

## Two cases of intestinal capillariasis in Korea

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**Abstract:** The distribution of intestinal capillariasis has been extended continuously through Asian countries. The first case in Korea was reported in 1993, and here we add 2 more cases. One case is a 41-year old man who was diagnosed by both eggs in the feces and worms in the biopsy specimen of the ileum. This case was supposedly infected in Indonesia. The other is a 78-year old man, who has not been abroad, and suffered from intractable diarrhea. He was diagnosed by eggs in the feces, and several juvenile worms were collected after anthelmintic treatment. In both cases the treatment was successful by albendazole.

**Key words:** Intestinal capillariasis, *Capillaria philippinensis*. Korea, Indonesia

### INTRODUCTION

Intestinal capillariasis, i.e., infection with *Capillaria philippinensis* in the small intestine, is a rarely observed helminthic infection which was reported first from the Philippines. It is well known that the infected cases suffered from intractable diarrhea without exception, which was sometimes fatal if managed inadequately (Detels *et al.*, 1969).

No more cases have been recently recorded from the Philippines. However, the cases were detected from other Asian countries such as Taiwan (Chen *et al.*, 1990), Japan (Mukai *et al.*, 1983), Thailand (Benjanuwatter *et al.*, 1990), Iran (Hoghooghi-Rad *et al.*, 1987), and Egypt (Mansour *et al.*, 1990). The presence of *C. philippinensis* in Korea was first found in 1991 by detecting worm sections from the

biopsy specimens of the small intestine and also by identifying the eggs in the feces of an emaciated man (Lee *et al.*, 1993). The patient was severely malnourished due to year-long diarrhea. By detection of this patient, Korea has been added to the distribution map of this nematode infection.

Since the discovery of the first case, we have met 2 more cases, one in 1992 and the other in 1993. In the present record, we describe the clinical and parasitological profiles of the two cases of intestinal capillariasis found in Korea.

### CASE DESCRIPTION

Case I; Kim xx, 41-year old Korean man. On July 20, 1992, he was admitted to the Seoul National University Hospital (SNUH) for management of diarrhea lasting 8 months. He looked ill and emaciated, but showed no other abnormal physical findings.

The diarrhea first appeared in October 1991, when he was in Bali, Indonesia. He had lived in Seoul, Korea, but stayed at Indonesia for 2

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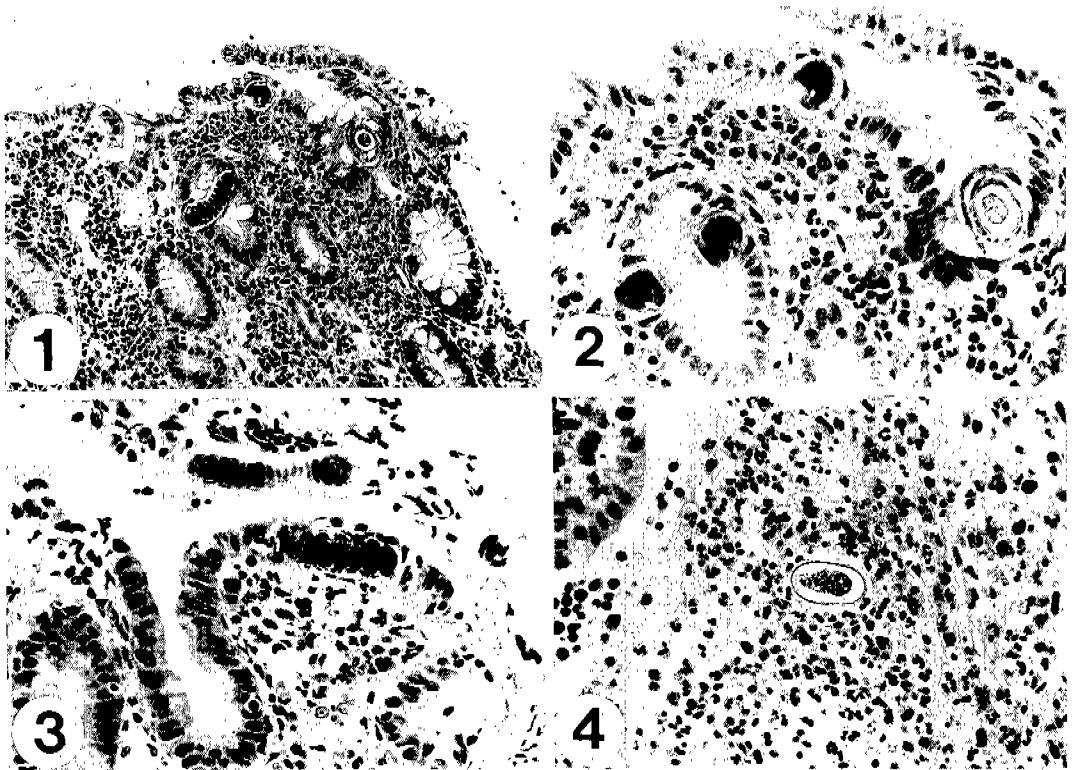
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years from December 1989 to December 1991 for a local construction business. He recalled that he had taken raw fish such as the sea bream, tuna, and lobster at Bali. Just before his leave from Indonesia (December, 1991), he noticed that he had lost 4 kg of body weight during 10 days due to watery diarrhea 1-2 times a day. The diarrhea was accompanied with abdominal pain. After returning to Seoul, his diarrhea increased in its frequency and amount.

