☐ **Case Report** ☐

A case of *Strongyloides stercoralis* infection

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Abstract: Strongyloidiasis has been recognized as one of the life-threatening parasitic infections in the immunocompromised patients. We report an intestinal infection case of *Strongyloides stercoralis* in a 61-year-old man. Rhabditiform larvae were detected in the stool examination and developed to filariform larvae having a notched tail through the Harada-Mori filter paper culture. The patient received five courses of albendazole therapy but not cured of strongyloidiasis.
**Key words:** *Strongyloides stercoralis*, human infection, albendazole, filariform larva

The intestinal nematode, *Strongyloides stercoralis*, is a soil-transmitted nematode endemic in many countries throughout tropical and temperate regions, and is responsible for a wide range of symptoms (Grove, 1989). In warm climates, the parasite lives the free-living generation in humid soils. When the microenvironment changed to unfavorable circumstances (dry and/or cold temperature), rhabditiform larvae transform to filariform larvae, an infective form to the final hosts. Upon a contact with the contaminated soil, the filariform larva penetrates into the human skin and takes into superficial veins. In immunocompetent hosts, the infection by *S. stercoralis* is largely confined to the intestinal tract and is asymptomatic or induces non-specific complaints such as moderate abdominal pain, nausea and diarrhea (Tanaka et al., 1996). In immunocompromised hosts, the autoinfection results in the dissemination of the filariform larvae into various tissues and organs, which is unfortunately very fatal (Venizelos et al., 1980; Gotuzzo et al., 1999).

In Korea, the intestinal strongyloidiasis in human has not been uncommon in terms of the larval positive rate in the stool examination (Kobayashi, 1928). In accordance to the decrease of prevalance of soil-transmitted helminthiases over last three decades (MHW and KAH, 1997), human infections by *S. stercoralis* have been recorded as clinical cases, about 20 cases in number. The human cases recorded were of intestinal or hyper-infections (Kim et al., 1992; Lee et al., 1994; Chung et al., 1995). In the present paper, we report a human case of *S. stercoralis* infection diagnosed with the coprocultured filariform larvae and the parasitic female worms.

A man, 61 years old, living at Shinan-myon, Sanchung-gun, Kyongsangnam-do, was admitted to the Kyongsang National University Hospital on March 3, 1989, with chief complaints of dyspnea and cough. He had had an episode of dyspnea and chest pain, and was diagnosed as a cardiac disease at a local clinic, and got medications over some extension of periods 25 years ago. About 10 years ago, he experienced dyspnea and pitting edema in the lower extremities and was diagnosed as congestive heart failure. He denied any experience of immunosuppressive
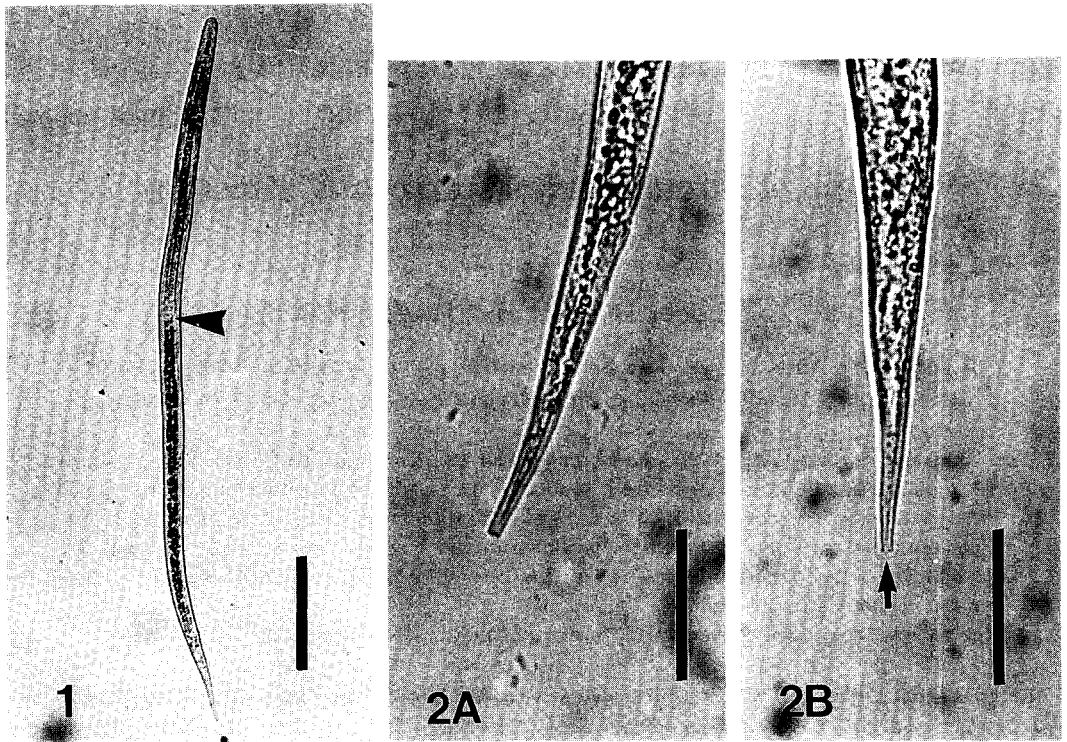
Figs. 1-2. The filariform larva of *Strongyloides stercoralis* obtained through a fecal cultivation.
Fig. 1. The esophago-intestinal junction is indicated by an arrowhead. Bar=0.1 mm. **Fig. 2.** The notched tail end is flat (**2A**) or pointed (arrow) (**2B**). Bar=0.05 mm.

