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Case Report

Diploscapter coronata Infection in Iran: Report of the First Case and Review of Literature

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Abstract

We describe a 61-year-old man who developed a mild gastrointestinal discomforts including diarrhea associated with feces containing many larvae similar to rhabditiform larvae of *Strongyloides stercoralis* diagnosed finally as *Diploscapter coronata,* a free-living nematode. This case is unusual infection in human and there are a few reports of this worm as a real parasite. Microscopically, *Diploscapter* larvae in feces should be considered in the differential diagnosis of Strongyloididasis and hook worm disease in endemic area. This was the first reported occurrence of human *D. coronata* infection in Iran. Most of the clinical manifestations of human infection are not yet known due to limited information; thus, there is a need for more studies.

Keywords: Diploscapter coronata, *Free-living nematode, Gastrointestinal symptoms, Iran*

Introduction

Diploscapter coronata was first described by Cobb under the name of *Rhabditis coronata*. The specimen was obtained from a human feces near decaying banana roots in Fiji Island (1). De Man found only numerous single male worms in the diseased pseudo-bulbs of tropical orchids (2). Zimmerman and Maupas added more information about the morphology of the worm (3, 4), and then Cobb reviewed and established a new genus: *Diploscapter* (5).
The main morphological characteristics of the worm are annulated cuticle with two pairs of lips in the mouth region; lips that had been entirely transformed into a pair of medial, outwardly acting, distally bifurcate fossores and a pair of lateral lamellae; rhabditoidal type of oral cavity; absence of glottoid apparatus, and bursa with 7 pairs of papillae(6).
Peters was the next author who found the adult worms of *Diploscapter* in sewage beds in England and supported Cobb's work (7). The parasite was then known as *D. coronata*, which was originally not infectious, but merely a saprophyte living in soil around decaying plants and roots. Its life cycle was later discovered to be as follows: adult worms generally inhabit the stomach wall of cats, dogs and tigers, and are infrequently found as human parasites; the mature female worms produce fertilized ova that are excreted with the host's feces; eggs are flushed by rain into ponds, canals and rivers, where they hatch into first stage larvae; the infective larvae are then ingested. After the life cycle was established, only a few case reports ap-

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peared in the literature over subsequent decades because human infection was not common (7).
A junior physician in Taihoku Government Hospital found some small nematodes in the urinary sediment of an old female in-patient suffering from acute pyelitis. They appeared continually during the period when the urine showed an alkaline reaction, and disappeared with the change of the reaction from alkaline to acid. Upon the morphology and structure of the nematodes, they were identified as adults and larvae of *D. coronata*. The medical history of the patient previous to her illness, and searching for the worms in suspicious places where she may have been infected with the worms showed the same nematodes in rotten tissues of a banana tree by her house, where she was once playing with her grandchildren. From this fact the author, Yokogawa, pointed out that while the worm is saprophytic in such decaying things as diseased roots of various plants in tropical and subtropical lands, it may also live in a filthy part of the human body, such as the urogenital opening of woman, if it is accidentally transferred there from the soil (8).
The other human case was a 73-year-old Thai woman who presented with numerous hookworm-like nematodes, finally revealed as *D. coronata*, by fecal culture. The patient exhibited no significant clinical signs of the gastrointestinal or genitourinary systems, and was generally not ill as a result of this unusual infection. She had a habit of consuming a local Thai dish called "Laab Moo," and sometimes excreted feces in the jungle. Microscopic examination of the feces demonstrated hookworm-like eggs which were oval in outline, possessed one thin single shell with one yolk cell inside, and measured about 48-50 µ by 21 µ. This was the first reported occurrence of human *D. coronata* infection in Thailand (9).
In another rare case in Japan the faeces of an 8-year-old female suffering from Henoch-Schönlein purpura, were contained the adult female rhabditiform nematodes measuring 325.6–441.2 µm in length and 18.3–26.5 µm in width. In this case the worms showed one pair of notched labia oris with many spiny projections, while the other pair was strongly curved outwards. The worms were identified using light and scanning electron microscopy as the free-living nematode *D. coronata* (Cobb) based on their characteristic morphology. Worm survival time and hatchability of the eggs were examined *in vitro* after treatment with an artificial gastric or intestinal fluid. Although adult worms survived for less than one minute, eggs hatched after treatment with artificial gastric fluid. This suggests that eggs accidentally ingested or produced by adult *D. coronata* could develop in the human gastro-intestinal tract (10).

