

A Case of Tapeworm Detected by a Fecal Occult Blood Test During Health Screening

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Abstract

A 44-year-old woman had a positive fecal occult blood test during health screening. A meta-meric, threadlike cestode extending from the ileocecal valve to the ascending colon was detected via colonoscopy, leading to a diagnosis of tapeworm infestation. Capsule endoscopy (CE) confirmed a cestode extending from the ileum to the ileocecal region. A single dose of praziquantel (120 mg) was administered. Follow-up CE and stool testing for parasitic ova confirmed no recurrence. This case is valuable because part of the cestode could be observed in the small bowel after a positive fecal occult blood test and during colonoscopy.

Keywords tapeworm, fecal occult blood test, health screening, capsule endoscopy (CE)

Reports of tapeworms identified using capsule endoscopy (CE) have increased in recent years. Most cases are detected as a result of detailed investigation of feces for nematodes and cestodes excreted. This report documents a case of a tapeworm detected by a fecal occult blood test conducted during health screening in which CE was useful for determining the therapeutic approach.

Case Report

A 44-year-old woman had a positive fecal occult blood test during health screening. Her general practitioner performed a colonoscopy (CS) in June 2018. Findings revealed a solitary, metameric, white, threadlike cestode extending from the ileocecal valve to the ascending colon (**Fig. 1**). No other abnormalities were detected in the colon or anal canal. She was diagnosed with tapeworm infestation based on endoscopy findings and was referred to our hospital for detailed investigation and treatment in July of the same year. Medical, family, and lifestyle histories were all unremarkable. There was also no history of domestic or international travel.

Physical examination results were unremarkable and blood test findings showed no evidence of anemia or malnutrition. Eosinophil counts and immunoglobulin E levels were not elevated, and the levels of inflammatory response markers were in the normal range. Fecal tests were positive for cestode ova (**Table 1**).

CE was then performed for further investigation.

The results showed a 10-cm-long, intact threadlike cestode from the deeper layers of the ileum. The cestode was observed from 02:13:46 to 02:32:35 (**Fig. 2, 3**). This was consistent with the CS findings observed by the previous doctor, in which the cestode was seen extending into the ascending colon; therefore, the patient was diagnosed with taeniasis. CE was used to perform examination up to the transverse colon, after which the examination was concluded. No notable findings were observed other than the small intestinal cestode.

The patient was administered a single dose of praziquantel 120 mg (25 mg/kg/dose) as an anthelmintic treatment. This was chosen based on the fact that the detected cestode was relatively short, extended from the deeper layers of the ileum to the ascending colon, and because the patient requested noninvasive treatment. CE performed after anthelmintic treatment and at 3 and 6 months later confirmed successful eradication of the tapeworm and its ova.

Discussion

Cestodes are intestinal parasitic worms that infest the human upper small bowel through intermediate hosts, such as salmon and trout. They are known to grow to lengths of up to 10 m in the human small bowel. Infection occurs as a result of ingestion of the parasite's eggs by eating sashimi made from improperly frozen fish¹. While we could obtain an accurate medical history from the patient, we were unable to identify the route or time of infection.

