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### CASE 1

A 77-year-old female with an underlying of pseudogout complained with dyspnea for 3 months. Her CBC was shown a hematocrit of 23%. The iron study confirmed a diagnosis of iron deficiency anemia. An EGD was done as shown.

#### Endoscopic findings:

Multiple clean base duodenal ulcers (size 0.5 cm.). Two living parasites with red color were found. They adhered to the anterior wall of duodenal bulb, and later parasites were removed.

#### Diagnosis:

Hookworms Infestation.

#### Discussion:

Hookworms are found worldwide in the tropics and subtropics including South Eastern US. They are two species, *N. americanus* (new world hookworm) and *A. duodenale* (old world hookworm). Clinical manifestations are varies; many cases are asymptomatic. Symptoms include; ground itch at the site of larval penetration, pneumonitis, intestinal malabsorption, and iron deficiency anemia. Laboratory usually demonstrates anemia, eosinophilia. Stool samples typically show the characteristic “thin-shelled” eggs. The



Figure 1.

treatment is one time oral albendazole 400 mg or mebendazole 500 mg<sup>(1)</sup>.

#### REFERENCE

1. Keiser J, Utzinger J. Efficacy of current drugs against soil-transmitted helminth infections: systematic review and meta-analysis. *JAMA* 2008;3;299:1937-48.

## CASE 2

A 51-year-old female underwent colonoscopy for a colorectal cancer screening. She also complained of vague abdominal pain for a month. Colonoscopy showed a linear white movable parasite in the terminal ileum (Figure 1 and 2). She was treated with praziquantel 600 mg single dose, then she passed a tapeworm (95 cm-in-length) (Figure 3). After an ink injection for identification, the diagnosis was confirmed as *Taenia saginata* infestation (Figure 4).

### Diagnosis:

*Taenia saginata* infestation.

### Discussion:

Ingestion of imperfectly or raw cooked beef may result to *T. saginata* infestation. In the host's stomach, proteolytic enzymes digest the capsule of cysticerci and later a scolex attaches to the tapeworm with an average size of 2-5 meter and its size may be up to 6-8 meter in length<sup>(1)</sup>. The adult worm may contain more

than hundreds to thousands of proglottids. *Taenia* species bud of distal segments from the rest of the body that are passed through the feces<sup>1</sup>. Most patients carrying an adult *T. saginata* tapeworm are asymptomatic. Rarely, non-specific symptoms, such as abdominal discomfort, epigastric pain, nausea, vomiting, diarrhea, weight loss, and perianal symptoms associated with the discharge of proglottids, can be observed<sup>(2)</sup>. The treatment of human intestinal Taeniasis (*T. saginata* and *T. solium*) is usually effective (85-98%) with anthelmintics such as praziquantel (5 mg/kg, single oral dose) or niclosamide (2 g, single oral dose)<sup>(3)</sup>.

### REFERENCES

1. Ito A, Nakao M, Wandra T. Human Taeniasis and cysticercosis in Asia. *Lancet* 2003;362:1918-20.
2. Craig P, Ito A. Intestinal cestodes. *Curr Opin Infect Dis* 2007;20:524-32.
3. Howell J, Brown G. Education and imaging. *Gastrointestinal: beef tapeworm (Taenia saginata)*. *J Gastroenterol Hepatol* 2008;23:1769.