At a general hospital, a physician suspected that he might be suffered from intestinal tuberculosis. He was delivered to the Asan Medical Center, University of Ulsan College of Medicine and various diagnostic approaches were carried out. The endoscopic biopsy specimen of the terminal ileum revealed many worm sections in the mucosa. The villi were extremely atrophic while the crypt layer was

hypertrophic. The interstitium of the crypt showed high cellularities with eosinophils and plasma cells (Fig. 1). Numerous sections of a nematode species were found in the epithelial layer (Fig. 2). The cross sectioned worms showed cuticular body wall and stichocytes in the pseudocoelomic body cavity (Fig. 2). Chains of stichocytes were found in the obliquely sectioned worms (Fig. 3). Also an egg was observed encircled by many eosinophils in the lamina propria (Fig. 4). The patient was transferred to Seoul National University Hospital (SNUH) for further management.

Laboratory data at SNUH revealed eosinophilia up to 21%, low serum albumin of 2.8 g/100 ml and positive occult blood in feces, but others were in the range of normal values. A jejunal biopsy showed chronic inflammation of the mucosa with blunt villi. The small bowel radiography showed diffuse



**Figs. 1-4.** Photographs of the biopsied mucosa of the terminal ileum in the Case I. HE stain. **Fig. 1.** Three sectioned worms are in the epithelial layer. The villi are severely atrophic, and the crypts are hypertrophic. Original magnification,  $\times 200$ . **Fig. 2.** The worm sections show stichocytes in the thin body wall. One section includes an egg. Original magnification,  $\times 400$ . **Fig. 3.** Oblique sections show a chain of stichocytes. Original magnification,  $\times 400$ . **Fig. 4.** An egg is found in the lamina propria surrounded by numerous inflammatory cells. Original magnification,  $\times 400$ .

loss of the mucosal fold in the ileum. The interbowel distance looked slightly increased. Stool examination revealed many eggs of *C. philippinensis*. The patient was prescribed with albendazole 800 mg daily for 4 weeks. His diarrhea disappeared a few days after the first dose medication. He was assessed to be cured 4 weeks after the treatment.

Case II; The patient was a farmer named Park xx, 78-year old Korean man, living in Chusaeng-myon, Namwon-gun, Chollabuk-do. He complained of long-lasting diarrhea and poor appetite, and was admitted to the Namwon Medical Center on July 16, 1993. He had a history of hospital care because of a traffic accident in May 1992.