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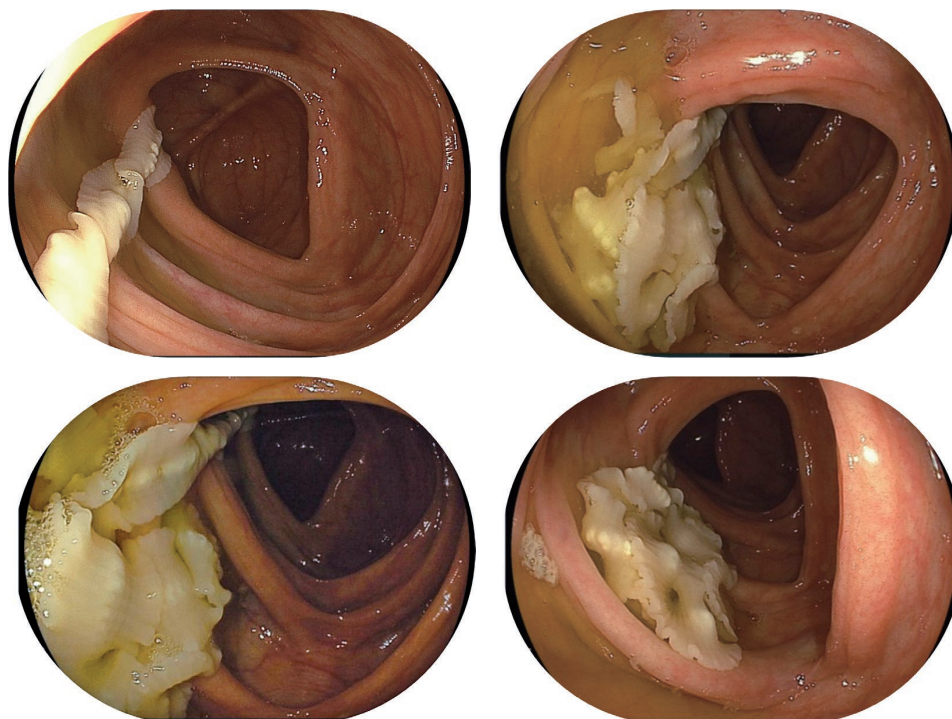


Fig. 1. Findings during Colonoscopy Performed by the Patient's General Practitioner

A solitary, metameric, white, threadlike cestode is seen extending from the ileocecal valve to the ascending colon.

Table 1. Blood Test and Fecal Test Findings on Arrival at the Hospital

Peripheral blood tests	
WBC	6100/ μ L
Neutrophils	1%
Eosinophils	3%
Monocytes	4%
Segmented leucocytes	63%
Lymphocytes	29%
RBC	420×10^4 / μ L
Hb	12.4 g/dL
Ht	35.6%
Plt	10.0×10^4 / μ L
Blood biochemistry	
T-Bil	0.5 mg/dL
Alb	4.4 g/dL
AST	17 IU/L
ALT	12 IU/L
LDH	157 IU/L
ALP	214 IU/L
γ -GTP	13 IU/L
AMY	56 IU/L
T-Chol	204 mg/dL
TG	62 mg/dL
BUN	11 mg/dL
Cre	0.6 mg/dL
CRP	0.04 mg/dL
IgE	56.0 IU/L
Stool tests	
Cestode ova	Positive
Direct cestode observation	Positive

WBC, white blood cell count; RBC, red blood cells; Hb, hemoglobin; Ht, hematocrit; Plt, platelets; T-Bil, total bilirubin; Alb, albumin; AST, aspartate aminotransferase; ALT, alanine aminotransferase; LDH, lactate dehydrogenase; ALP, alkaline phosphatase; γ -GTP, γ -glutamyl transpeptidase; AMY, amylase; T-Chol, total cholesterol; TG, triglyceride; BUN, blood urea nitrogen; Cre, creatinine; CRP, C-reactive protein; IgE, immunoglobulin E

The use of CE has increased in recent years, and we have begun to see reports of taeniasis from Japan and overseas due to infestation of the small bowel. There have been scattered reports from Japan that have classified the infecting cestodes into species such as *Diphyllobothrium latum*, *D. nihonkaiense*, and *Taenia asiatica*, based on DNA sequence analysis²⁻⁸. The diagnosis cannot be made macroscopically, so it is made based on polymerase chain reaction (PCR) test results.

The cestode was not excreted before or after treatment in the present case, so it was not possible to identify the species. A single dose of oral praziquantel was administered as treatment, which we suspected destroyed the cestode and explained why it was not excreted. Most cases of tapeworm infestation are diagnosed when the cestode is excreted, and when this occurs, PCR test should be proactively performed to identify the species.

CE allows observation of cestodes that have infested the small bowel in its live form. They are white and threadlike in appearance with microscopic segmentation and may also be observed floating freely in the small bowel⁹⁻¹². CE also facilitates identification of the site of parasitic infestation. In this case, the findings showed that the cestode extended from the terminal ileum to the ascending colon.

