

Endoscopic Diagnosis of Hookworm Disease of the Duodenum: A Case Report

**Keng-Liang Wu, Seng-Kee Chuah, Chia-Chang Hsu, King-Wah Chiu,
Yi-Chun Chiu, and Chi-Sin Changchien**

*Division of Gastroenterology, Department of Internal Medicine,
Chang Gung Memorial Hospital, Kaohsiung Medical Center, Kaohsiung, Taiwan*

Abstract

Hookworm is one of the most common parasites in the world and usually high suspected from eosinophilia on blood examination or diagnosed from characteristic egg shape appearance on microscopic examination of faeces. A 78-year-old man complained of epigastric pain and intermittent black stool passage for 4 months. Laboratory data showed iron-deficiency anemia with microcytic hypochromic erythrocytes. Stool routine examination showed positive occult blood but there was no parasitic egg detected microscopically. Under the impression of peptic ulcer disease with chronic blood loss, upper endoscopy was performed. Many worms were found in the second portion of the duodenum incidentally by endoscopy. *Necator americanus* was diagnosed and eradicated successfully by mebendazole. It is always crucial to observe the distal duodenum carefully in upper endoscopy although parasite infestation is not suspected clinically, especially when a normal study for esophagus, stomach, and duodenal bulb. (*J Intern Med* 2002;13:27-30)

Key Words : Hookworm, *Necator americanus*, Iron-deficiency anemia, Endoscopy.

Introduction

Hookworm is one of the most common parasites in the world and usually diagnosed from characteristic clinical findings such as eosinophilia on blood examination and egg with specific shape appearance on stool microscopic examination. There are some reports of hookworm diagnosis by means of routine upper endoscopy before 1970 in Taiwan. But due to improving sanitation, hygiene and chemotherapy have made hookworm infestation a rarity in Taiwan after 1970. Liu et al. ever reported three patients with hookworm infestation in the duodenum visualized by endoscopy in Taiwan from 1983 to 1993. Here, we report an unusual case in which endoscopy distinctly demonstrated the hookworm penetrating the duodenal mucosa and in which the responsible species were diagnosed from samples retrieved by endoscopic biopsy forceps. *Necator americanus* was diagnosed and eradicated successfully by mebendazole.

Case Report

A 78-year-old man complained of epigastric pain, dizziness and intermittent black color stool passage for 4 months. He was referred to our hospital due to severe anemia. Physical examination was unremarkable except for extreme pallor. Laboratory data showed iron-deficiency anemia with microcytic hypochromic erythrocytes (erythrocyte: $236 \times 10^6/\mu\text{l}$, hemoglobin: 3.7 g/dL, hematocrit: 15.8%, mean corpuscular volume: 66.9%) and decreased serum iron. There was no eosinophilia (4%, normal <5%). Stool routine examination showed positive occult blood but there was no parasitic egg detected microscopically. Under the impression of peptic ulcer disease with chronic blood loss, upper endoscopy was performed. There was no particular finding in esophagus, stomach and duodenal bulb, but some live worms measuring 4-6 mm in length were found in the second portion of the duodenum incidentally. On closer observation, we observed them attaching or penetrating the duodenal mucosa and moving actively (Fig. 1). They were removed by using the biopsy forceps (Fig. 2) and these worms were identified as adult hookworms of *Necator americanus* species by recognizing a pair of ventral cutting plates (Fig. 3). This patient was treated with oral mebendazole (100mg twice a day for three days). Stool routine examination 1 week later still showed no sign of hookworm eggs. Endoscopic examination 2 weeks later was also unremarkable. The patient received oral iron supplement for iron-deficiency anemia and hematocrit improved from 15.8% to 32.4% within a month. The patient remained asymptomatic till now.

Discussion

Hookworm is one of the most common parasites in the world, about 1.3 billion of people are infected globally². It is also a common cause of occult gastrointestinal bleeding and anemia especially in the tropical countries³. There are two human-specific hookworms, namely *Ancylostoma duodenale* and *Necator americanus*, distinguished from each other by the morphological differences of their mouth capsules, bursae, and spicules. Usually, the diagnosis is made by the characteristic clinical findings such as eosinophilia and egg shape appearance on fecal examination^{4,5}. However, misdiagnosis is due to the absence of eggs of the parasites in stools or eosinophilia. Upper endoscopy is a very important tool for diagnosis of gastrointestinal problems, and there are some reports of hookworm diagnosis by means of routine upper endoscopy^{6,7,8,9}. If present, these parasites usually live in the upper part of the small intestine but relatively few in the duodenum^{7,8}. Sharma et al. reported five patients with negative upper gastrointestinal endoscopy finding have helminth infestation by using enteroscopy¹⁰.

Gastrointestinal blood loss associated with hookworm infestation is always occult but massive bleeding is uncommon^{9,11}. Each worm sucks between 0.1 and 0.4ml of blood/day. It can be responsible for a daily blood loss up to 250ml/day in heavy infection. The severity of blood loss in hookworm disease depends on the acuteness and magnitude of infestation. Acute heavy infection is usually presented as bloody or tarry stools, whereas chronic infestation is usually associated with occult bleeding only. After 1970, this is a rare report in which endoscopy distinctly demonstrated the hookworm penetrating the duodenal mucosa and in which the responsible species was diagnosed from samples retrieved by endoscopic biopsy forceps^{8,9}.