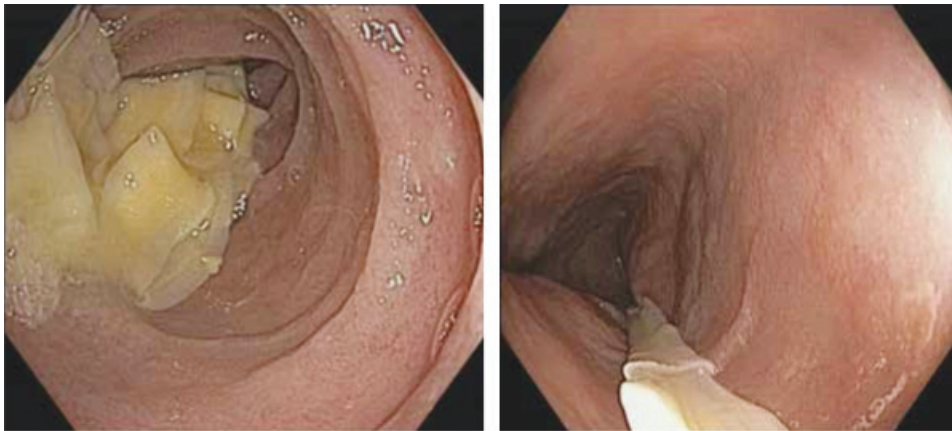


Figure 1 and 2. *Taenia saginata* in the terminal ileum

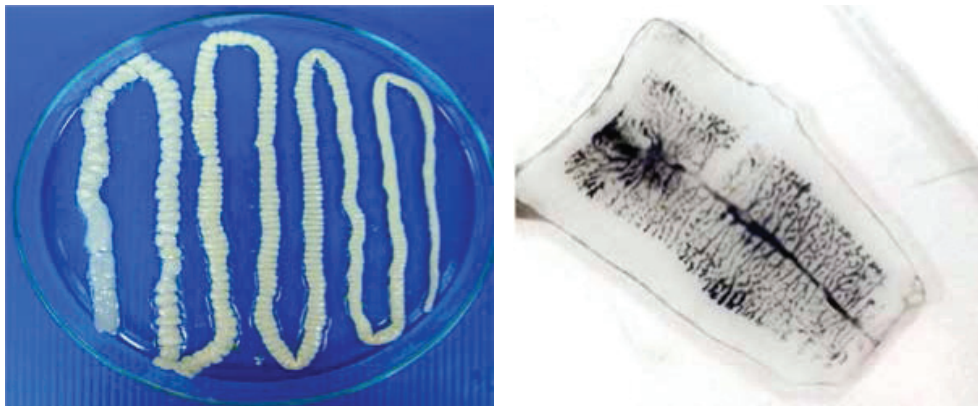


Figure 3 and 4. *Taenia saginata* and a proglottis of *Taenia saginata* after an ink injection.

### CASE 3

A 44-year-old man presented with chronic diarrhea and abdominal pain. Stool examination and stool culture were unremarkable. Colonoscopy was performed. A giant long roundworm was detected at the ascending colon (Figures 1 and 2). The diagnosis was *Ascaris lumbricoides* infestation. His clinical symptoms improved after a single dose of albendazole.

#### Diagnosis:

*Ascaris lumbricoides* infestation.

#### Discussion:

*Ascaris* infection in human occurs after accidentally after an ingestion of contaminated food with the parasite's eggs. The eggs become larvae that penetrate

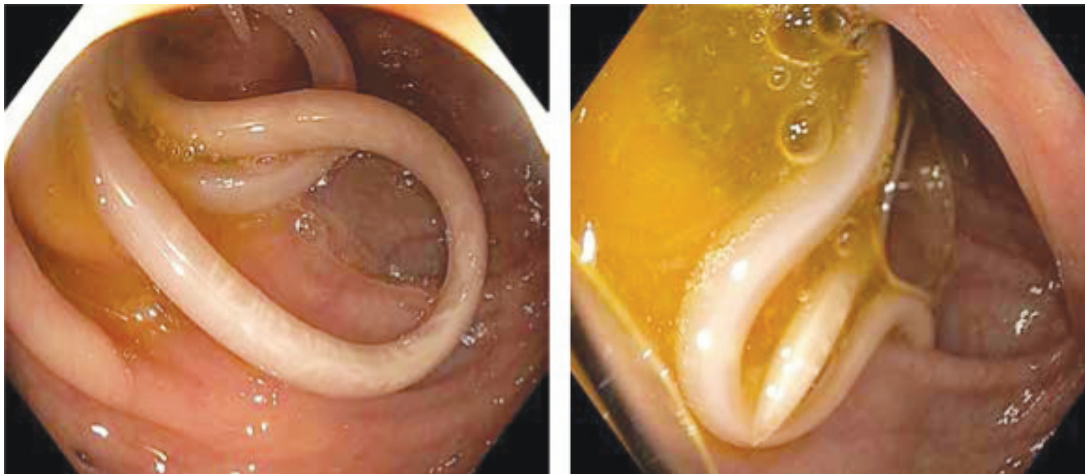


Figure 1 and 2 A giant long roundworm was detected at the ascending colon.

the duodenal wall and enter blood circulation to heart and lungs<sup>(1)</sup>. The larvae pass from the respiratory system and return to the small intestine after swallowing<sup>(1)</sup>. Male and female adult worms size are 15-25 cm and 20-35 cm respectively. Symptoms of adult worm infestation or chronic ascariasis are abdominal pain, distension, nausea, and diarrhea. Entangled adult worms have also been reported as leading to mechanical intestinal obstruction in 0.005-2 per 1,000 infestations per year<sup>(2)</sup>. Treatments of choice are a single-dose oral mebendazole (500 mg) or albendazole (400 mg),

with response rates in 88-95% of patients<sup>(3)</sup>. Colonoscopy and EGD may be useful in removing the obstructive masses formed by the worms<sup>(3)</sup>.