He was ill-looking and emaciated, but physical examination gave no specific abnormalities. He first noticed diarrhea and abdominal pain in March, 1993. The diarrhea was watery, but neither bloody nor mucoid. It persisted for 3 months and he became worse due to dehydration and loss of electrolytes. Finally he suffered severe loss of the body weight, up to 24 kg, and then visited the Namwon Medical Center. He received supportive cares by infusion of the fluid with electrolytes and took various screening examinations for the etiological diagnosis. Laboratory data showed mild increase of the total number of WBC ( $10,800/\text{mm}^3$ ) and eosinophilia 10%. Serum albumin level was low as 1.5 g/100 ml. Fecal examination confirmed eggs of *C. philippinensis* and *Clonorchis sinensis*. The eggs of *C. philippinensis* measured 44-54  $\mu\text{m}$  (mean 47  $\mu\text{m}$ ) long and 22-25  $\mu\text{m}$  (mean 23  $\mu\text{m}$ ) wide, and were characterized by bipolar mucoid plugs. The shell showed surface striations, and contained the blastomere of one or two cell stage (Fig. 5).

The patient was treated with albendazole 800 mg a day for 14 days. He felt much better 2 days after the medication. The discharged worms were collected from the feces after the treatment, and 5 larval and 11 juvenile nematodes were recovered at the day 3 from the first dose (Fig. 6). Ten juveniles were females, 0.65-1.56 mm long and 13-26  $\mu\text{m}$  wide (Fig. 7). The larvae showed stichocytes in the posterior esophagus (Fig. 8). One male

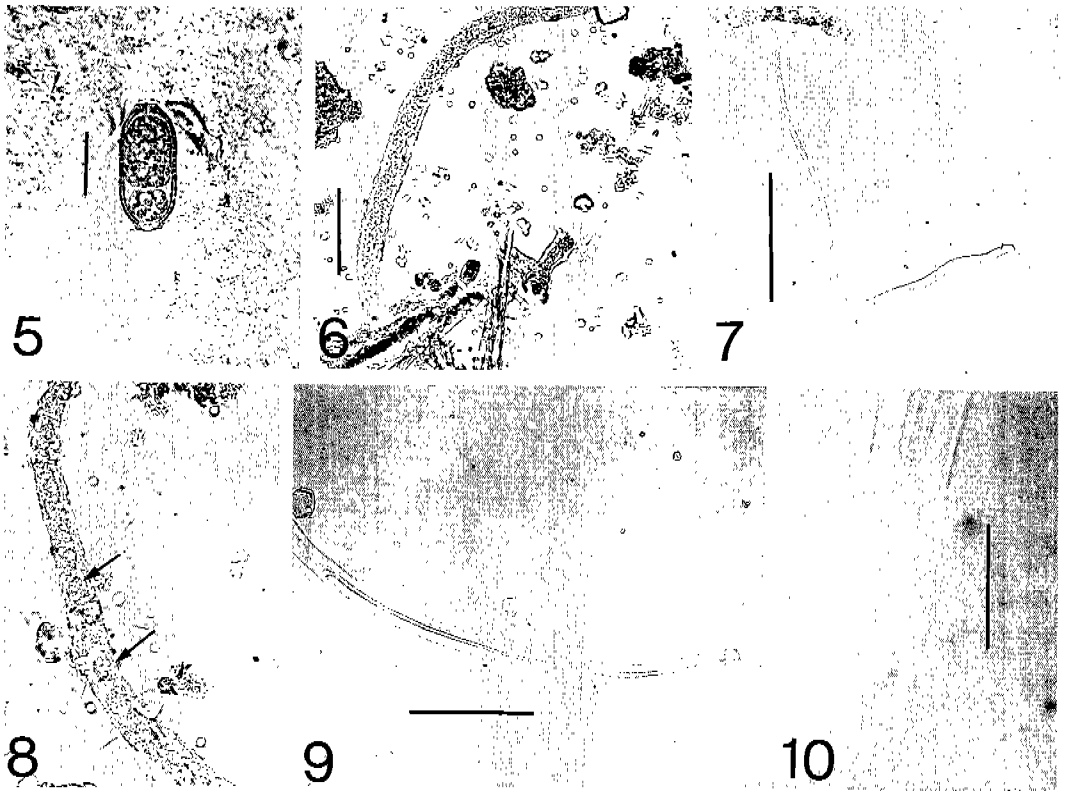
worm was 0.8 mm long and 22  $\mu\text{m}$  wide, and had a spicule and caudal alae (Figs. 9 & 10).