When a round worm is found in the duodenum during upper gastrointestinal endoscopy, differential diagnosis is important to determine the diagnosis for the appropriate treatment. This can be achieved according to the morphology of the worms under microscopy and the location where they are infected. The common intestinal worms include *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis*, *Strongyloides stercoralis*, *Capillaria philippinensis*, and *Anisakis*.

Ascaris is a large roundworm (15-40cm in length) and inhabits the small intestine. Whipworm is 30-50mm in length and inhabits the large intestine (especially around cecum). Pinworm (-10mm in length) also inhabits the same areas as the whipworm. Therefore, both parasites are very rarely observed during upper gastrointestinal endoscopy. *Strongyloides stercoralis* inhabits the mucosa of duodenum or upper jejunum and is pretty small (2-3 mm in length) and relatively rare. The rest of the parasites, including hookworm, usually reside in the upper portion of small intestine; it is hard to distinguish them only by endoscopy.

Improved sanitation, hygiene and chemotherapy have made hookworm infestation a rarity in developed countries, but it is still endemic. Although it is less common than other diseases such as neoplasm and ulcer, parasite infection should always be considered as a differential diagnosis in patients with iron-deficiency anemia and unexplained gastrointestinal blood loss, especially in poor sanitary areas. It is also crucial to observe the distal duodenum carefully in upper endoscopy although parasite infestation is not suspected clinically.

Acknowledgement

The author thanks Department of Parasitology, Kaohsiung Medical University for discussing.

References

- 1.Liu JD, Cheng NY, Chu SY, et al. Parasitic disease in the gastroenterological field. [Japanese] *Endoscopia Digestiva* 1993; 5: 1553-9.
- 2.Warren KS, Bundy DAP, Anderson RM, et al. Helminth infection. In: Jamison DT, Mosley WH, Measham AR, Bobadilla JL (eds). *Disease Control Priorities in Developing Countries*. 1 st ed. New York: Oxford University Press, 1993: 131-60.
- 3.Grosby WH. The deadly hookworm. Why did the Puerto Ricans die? *Arch Intern Med* 1987; 147: 577-9.
- 4.Prociv P, Luke RA. The changing epidemiology of human hookworm infection in Australia. *Med J Aust* 1995; 162: 150-4.
- 5.Yu SH, Jiang ZX, Xu LQ. Infantile hookworm disease in China. A review. *Acta Tropica* 1995; 59: 265-70.
- 6.Dumont A, Seferian V, Barbier P. Endoscopic discovery and capture of *Necator americanus* in the stomach. *Endoscopy* 1983; 15: 65-6.
- 7.Genta RM, Woods KL. Endoscopic diagnosis of hookworm infection. *Gastrointest Endosc* 1991; 37: 476-8.
- 8.Kato T, Kamoi R, Lida M, Kihara T. Endoscopic diagnosis of hookworm disease of the duodenum. *J Clin Gastroenterol* 1997; 24(2): 100-2.

9. Bhargava DK, Dasarathy S, Chowdhry GC, Anand AC, Saraswat V. Upper gastrointestinal bleeding due to hookworm (*Ancylostoma duodenale*)-a case report. *Endoscopy* 1993; 25: 548-9.
10. Sharma BC, Bhasin DK, Bhatti HS, Das G, Singh K. Gastrointestinal bleeding due to worm infestation, with negative upper gastrointestinal endoscopy finding: impact of enteroscopy. *Endoscopy* 2000; 32: 314-6.
11. Kuo YC, Chen PC, Wu CS. Massive intestinal bleeding in an adult with hookworm infection. *J Clin Gastroenterol* 1995; 20: 348-50.

Fig.1. A live worm (arrow) measuring 6 mm in length attaching on the mucosa in the second portion of the duodenum and moving actively.

Fig.2. A hookworm was removed by using the biopsy forceps (arrow).

Fig.3. Adult hookworm of *Necator americanus* species due to a pair of ventral cutting plates (arrow) (original magnification x 100).

胃鏡診斷十二指腸鉤蟲病：一病例報告

吳耿良 蔡成枝 許家彰 趙景華 邱逸群 張簡吉幸

高雄長庚醫院 內科部胃腸肝膽科

摘 要

鉤蟲病是一種世界上最常見的寄生蟲疾病之一，通常是經由週邊血液有嗜伊紅性血球升高而高度懷疑，或經由病人糞便有特殊形狀的蟲卵而診斷出。一個七十八歲的男性病人主訴上腹痛和間接性的黑便已四個月了，血液檢查有缺鐵性貧血現象且糞便有潛血的反應，然而糞便中並沒有看見寄生蟲蟲卵。在高度懷疑消化性潰瘍合併慢性出血下，經由胃鏡意外的發現有許多活動性的蠕蟲在十二指腸的第二部份。在顯微鏡下檢視蟲體，美洲鉤蟲 (*Necator americanus*) 被診斷出並成功的經由口服 *mebendazole* 來根治。對於一個貧血的病人，雖然臨床上寄生蟲感染並沒有被懷疑，然而在上消化道胃鏡的檢查中仔細觀察十二指腸的遠端是非常重要的，特別在食道、胃、十二指腸球部都是正常的情況下。