

## Case report

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# *Diphyllobothrium latum* infection in a child with recurrent abdominal pain

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*Diphyllobothrium latum* infection in humans is not common in Republic of Korea. We report a case of fish tapeworm infection in a 10-year-old boy after ingestion of raw perch about 8 months ago. The patient complained of recurrent abdominal pain and watery diarrhea. A tapeworm, 85 cm in length, without scolex and neck, was spontaneously discharged in the feces of the patient. The patient was treated with 15-mg/kg single dose praziquantel, and follow-up stool examination was negative after one month. There was no evidence of relapse during the next six months.

**Key words:** *Diphyllobothrium latum*, Abdominal pain, Diarrhea

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## Introduction

*Diphyllobothrium latum* is one of the longest intestinal tapeworms of mammals, such as humans, dogs, cats, foxes, and other wild canines<sup>1</sup>. The infection by *D. latum* is common in regions with cold water lakes, such as North America and Europe. In Asia, this infection has been reported in Republic of Korea, Japan, Siberia and Malaysia<sup>2</sup>. In Republic of Korea, the first case of *D. latum* infection was reported in Jinju by the recovery of eggs in the feces of 2 patients<sup>3</sup>. An adult tapeworm was reported for the first time in 1971<sup>4</sup>. A total of 48 cases have been diagnosed by the adult worm from 1971 to 2012<sup>5</sup>. We report here a case of a young child with *D. latum* infection in Republic of Korea.

## Case report

A 10-year-old boy visited our outpatient clinic with a segment of a tapeworm which was naturally discharged in his feces on the previous day. He was a healthy elementary school student in the city, without any recent history of travel to a foreign country. His family lives in urban area (Iksan city, Jeollabuk-do) but his parents reported frequent consumption of raw fish, and ingestion of raw perch about 8 months ago. He had suffered from recurrent lower abdominal pain and watery diarrhea for about 6 months. These episodes were characterized by vague abdominal pain that may be dull or crampy relatively. The abdominal pain frequently relieved with watery diarrhea but relapsed every 2–3 days. And three months ago, he detected several noodle-like whitish materials in his feces. But, he did not visit any medical institution at that time. On physical examination, no specific signs, such as pale conjunctiva and abdominal distention or tenderness were observed. Hematologic examination revealed eosinophilia without signs of anemia and his erythrocyte sedimentation rate was elevated (hemoglobin 13.2 g/dL, hematocrit 37.5%, eosinophil 710/ $\mu$ L, erythrocyte sedimentation rate 29 mm/hr). Blood chemistry and serology were within

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the normal range. The coprological study was positive for *D. latum* eggs. The worm was white, 85 cm long without scolex, and was identified as *D. latum*, based on the biological characters (Fig. 1). To determine the accompanying complications such as intestinal obstruction or cholangitis, we performed radiological examination. Abdominal ultrasonography showed mild intestinal wall swelling and normal hepatobiliary findings. On abdominal computed tomography, multiple mesenteric lymph nodes were enlarged, but no other complications were found (Fig. 2). He was treated with a single oral dose of praziquantel (15 mg/kg), and stool examination was negative one week later. His symptoms improved, and there was no evidence of relapse during the next 6 months.



**Fig. 1.** A complete strobila without scolex and neck of *Diphyllobothrium latum* parvum type recovered from the patient. Its whole length was only 85 cm.