or anticancer therapies. In August 1988, he sufferred from an upper respiratory infection and was admitted to a clinic in Chinju, Kyongsangnam-do. However, the illness had taken progressively a turn for the worse before two months transferred to the University Hospital. On admission, physical examination revealed mild tenderness and bowel sounds in the abdomen, and the liver palpable over five finger breadths under the diaphragm. He passed loose stools but not diarrheic. During 25 hospital days before the cardiac operation, leukocytes count was 3,900-4,700/mm³ and eosinophil count 4-8% in the peripheral blood.

On the first hospital day, rhabditiform larvae were found in routine stool examination and cultured by the Harada-Mori filter paper culture method. Briefly, the stool was streaked on a strip of filter paper, dipped in water in a 15-ml screw-capped tube, and cultured at 36°C two overnights. After taking out the filter paper strip, the cultured solution was added

with ethanol to a final concentration of 70% and spinned at 3,000 *g* for 10 min. The filariform larvae obtained (Fig. 1) had a notched tail (Figs. 2A, 2B) and were identified as the third-stage larvae of *S. stercoralis* (Hong et al., 1988). The filariform larva was 2.35 mm in length and 0.041 mm in diameter. The esophagus was 0.67 mm long. The vulva opened at 0.77 mm from the posterior end of the body. Any form of developmental stages of *S. stercoralis* was not found in the sputum of the patient.

From March 10, he took orally albendazole 400 mg a day for three days. Parasitic females of *S. stercoralis* were collected from the stool over 6 days after albendazole therapy. Number of the worms collected were 5,729, 130, 93, 0, 1 and 0 successively from the first to the sixth day after the treatment. On March 16, the rhabditiform larvae, two larvae per slide, were detected in the direct fecal smears. With this result, the second course of albendazole

therapy was executed and a total of eleven parasitic female S. stercoralis was collected from stools for the following two days.

Clinical studies revealed the cardiac insufficiency complexed with atrial septal defect, tricuspid regurgitation and left pericardiac effusion and pulmonary hypertension. He was operated by patch closure and tricuspid annuloplasty on March 28, recovered from the illness without any complications, and discharged on April 26. He took the third, fourth and fifth courses of albendazole therapy on July 3, August 19 and September 12, respectively, and the stools were inspectd for the rhabditi- and/or filari-form larvae. The rhabditiform larvae were detected from the stools until January 19, 1991.

In many instances, a clue compelling check up for S. stercoralis infection has been the rhabditiform larva detected in the routine stool examination under impressions of gastro-intestinal infections. In the present case, fortunately the rhabditiform larva was detected at the first stool examination. The detection of the rhabditiform and filariform larvae in the stool examination has been crucial for the management and treatment of S. stercoralis infections. Formalin-ether centrifugal sedimentation enriches the helminth eggs and larvae, but is not efficient to detect the filariform larvae of S. stercoralis in stool specimens of chronic, low-level infections. The Harada-Mori filter paper culture gives birth to the filariform larvae from the rhabditiform larvae and enables to differentiate S. stercoralis infection from other gastro-intestinal nematode infections, but is not sufficient for detection of the larvae. A new coproculture method, the agar plate culture method (Arakaki et al., 1988), was highly effective and detected the filariform larvae in more than 96% of the positive cases (Sato et al., 1995). To get the best results, it is recommended to inspect the same specimen more than three times and to repeat the stool examination with intervals.

The intestinal strongyloidiasis is of a great medical importance, since the filariform larvae can be disseminated by internal autoinfection in the hosts whose immune status was compromised by a various kinds of inter-

ventions (Hong et al., 1988). Therefore, it has been recommended that efforts to restore the altered immunophysiological status of the patients should be set out simultaneously or prior to anthelmintic therapy. In S. stercoralis hyperinfections, the discontinuation of immunosuppressants gave of little effect for improvement of the illness. Therapy with thiabendazole has been recognized to be highly effective in the treatment for intestinal strongyloidiases (Choi et al., 1985; Wurtz et al., 1994) but not for the disseminated hyperinfections (Venizelos et al., 1980).

In the course of managing the present case, the patient remained to be immunocompetent by keeping away administering immuno-suppressants, and saved his life from hyperinfection by virtue of his immuno-competency. However intestinal strongy-loidiasis persisted to the five courses of albendazole therapy over six months. Albendazole therapy was not effective to clear out S. stercoralis from the gastrointestinal tracts, even from the immunocompetent cases. Unfortunately, the strongyloidiasis of immuno-compromised patients was not cured with albendazole therapy and ended in a death (Hong et al., 1988; Kim et al., 1989; Yoon et al., 1992). Ivermectin, a potent broad spectrum anthelmintic, was reported to cure the human infections with S. stercoralis (Tanaka et al., 1996; Nonaka et al., 1998).

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