Case report

A 61- year- old man from Kermenshah, western Iran was referred to clinical laboratory of Kermanshah University of Medical Sciences in 1996, with a two week history of epigastric tenderness, mild gastrointestinal symptoms including diarrhea, crampy abdominal pain, weakness and nausea. He was farmer and used to work in fruit garden for more than 30 years.
Stools tested for occult blood were negative. The white blood cell count was in normal range with 3% eosinophils. Stool samples were subjected to Formalin-Ether Concentration method. Microscopic examination of all samples obtained in three consecutive days revealed some rhabditiform larvae measuring approximately 250–300 µm (Fig. 1). The larvae were just the same as *Strongyloides stercoralis* rhabditiform larvae except having two prominent lancets in buccal cavity and lack of large genital primordium. The patient was asked to bring another three stool samples on daily basis. In all additional specimens the same larvae were seen. The patient's faeces containing larvae were cultured using a filter-paper culture technique and after 2 days of

culture, various stages of larvae, female worms and eggs were recovered (Fig. 2). Feces culture demonstrated hookworm-like eggs which were oval in outline, possessed one thin single shell with one yolk cell inside, and measured about 48-50 µ by 21 µ. The adult worms were closely resembled parasites described by Peters (1930) and Yokogawa (1936). After careful examination, they were finally identified as *D. coronata*. (Cobb) based on their characteristic morphology (Fig. 3). No male worm was detected in culture.

Although, thiabendazole is the drug of choice for strongyloidiasis and may be also for *Diploscapter* but it was not available in Kermanshah. Therefore the patient received treatment with mebendazole (100 mg/bid/ 3 days). After the treatment the diarrhea ceased and the other symptoms disappeared and patient expressed of gastrointestinal pain relief. In stool sample examined three days after treatment, no parasitic elements (ova and larvae) were detected.

Fig.1: *D. coronata* larvae in various stages. Note the two prominent lancets in buccal cavity X 400

Fig.2: *D. coronata* eggs and rhabditiform larvae in culture. X 400

Fig.3: *D. coronata* adult female rhabditiform nematodes measuring 3.1-4.2 mm in length and 0.2-0.3 mm in width, containing a typical single egg in uterus (culture) X 100.

Discussion

According to morphology and structure of the rhabditiform larvae in direct stool smears and also the adult female nematodes in culture, the worms were identified as *D. coronata* using the following special characteristics: annulated cuticle with two pairs of lips in the mouth region; lips that had been entirely transformed into a pair of medial, outwardly acting, distally bifurcate lancets; rhabditoidal type of oral cavity with two prominent lancets; and the presence of

only one large egg in uterus of adult female (9,10).

In our specimen, female nematodes and immature larval in various stages were found in culture and female nematodes could lay eggs that hatched into the larval stage. This was similar to other studies, which stated that mature nematodes were all female (8, 10) and that males were never found in the soil of any suspicious sites of human infection.

In culture, we did not detect any male worm and this is in agreement with Maupas who found that the females themselves could develop to maturity and they contained spermatozoa in uteri in cultures with no males. The worms were described as autogamous protandrous hermaphrodites and males were considered non-functional (4).

Generally, human infections are rare and few cases were reported. In Japan, these worms were found in the urinary sediment of an old female suffering from acute pyelonephritis (8). In Thailand a 73-year-old woman presented with numerous hookworm-like nematodes, finally revealed as *D. coronata*, by fecal culture (9). On the other hand, Chandler founded the adult worms of *D. coronata* in the aspirated stomach contents of nine patients who were suffering from complete or almost complete lack of hydrocholorich acid (10).

Contamination of free-living parasites during fecal collection, by soil, implements or flies, could not be ruled out and should be kept in mind, therefore, our patient was asked to bring six stool samples on daily basis and strict precautions to prevent contamination were taken. Surprisingly, in all additional specimens the same larvae were seen (11).

The source of our patient's infection is not clear. He may be infected actually from his agricultural activity and handling with plants. He had a habit of eating fresh and raw vegetable. However, transmission can occur where people have exposure to an environment that has been contaminated with infected feces, or more specifically, infective eggs; such conditions could lead to human infection with *D. coronata* worms.

The human stomach is usually free from worms due to its acidity. Although, *D. coronata* is occasionally recovered from this organ in people whose gastric hydrochloric acid level is abnormally low (10) but in our case, due to late diagnosis of the parasite as *D.coronata*, we did not examine his gastric aspiration.

Due to rare cases of human *Diploscapter* infection, the clinical manifestations and the other aspects of such condition are not well-known, thus, there is a need for more studies.

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