**Fig. 2.** Abdominal computed tomography showed multiple reactive mesenteric lymph nodes (arrows).

## Discussion

Diphyllobothriasis, an infection by *Diphyllobothrium* species, is a zoonosis acquired by humans and other mammals, having a worldwide distribution<sup>1</sup>. Several species of *Diphyllobothrium* have been reported in humans. *D. latum*, *Diphyllobothrium pacificum*, and *Diphyllobothrium nihonkaiense* are the main pathogens of human Diphyllobothriasis. *D. pacificum* is common in South America and *D. nihonkaiense* is common in Japan. *D. latum* is almost worldwide in distribution, occurring in northern temperate and subtropical areas of the world<sup>6</sup>. Creamy white in color, *D. latum* is one of the longest tapeworms causing human Diphyllobothriasis, measuring 4 to 15 m in length and 10 to 20 mm in width, and may consist of 3,000 to 4,000 proglottids. The scolex is shaped like a spoon and has a pair of bothria, in its anterior portion that serve as an organ of attachment<sup>7,8</sup>. The eggs of *D. latum* hatch into coracidium in cool fresh water. These are ingested by copepods (the first intermediate host), and develop into the proceroids. Second intermediate hosts include freshwater, anadromous, or marine fish. Through the ingestion of infected copepods, the proceroids enter their tissues and develop into the plerocercoid stage. Raw fish consumption by a definitive host allows the plerocercoids to attach to the small intestine wall. There, they develop rapidly into a mature tapeworm. Mature tapeworm can live for many years in the host intestine, and can discharge very large numbers of eggs per day, completing the cycle<sup>9</sup>. *D. latum* is transmitted to humans through eating raw or uncooked fish. As to the second intermediate hosts for *D. latum*, freshwater fishes, such as pikes, trouts, salmon, and perches have been reported<sup>1</sup>. In a study performed in Republic of Korea, salmon, mullet, perch, and trout were reported as the suspected sources of infection<sup>10</sup>. Our patient also had a history of eating raw fish frequently, and he had consumed raw perch about 8 months ago. The recent rapid advancement of life quality with improvement of dietary conditions in Republic of Korea, in particular, increased consumption of expensive raw fish, is suggested to be a factor responsible for an increase in *D. latum* infections. Because *D. latum* infection is caused due to this eating habit, it very rarely occurs in children. Although this infection is rare in children, in Republic of Korea, about 5 cases including the present case have been reported in children up to the age of 10 years (Table 1)<sup>10,11</sup>. *D. latum* infections are often asymptomatic. Clinical manifestations are often mild and vague, including fatigue, constipation, and poorly defined abdominal discomfort. Other symptoms of this disease are pernicious anemia, headache, and allergic reactions<sup>9</sup>. The symptoms reported by the patient in this study were recurrent abdominal pain and watery diarrhea. These were similar to those in a previous study<sup>9</sup>. Laboratory investigations tend to present normal results, but in prolonged or heavy *D. latum* infection, they might show low vitamin B<sub>12</sub> levels or frank pernicious anemia<sup>12,13</sup>.

**Table 1.** Summary of five *Diphyllobothrium latum* cases up to the age of 10 years reported in Korea

Case No	Study	Sex	Age (yr)	Residence	Complaints	Suspected source	Treatment
1	Lee et al. (1983)*	Boy	10	Seoul	Abdominal pain	Perch	Bithionol
2	Joo et al. (1983)*	Girl	6	Seoul	Anemia	Sea fishes	Bithionol
3	Joo et al. (1983)*	Boy	10	Seoul	Passage of proglottids	Unknown	Bithionol
4	Lee et al. (2001)*	Girl	7	Sokcho	Abdominal pain,	Salmon	Praziquantel
5	Lee et al. (2001) <sup>11)</sup>	Girl	5	Seoul	Abdominal pain,	Perch	Praziquantel

\*These studies were quoted from reference 10.

Only history taking and considering the possibility of parasitic infection can avoid further invasive evaluation. Praziquantel is used as the drug of choice in *D. latum* infection, and it is usually given as a single dose of 10 to 25 mg/kg. From 1987 up to present, praziquantel had been used primarily, and there has been no treatment failure among the 43 cases reported in Republic of Korea<sup>10)</sup>. In our case, a 15 mg/kg single dose of praziquantel was used. One week later and one month later, the patient underwent stool examination for *D. latum*, and it was negative. Niclosamide and intraduodenal gastrografin have been reported to be efficacious as an alternative therapy for diphyllobothriasis<sup>9)</sup>. Because cases of *D. latum* infection in Republic of Korea are expected to continue to increase and the symptoms are vague, physicians should give more consideration to cases in children with recurrent abdominal symptoms of unknown cause. Because gastrointestinal fiberoptic endoscopy, upper and lower gastrointestinal series and abdominal magnetic resonance imaging, etc. in an attempt to establish a tentative diagnosis are expensive and painful, it is important that diagnosis of these children with recurrent abdominal pain should begin with a detailed history such as dietary or bowel habit.

### Conflict of interest

No potential conflict of interest relevant to this article was reported.

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