## DISCUSSION

As Lee *et al.* (1993) described, the first case of intestinal capillariasis had great difficulties to make a correct and definite diagnosis. Since physicians and technicians had not known this parasite and its presence in Korea, such situation was inevitable at that time. Thanks to the first experience, the Case I of this record was diagnosed rather easily, although biopsy of the terminal ileum by colonoscopy was performed. However in the Case II, only stool examination could make the correct diagnosis, and he was treated without any difficulties. The profiles of the three cases of intestinal capillariasis found in Korea dramatically demonstrate how this new infectious disease became familiar to medical personnels. It is the Case II (the third case in Korea) who was diagnosed only by detection of eggs from the feces. All of future cases, if any, must be detected correctly by adequate stool examination at the beginning of the disease.

Concerning the diagnosis of the present cases, we have no hesitation. Both cases passed numerous characteristic eggs in their feces, and detection of the worms could boost the diagnosis. The biopsy finding of the Case I was exactly compatible with the previous record (Lee *et al.*, 1993). Furthermore we collected 16 worms of *C. philippinensis* from the Case II after medication. As Cross and Basaca-Sevilla (1989) described, an infected patient may harbour worms of various developing stages from eggs to mature adults. The worms recovered from the Case II were in their larval or juvenile stages. There must have been much more worms in his intestine because we failed to collect all of the whole day stools after medication.

The esophageal portion of the collected worms were equipped with a chain of stichocytes, which is a characteristic feature of the nematodes belonging to the superfamily Trichuroidea (trichuroids). The trichuroid nematodes which can infect the human intestine are *Trichinella*, *Trichuris*, and *Capillaria*. *Trichuris* is easily excluded by its



**Figs. 5-10.** The egg or worms from the Case II. **Fig. 5.** An egg measures  $46 \times 23 \mu\text{m}$ . Bipolar mucoid plugs and egg shell striations are clearly found. Bar  $22 \mu\text{m}$ . **Fig. 6.** A larva discharged after treatment, 0.65 mm long and 0.013 mm wide. Bar 0.1 mm. **Fig. 7.** A female juvenile worm collected after treatment. It is 1.56 mm long and 0.026 mm wide. Bar 0.3 mm. **Fig. 8.** High power view of the esophageal part of a larva, showing stichocytes (arrows). Original magnification,  $\times 400$ . **Fig. 9.** The tail part of a male worm. It has a retracted spicule. Bar  $100 \mu\text{m}$ . **Fig. 10.** High power view of the tail showing the caudal alae. Bar  $30 \mu\text{m}$ .

dimensions and peculiar whip-shaped body. *Trichinella spiralis* takes less than 1 week to grow into an adult in the upper small intestine, and stays there only a few weeks. The female worm looks rather stout, measuring 2.2 mm long and 0.6 mm wide, while the male measures 1.2 mm long and 0.04 mm wide (Beaver *et al.*, 1984). The posterior body end of a male *T. spiralis* is characterized by a pair of conical protuberances, and the anus of a female is terminal. These features support that the worms recovered from the Case II are not *T. spiralis*. *C. philippinensis* can be characterized by its extremely slender body contour and the presence of stichocytes. Fully mature females may harbour eggs in the uterus. Although the worms from the Case II

are immature, their measurements, extremely slender body contour, and the presence of stichocytes enabled us to identify the worms as *C. philippinensis*. Also the shape of the spicule and caudal alae of a male (Fig. 10) was compatible with the original description (Chitwood *et al.*, 1968).

