see Medications section).
  - Mechanical obstruction is usually amenable to medical therapy, but refractory cases may require surgical intervention. Medical treatment may include the use of the older drug piperazine citrate. Piperazine paralyzes the worm and may be more effective in clearing the obstruction than the usual first-line agent, mebendazole.

**Consultations:** Surgical and infectious disease consultation for ascariasis with secondary pancreatitis, cholecystitis, and/or appendicitis.
The list of drugs used to treat parasitic infections is large and varied. The treatment and disposition of parasites are based on the disease entity.

Drug Category: Anthelmintics -- Parasite biochemical pathways are sufficiently different from the human host to allow selective interference by chemotherapeutic agents in relatively small doses.

<table>
<thead>
<tr>
<th>Drug Name</th>
<th>Mebendazole (Vermox) -- Causes worm death by selectively and irreversibly blocking uptake of glucose and other nutrients in susceptible adult intestine where helminths dwell.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Dose</td>
<td>100 mg PO bid on 3 consecutive d Administer second course if patient not cured within 3-4 wk</td>
</tr>
<tr>
<td>Pediatric Dose</td>
<td>&lt;2 years: Not established &gt;2 years: Administer as in adults</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Documented hypersensitivity</td>
</tr>
<tr>
<td>Interactions</td>
<td>Carbamazepine and phenytoin may decrease effects; cimetidine may increase levels</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>C - Safety for use during pregnancy has not been established.</td>
</tr>
<tr>
<td>Precautions</td>
<td>Adjust dose in hepatic impairment</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Drug Name</th>
<th>Albendazole (Albenza) -- Decreases ATP production in worm, causing energy depletion, immobilization, and finally death. To avoid inflammatory response in CNS, patient must also be started on anticonvulsants and high-dose glucocorticoids.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Dose</td>
<td>400 mg/d PO single dose; repeat in 3 wk if patient not cured</td>
</tr>
<tr>
<td>Pediatric Dose</td>
<td>&lt;2 years: 200 mg/d PO single dose; repeat in 3 wk if infestation persists &gt;2 years: Administer as in adults</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Documented hypersensitivity</td>
</tr>
<tr>
<td>Interactions</td>
<td>Coadministration with carbamazepine may decrease efficacy; dexamethasone, cimetidine, and praziquantel may increase toxicity</td>
</tr>
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<td>C - Safety for use during pregnancy has not been established.</td>
</tr>
</tbody>
</table>
### Precautions

Discontinue use if LFTs increase significantly (resume when levels decrease to pretest values).

### Drug Name

Piperazine citrate -- Recommended for GI or biliary obstruction secondary to ascariasis. Causes flaccid paralysis of the helminth by blocking response of worm muscle to acetylcholine.

### Adult Dose

3.5 g PO qd for 2 consecutive d

### Pediatric Dose

75 mg/kg PO qd for 2 consecutive d; not to exceed 3.5 g/dose

### Contraindications

Documented hypersensitivity

### Interactions

Coadministration with chlorpromazine may increase toxicity

### Pregnancy

C - Safety for use during pregnancy has not been established.

### Precautions

Most commonly reported reactions include GI and CNS effects; discontinue therapy if effects become significant; prolonged, repeated, or excessive therapy should be avoided due to potential neurotoxicity

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### Further Inpatient Care:

- Inpatient care warranted for patients with complications due to worm migration.

### Further Outpatient Care:

- Primary care follow-up suggested to confirm cure.

### Deterrence/Prevention:

- Household contacts are not at risk because of worm life cycle requirements and presumed safe food and water supply in the home.
- Recommend good personal hygiene.
- Contacts may be screened for asymptomatic carrier state.

### Complications:

- Complications are principally due to worm migration.

### Prognosis:
• Excellent

Patient Education:

• Recommend good personal hygiene and food handling techniques.

BIBLIOGRAPHY


NOTE:

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