Case Report: Three Cases of Intestinal Capillariasis in Lao People's Democratic Republic

Phonepasong Soukhathammavong, Somphou Sayasone, Aina Nirina Harimanana, Aphonethip Akkhavong, Sivilay Thammasack, Niranh Phoumindr, Khamloun Choumlivong, Khamla Choumlivong, Valy Keoluangkhot, Simmaly Phongmany, Kongsap Akkhavong, Christoph Haiz, Michel Strobel, and Peter Odermatt*

Swiss Tropical Institute, Basel, Switzerland; National Institute of Public Health, Ministry of Health, Vientiane, Lao People’s Democratic Republic; Department of Infectious Medicine, Mahosot Hospital, Ministry of Health, Vientiane, Lao People’s Democratic Republic; Department of Internal Medicine, Setthathirath Hospital, Ministry of Health, Vientiane, Lao People’s Democratic Republic; Department of Parasitology, University of Health Sciences, Vientiane, Lao People’s Democratic Republic

Abstract. *Capillaria philippinensis* is a rare zoonotic intestinal parasite that emerged in the 1960s. The outcome of intestinal capillariasis may be fatal if untreated in due time. We report three cases of intestinal capillariasis in Lao People’s Democratic Republic (Lao PDR). The three patients were unrelated previously healthy young men (24, 26, and 27 years of age) with no underlying disease or immune depression. They had chronic diarrhea, abdominal pain, edema, and severe weight loss. Two of them acquired the infection in Thailand; the other patient had no travel history outside Lao PDR. All patients were seen several times in different hospitals before the diagnosis was made. All had concurrent parasite infections: *Giardia lamblia*, *Entamoeba histolytica*, *Strongyloides stercoralis*, *Opisthorchis viverrini*, and hookworm. The patients frequently consumed uncooked fish. After treatment with albendazole (400 mg/day for 21–30 days) all patients recovered. In Lao PDR, consumption of raw small freshwater fish is common. Therefore, the possibility of a capillariasis outbreak should be considered.

INTRODUCTION

Intestinal capillariasis, which is caused by *Capillaria philippinensis*, is a rare food-borne nematodiasis that was first described in The Philippines in 1962 and emerged during the 1970s. It has received little attention and may be frequently overlooked or confused with *Trichuris trichiura* infection. However, *C. philippinensis* infection is remarkable because of its potential severity and fatal outcome in cases of delayed diagnosis or inappropriate treatment. Thus, approximately 2,000 cases with almost 200 deaths have been documented worldwide, mostly from Asia.1 We report three cases of intestinal capillariasis in Lao Peoples’ Democratic Republic (Lao PDR).

CASE DESCRIPTION

The patients were three unrelated previously healthy young men (24, 26, and 27 years of age). They showed no underlying disease or immune depression. All patients had non-febrile, chronic diarrhea associated with abdominal pain, edema, and severe weight loss. Two of them had low levels of serum protein, albumin, and cholesterol, but a normal level of hemoglobin. All patients were negative for human immunodeficiency virus, and one was positive for hepatitis B surface antigen. Detailed information on the three patients is shown in Table 1.

**Case 1.** A 24-year-old man from Vientiane. In May 2007, he reported an eight-month history of recurrent diarrhea associated with colicky pain that started after returning from southern Thailand where he was a seasonal migrant worker. Infections with *Giardia lamblia*, *Trichomonas* spp., and *Trichuris trichiura* were diagnosed and he was treated with standard regimens. Two months later (10 months after symptom onset), the diarrhea persisted and he had a weight loss of 12 kg. He was then admitted to Setthathirath Hospital in Vientiane. Clinical examination showed subcutaneous fat and muscle wasting, moderate dehydration, pallor, a soft non-tender, non-distended abdomen, and a marked pitting edema of the lower limbs. The liver and spleen were not enlarged.

Stool examinations showed numerous eggs (1–2 eggs/10 × 40 microscopic field) that were elongated and peanut-shaped with flattened bipolar plugs, striated shells (46.1 × 22.1 μm), and Charcot-Leyden crystals. Eggs were identified as those of *C. philippinensis*. Adult or larval *C. philippinensis* was not found in stool samples of all patients.