#### REFERENCES

1. Dold C, Holland CV. *Ascaris* and ascariasis. *Microbes Infect* 2011;13:632-7.
2. Crompton DW. *Ascaris* and ascariasis. *Adv Parasitol* 2001; 48:285-375.
3. Keiser J, Utzinger J. Efficacy of current drugs against soil-transmitted helminth infections: systematic review and meta-analysis. *JAMA* 2008;299:1937-48.

## CASE 4

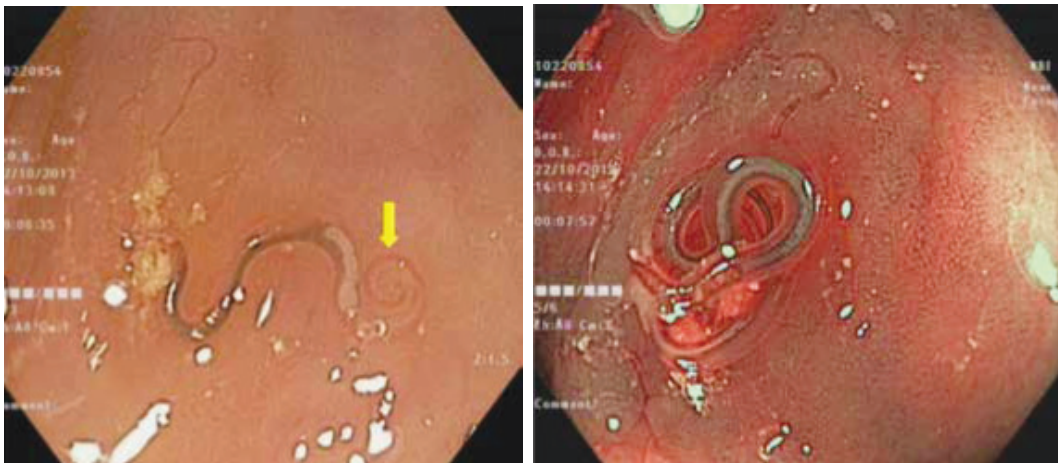
A healthy 56-year-old male underwent a screening colonoscopy. A colonoscopy revealed a small slender shape white parasite attached to the descending colon. Its head was embedded in the colonic wall and the tail was coiled liked a whip with wider handles. Under NBI exam, human blood in its body cavity was demonstrated (Figures 1 and 2). The surrounding mucosa was normal. The parasite was removed by a forceps (Figure 3). A microscopic examination demonstrated *Trichuris trichiura*. The patient was treated with an oral albendazole.

### Diagnosis:

*Trichuris trichiura* infestation.

### Discussion:

*Trichuris trichiura* or whipworm is known as a soil-transmitted helminth. *T. trichiura* lives in the large intestine and the eggs are passed in the feces of infected person. This infestation is caused by an ingestion of parasite's eggs<sup>(1)</sup>. The adult worm is 3-4 cm in length and has a thin tapered anterior region. The adult worm invades mucosa and produces localized mild inflammation<sup>(1)</sup>. Most people with light infestation usually have no symptoms. Only patients with heavy infestation develop nausea, vomiting, abdominal pain, watery or mucus bloody diarrhea. The treatment is either oral mebendazole or oral albendazole<sup>(2)</sup>.



**Figures 1 and 2.** A movable small whitish worm with coiled tail (arrow) embedded in the descending colon. Under NBI exam, the internal blood was clearly detected.



**Figure 3.** The parasite was removed by a biopsy forcep.

### REFERENCES

1. Ok KS, Kim YS, Song JH, *et al.* *Trichuris trichiura* infection diagnosed by colonoscopy: case reports and review of literature. *The Korean Journal Parasitology* 2009; 47:275-80.
2. Keiser J, Utzinger J. Efficacy of current drugs against soil-transmitted helminth infections: systematic review and meta-analysis. *JAMA : the journal of the American Medical Association* 2008;299:1937-48.