Since 1991, we have met intestinal capillariasis cases every year in Korea. Is the worm transmitted indigenously in Korea? Actually the answer should be yes, considering the first case of Lee *et al.* (1993) and the Case II of this report. The Case I is regarded as imported one, because his symptom first appeared during his stay in Indonesia and also he had the history of eating raw fish there. Observing the first case, we rather regarded it

as a single incidental occasion than indigenous transmission in Korea (Lee *et al.*, 1993). However, we found successive occurrence of *C. philippinensis* infection from the same locality, Namwon, Chollabuk-do. The discovery of 2 successive cases in Namwon strongly suggests that the life cycle of *C. philippinensis* should be maintained indigenously.

As Cross and Basaca-Sevilla (1989) suggested, the parasite may be transferred to Korea from the Philippines or other tropical countries by migrating birds. In Korea it is hot enough in summer for the parasite to propagate and transmit to the intermediate or definitive hosts. In winter, natural transmission of the worm may not be possible. However, whether or not the parasite can survive the winter seems not so much important, because the birds migrate every year.

Also we can consider another way of spread. Several kinds of fish are imported from abroad for food or plantation, which can be another route of import of this parasite.

The source of infection of the indigenous cases is still unknown. Only certain kinds of fish are suspicious, because they have past histories of eating raw fish. The first case enjoyed fishing, and eating cyprinoid fish and rainbow trout (Lee *et al.*, 1993). The Case II of this report was mixed-infected with *Clonorchis sinensis*, which is an evidence of eating raw fresh water fish. The Case I also had experiences of consuming several kinds of fish. Some fish must be the source of human infection, and it should be the subject of future research.

The Case I had been to Bali, Indonesia, and is supposed to have been infected there. Since no literature are known for occurrence of intestinal capillariasis in Indonesia, the present Case I seems to be the first record. However, we still have to avoid adding

Indonesia to the distribution map of *C. philippinensis*, because we cannot confirm whether the case was infected through imported fish there.

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=국문초록=

장모선충에 감염된 2증례

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장모선충(*Capillaria philippinensis*)에 감염된 증례가 1991년에 국내에서 처음으로 발견된 이래 1992년과 1993년에 각각 하나씩 증례가 관찰되어, 지금까지 모두 3례가 확인되었다. 이 보고에서는 둘째(본 논문 증례 I)와 셋째 증례(증례 II)의 임상소견과 검사소견을 기술하고 역학적인 상황에 대하여 고찰하였다. 이 기생충은 자칫하면 치명적일 수도 있는 정도의 심한 윤충성 설사를 일으키고, 1960년대 후반에 필리핀에서 큰 유행이 있었으며, 그 후 아시아 여러 나라에서 인체 감염이 확인되었다. 증례 I은 41세 남자로 인도네시아의 발리에 근무하던 때부터 설사가 시작되었고, 귀국 후에 더 심해져서 대장 내시경을 통한 회장 말단부 조직생검과 대변검사를 통하여 진단 받았다. 증례 II는 78세 남자로 전북 남원에 거주하며 농업에 종사하였다. 그는 3개월 이상 지속된 설사로 체중이 심하게 줄고 쇠약해져서 입원하였고, 검사 중에 대변에서 특징적인 충란을 검출하여 진단을 받았다. 두 증례 모두 알벤다졸로 치료받고 완쾌하였다. 증례 II에서는 치료 후 3일 제 대변에서 16마리의 유약충을 얻었다. 두 증례 모두 감염원은 생선회일 것으로 추정되나, 증례 I은 인도네시아에서 감염된 수입레로 판단된다. 국내, 특히 남원 일대에서 이 기생충이 실제로 토착적으로 전파되는가와 국내 전파의 경우 감염원이 무엇인가를 규명하는 연구가 요망된다. 이 기생충의 국명은 장모선충(腸毛線蟲)으로 제안한다.

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