Levels of serum protein and albumin were low (1.7 and 0.9 g/dL, respectively), and proteinuria was not detected. A chest radiograph and abdominal ultrasound did not disclose any specific abnormalities. Gastroscopy showed a non-specific duodenitis with superficial erosions. A biopsy specimen of the duodenum did not show any parasites or specific abnormalities.

The patient reported eating small raw or insufficiently cooked freshwater fish and prawns in Lao PDR and Thailand. All other family members were healthy without any diarrhea. A routine stool examination performed for all family members showed negative results (no *C. philippinensis* eggs detected). The patient was given a one-month course of albendazole (400 mg/day) and he made uneventful and stable recovery.

**Case 2.** A 26-year old man from Vientiane. In December 2007, he came to the emergency department at Mahosot Hospital in Vientiane with a one-month history of profuse watery diarrhea. He was extremely emaciated and had severe prolonged dehydration. He was admitted for further investigations and treatment. During the preceding month, the patient had been repeatedly seen in district and military hospitals in Vientiane for the same symptoms. No diagnosis was made, including after stool examination, and multiple and empirical treatment regimens were given that did not relieve the symptoms.

He had approximately 10 bowel movements per day of non-dysenteric, watery stools associated with abdominal pain,
borborygmus, anorexia, and episodic vomiting. The patient reported a weight loss of 13 kg within the past 4 weeks. He admitted eating raw fish. Other family members remained free of symptoms. Two months before admission, he had returned from central Thailand where he had been a migrant worker for approximately one year.

On physical examination, he appeared emaciated, pale, and in poor general health. He had subcutaneous fat and muscle wasting, marked pitting edema on the lower limbs, a temperature of 36°C, low blood pressure (80/50), a heart rate of 119 beats/minute, and a respiratory rate of 25 breaths/minute. The abdomen was distended. Results of chest and heart examinations were normal. The patient received intravenous fluids to correct dehydration and electrolyte imbalance. Stool examinations showed C. philippinensis eggs and parasitic co-infections (Table 1). A chest radiograph and an abdominal ultrasound were normal. Stool examinations were carried out for all family members; none showed parasitic infections. After a full month course of albendazole (400 mg/day), the patient fully recovered. At a one-month follow-up visit, weight gain (8 kg), negative stool examination results, and normal levels of serum albumin were noted.

### Case 3.

A 27-year-old man (farmer) from southern Lao PDR (Phine District, Savannakhet Province). He was seen in September 2005 at Savannakhet Provincial Hospital with chronic diarrhea of six months duration. On admission, he had at least six daily bowel movements, persistent abdominal pain, and episodic vomiting. He was wasted and emaciated, moderately dehydrated, and reported a weight loss of 10 kg during the past 3 months.

The patient had no history of travel outside his province. After the start of illness, he visited district hospitals and a

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin (10.5–15 g/dL)</td>
<td>15</td>
<td>13.5</td>
<td>14.8</td>
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<tr>
<td>Leukocytes (4,000–9,000/µL)</td>
<td>8,800</td>
<td>10,800</td>
<td>5,200</td>
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<td>Neutrophils (50–65%)</td>
<td>65</td>
<td>68</td>
<td>60</td>
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<tr>
<td>Lymphocytes (20–40%)</td>
<td>30</td>
<td>35</td>
<td>39.3</td>
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<td>Eosinophils (1–4%)</td>
<td>2</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Serum creatinine (0.6–1.3 mg/dL)</td>
<td>1.2</td>
<td>1.4</td>
<td>1.1</td>
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<td>Glucose (75–115 mg/dL)</td>
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<td>98</td>
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<td>Serum sodium (135–445 mmol/L)</td>
<td>122</td>
<td>132</td>
<td>122</td>
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<tr>
<td>Total serum protein (6.0–8.5 g/dL)</td>
<td>1.7</td>
<td>1.7</td>
<td>7.2</td>
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<tr>
<td>Serum albumin (3.5–5.0 g/dL)</td>
<td>0.9</td>
<td>2.3</td>
<td>3.7</td>
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<tr>
<td>Cholesterol (119.7–220.1 g/L)</td>
<td>104.2</td>
<td>173.2</td>
<td>169.2</td>
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<tr>
<td>ALT (0–40 U/L)</td>
<td>18</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Urine analysis result</td>
<td>Normal</td>
<td>Normal</td>
<td>Normal</td>
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<tr>
<td>Stool examination result</td>
<td>Watery, 100–150 leukocytes/40 high-power microscopic fields, no erythrocytes, mucus = 1+, stool culture negative</td>
<td>Watery, absence of stool culture</td>
<td>Watery, stool culture–negative results</td>
</tr>
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<td>Parasites detected</td>
<td>Giardia lamblia (cyst), Trichomonas spp. Entamoeba histolytica (cyst), Trichuris trichiura</td>
<td>Capillaria philippinensis</td>
<td>Negative</td>
</tr>
<tr>
<td>Treatment</td>
<td>Antibiotics (metronidazole, ofloxacin), intravenous fluids, albumin, and albendazole, 400 mg/day for 3 days</td>
<td>Albendazole, 400 mg orally/day for 30 days</td>
<td>ND</td>
</tr>
</tbody>
</table>