Our search of the Japanese medical abstracts database *Igaku Chuo Zasshi* using the keywords "capsule endoscopy" and "cestode" for publications between 2009 and

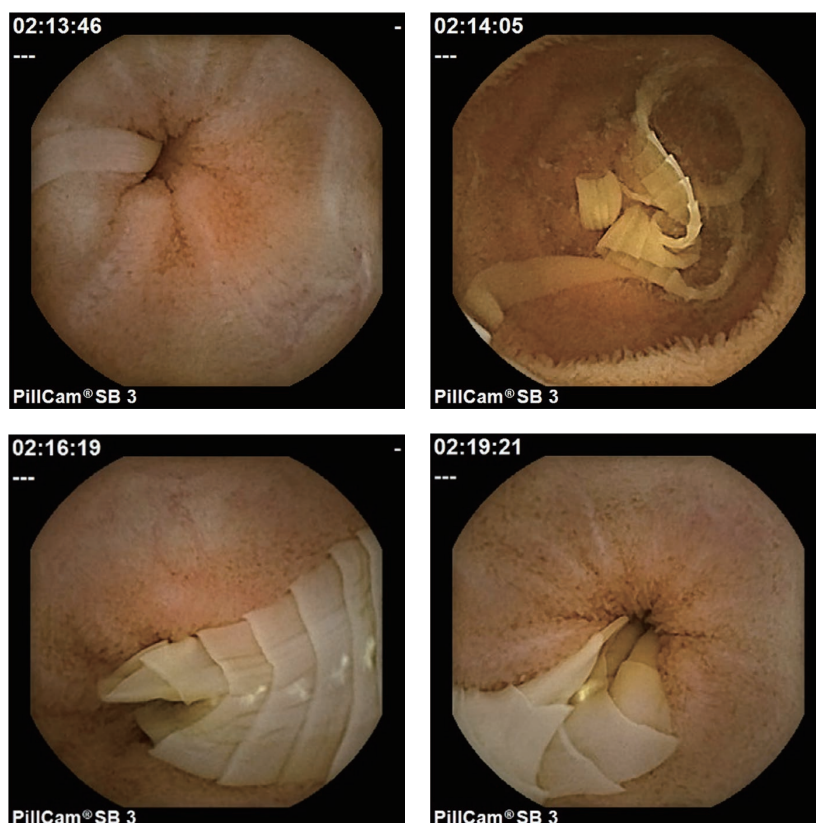


Fig. 2. Capsule Endoscopy Findings (1)

A 10-cm long, threadlike cestode continuous to exist in the ileum.

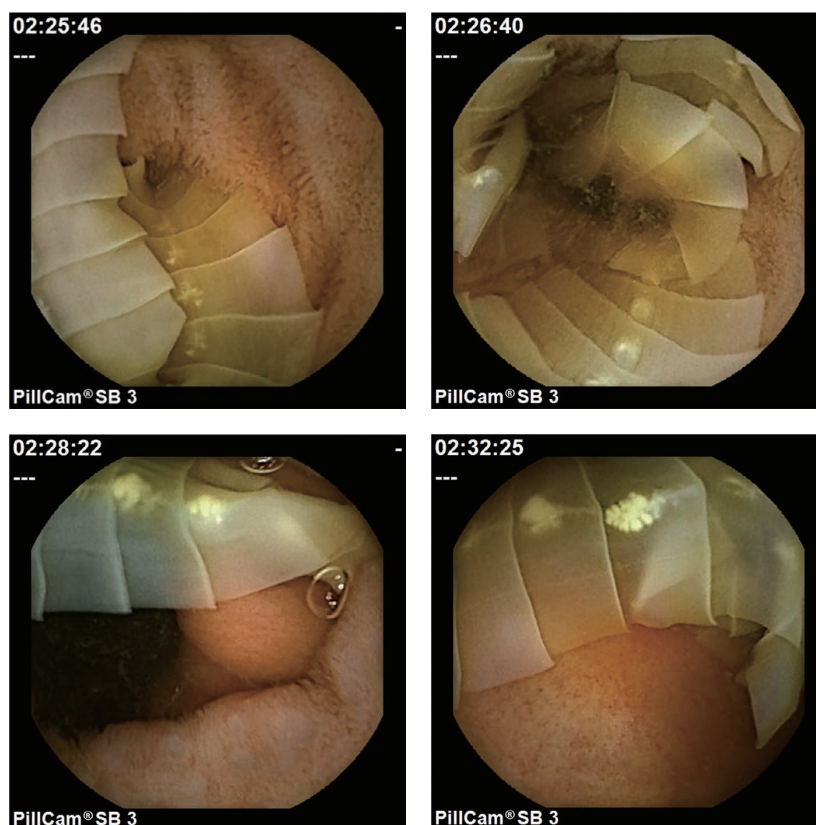


Fig. 3. Capsule Endoscopy Findings (2)

A solitary cestode seen extending up to the ascending colon.