* Values in parentheses are normal ranges.

ALT = alanine aminotransferase; ND = not done.
neighboring hospital in Vietnam where no diagnosis was made. Treatment with several anti-infective drugs, including ampicillin, sulfamethoxazole, and metronidazole, did not improve his condition. Results of stool examinations by the Kato-Katz (KK) technique and a formalin-ether concentration technique (FECT) were positive for *C. philipipnensis* (1,696 epg/gram [of feces] [epg] by KK and 346 epg by FECT). Moreover, *Opisthorchis viverrini* (336 epg by KK and 58 epg by FET; 9 adult worms isolated after treatment with praziquantel and pargyline), *Strongyloides stercoralis* (9 larvae), and hookworm (408 epg by KK and 14 epg by FECT) were also present. The patient received albendazole, 400 mg/day for 3 weeks, and showed gradual and significant improvement. He was lost to further follow-up.

**DISCUSSION**

The first case of capillariasis was diagnosed in 1962 in Luzon, The Philippines. Soon afterwards, several outbreaks were described in this country and in Thailand. Other Asian countries (Taiwan, South Korea, India, and Indonesia) reported sporadic cases, followed by Middle East countries (Iran, United Arab Emirates, Egypt, and Egypt). These results suggested that *Capillaria* spp. are present in more areas than initially thought. In addition, *C. philippinensis* infections were imported into Europe.

The genus *Capillaria* is a nematode member of the superfamily Trichinelloidea, which includes *Trichuris* spp. and *Trichinella* spp. Among some 250 different *Capillaria* species, only three are human pathogens (*C. hepatica* and *C. aerophila*, which cause liver and a tracheo-bronchial disease, respectively, and *C. philippinensis*, which affects the intestinal tract). *Capillaria philippinensis* is the only species that causes severe disease. It may be endemic but also can cause epidemics.

The life cycle of *C. philippinensis* involves a small fresh or brackish water fish harboring the infectious stages in their viscera. Natural definitive hosts are fish-eating birds. Human become infected when they consume raw or insufficiently cooked fish or, less often, ichtyophagic birds. Handling fish under poor sanitary conditions may contaminate other foods and favor indirect transmission. In humans, the parasite is not opportunistic (disseminated) but is usually restricted to the small intestine where it develops, reproduces, and where the female lays eggs that mature into larvae. A notable feature is that these larvae may engage in a shorter auto-infection circle, which may produce high parasitic loads.

The pathophysiology of this nematode is largely unknown, especially with regard to detail mechanisms of malabsorption. Parasitic products may interfere with ionic exchanges and carbohydrate and protein absorption of the intestinal epithelium, which produces a protein-losing enteropathy that is an outstanding feature of capillariasis.

Intestinal capillariasis has been known since 1973 to occur in Lao-neighboring countries. It has been previously reported in travelers to Thailand. Two of our cases had stayed for several months in this country. This finding indicated that they were infected in Thailand. However, one case from rural southern Lao PDR had no travel history out of this country. He must have been infected in Lao PDR, which documents that transmission of *C. philippinensis* infection also occurs in this country. Lao PDR and Thailand share many environmental, epidemiologic, and cultural features. In particular, the widespread habit of eating raw or insufficiently cooked fish, the main risk factor for infection with *C. philippinensis*, is common in both countries.

To our knowledge, the cases reported here are the first to be documented in Lao PDR. The patients were active healthy men with no underlying disease or immune deficiency. Clinical and laboratory features were comparable to those initially described in The Philippines and elsewhere, i.e. chronic watery diarrhea, abdominal pain, and notably pronounced weigh loss and pedal edema, the latter as part of a malabsorption syndrome. The diagnosis was easily achieved by finding ova of characteristic size and shape in stool specimens. However, *C. philippinensis* eggs may be sparse or inconstantly shed in the stools. They also have a similar appearance to those of *T. trichiura* in size and peanut shape with two polar opercula, and are often mistaken for those of the latter species.

The clinical presentation of capillariasis may be confused with those of other protozoans (*Entamoeba histolytica*), nematodes (*S. stercoralis*), trematodes (*Fasciolopsis buski*), or opportunistic parasites associated with acquired immunodeficiency syndrome (*Microsporidium* spp.). In addition, capillariasis may be confused with other chronic diarrheas of unclear origin such as tropical sprue, collagen colitis, adult celiac, or Crohn disease. Associated hypovolemic cardiac failure has also been described. It is important to note that intestinal capillariasis even when properly recognized and treated recurs frequently because of auto-infestation or re-infection.

All three patients experienced clinical and biologic recovery (negative stool results for parasites, serum albumin levels returning to normal values) after completing the 3–4-week regimen of albendazole. To avoid frequent relapses, high dosages and prolonged (3–4 weeks) or sequential treatments have been advocated. Several anti-helminthic drugs have been recommended for treatment of intestinal capillariasis. All compounds of the azole family of drugs are effective. However, several studies have consistently recommended albendazole as the drug of choice.

Unawareness and delayed diagnosis may cause serious medical problems. This issue has been documented in South Korea, Egypt, and India, and may even be fatal (fatality rate up to 30% in an outbreak in The Philippines), which is an exceedingly uncommon outcome for other nematode infections.

Finally, food-borne parasites are an emerging public health problem, particularly in Southeast Asia. Intensified production of fish farming and the persisting habit of eating raw or undercooked fresh water fish contribute to increased transmission rates, including *Capillaria* spp. As an example, in Lao PDR, despite increased development, as many as 75% of the population still eat traditional raw fish dishes, such as Koy kung (prawn), koy pa or lap pa (minced fish with spices), and koy pa siew (raw *Rasbora borapetensis*). Therefore, *C. philippinensis* deserves particular attention in this and neighboring countries that have similar environments and traditional behavior patterns. Because this parasite is endemic in this region, the occurrence of outbreaks cannot be excluded.

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Authors’ addresses: Phonepasong Soukhhammavong and Somphou Saysone, National Institute of Public Health, Ministry of Health, Vientiane, Lao PDR and Department of Public Health and Epidemiology, Swiss Tropical Institute, Basel, Switzerland. Aina Nirina Harimanana, Aphonethip Akkhavong, and Michel Strobel, Institut de la Francophonie pour la Médecine Tropicale, Vientiane, Lao PDR. Sivilay Thammassack and Simmaly Phongmany, Department of Infectious Medicine, Mahosot Hospital, Ministry of Health, Vientiane, Lao PDR. Niranh Phoumindr, Department of Parasitology, University of Health Sciences, Vientiane, Lao PDR. Christoph Hatz and Peter Odermatt, Swiss Tropical Institute, Basel, Switzerland.

Reprint requests: Peter Odermatt, Department of Public Health and Epidemiology, Swiss Tropical Institute, PO Box, CH-4002 Basel, Switzerland, Tel: 41-61-284-8214, Fax: 41-61-284-8105, E-mail: peter.odermatt@unibas.ch.

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