2019 revealed 23 cases in which cestodes in the small bowel were observed during CE. Among these cases, the indication for CE was excretion of worms in feces in 22 cases⁴.

Our patient was diagnosed as a result of a fecal occult blood test during health screening. To our knowledge, there have been no cases of diagnosis based on this test result in Japan, and we found only one such report overseas¹³. The fecal occult blood test performed in our patient was a colorectal cancer screening test, which is used worldwide. CS is recommended when the test result is positive. According to reports, approximately 38,000 non-therapeutic, exploratory colonoscopies are performed annually in Japan¹⁴, although there are virtually no reports of incidental observation of tapeworm during testing. We examined the results of our literature search to determine whether tapeworms had been observed in the small bowel and found a total of 3 cases from Japan, including the present case. One case involved incidental observation of cestode infestation in the small bowel during CS performed as screening after colorectal cancer surgery, and the other involved observation of worms during CS performed for the investigation of diarrhea and abdominal pain¹⁵. Moreover, according to reports from both Japan and overseas^{16,17}, it is extremely rare for cestodes to be observed in their natural state during CS, as observed in our case. It is pertinent to always consider the possibility of encountering rare disorders during routine examinations in health check-ups and endoscopic examinations because these also need to be treated.

Taeniasis is treated with oral praziquantel or diatrizoate meglumine and diatrizoate sodium solution (Gastrografin®). A probe is inserted into the duodenum transnasally and secured in place after crossing the ligament of Treitz. Irrigation is then performed using Gastrografin® to eject the cestodes from the small bowel into the anus, from where the cestode can be excreted in feces. Examination under fluoroscopic guidance may also indirectly reveal the entire cestode. It is also possible to administer anthelmintic treatment if the scolex is observed when the cestode is excreted in feces. Historically, this was the first-line anthelmintic treatment for taeniasis in Japan for many years. However, using Gastrografin® in this manner involves high levels of X-ray exposure and is invasive; moreover, it can be difficult to detect small cestodes¹⁸. On the other hand, oral administration of praziquantel is easy, but the cestodes are destroyed by pharmacological effects. Thus, a disadvantage of this treatment is the inability to confirm the presence of the scolex after excretion¹⁹. Among the cases of cestodes observed during CE in Japan, approximately half of the patients received anthelmintic Gastrografin® treatment⁴. The primary mode of anthel-

mintic treatment overseas is praziquantel²⁰.

In Japan, neither of the aforementioned treatment methods are covered by national health insurance. In our case, the cestode observed during CE was relatively small and the patient requested noninvasive treatment; therefore, we initially attempted treatment with a single dose of praziquantel. Performing CE in advance aided in deciding the treatment plan. CE is also useful for follow-up observation after anthelmintic treatment.

A major complication of CE is retention of the capsule within the body for a period of 2 weeks or longer. A previous study found that retention occurred in 1.5% of cases of gastrointestinal hemorrhage of unknown origin²¹. However, in Japan and overseas, there have been no reports of capsule retention in cases where CE was used to examine patients with intestinal parasites, including tapeworms. Capsule retention is extremely rare in patients with no history of intestinal obstruction or abdominal surgery and in those who are not taking nonsteroidal anti-inflammatory drugs or low-dose aspirin. We believe that CE should be proactively performed when parasitic infestation is suspected. If there is a prior suspicion of gastrointestinal stenosis, then a patency capsule should be used to evaluate the patency of the gastrointestinal tract.

CE is useful for diagnosing tapeworm infestation and determining a treatment plan. This report documents the first case of tapeworm infestation diagnosed based on a positive fecal occult blood test conducted during health screening in Japan.

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Conflicts of Interest

All authors declare that they have no conflicts of interest.

Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Informed Consent

Informed consent was obtained from the patient, and there will be no issue with the publication of this statement.

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