
症 例 報 告

TWO CASES OF TAENIASIS INFECTION

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Abstract

We report two cases of taeniasis caused by tapeworm infection. The first was a Japanese female, 23 years old, who had a history of eating raw meat during a visit to Thailand. She was referred to our hospital with a history of passing proglottids in feces. *Taenia saginata* or *T. asiatica* was suspected based on the proglottid morphologic features in addition to supportive information regarding her travel and dietary history. The patient was given praziquantel and the tapeworm was excreted. The second was a 35-year-old Thai male who had lived in Japan since 2000 and not left the country since that time. He had consumed beef cooked in the so-called *yakiniku* style and also sometimes raw, because of nostalgia for that Thai custom. The patient passed proglottids several times and then came to us. The proglottids were compatible with those of *T. saginata*. Praziquantel was prescribed and the tapeworm was excreted. In both cases, mitochondrial DNA analysis identified the worm species as *T. saginata*. Since morphological discrimination of three human-infecting *Taenia* species, *T. saginata*, *T. solium*, and *T. asiatica*, is not always possible, it is necessary to employ DNA analysis for diagnosis of taeniasis to confirm the worm species.

Key words : *Taenia saginata*, Taeniasis, Molecular diagnosis

Introduction

Taeniasis is a parasitic disease caused by infection with a *Taenia saginata*, *T. solium*, or *T. asiatica* tapeworm, which occurs from consumption of raw or undercooked meat¹⁾. This disease was more common in Japan several decades ago as compared to the present, with very few such cases recently presented. Despite the rarity of this disease, we treated two unrelated patients infected with *T. saginata* in 2019. Those details are reported here to help raise the awareness of clinicians.

Case report

Case 1

A Japanese woman (age 23 years) came to us after passing tapeworm segments (proglottids). She had visited Thailand (Bangkok Chiang Mai Pattaya) for 10 days in September 2018, and ate raw beef, pork, horse meat, shrimp, and salmon obtained at a market in Bangkok. In February 2019, the patient felt incongruity in the anal region, followed by the passing of proglottids, which she recognized as small worms with the appearance of maggots. A local doctor was consulted, who prescribed pyrantel pamoate based on suspicion of ascariasis. However, passing proglottids occurred several more times after taking that medication and she visited us.

The patient was a college student, with no particular history of illness or known allergies. At the initial examination, body temperature was 36.1°C and blood pressure was 118/70 mmHg, while physical as well as laboratory examinations were normal, including peripheral blood cell differentiation and chemistry.

The patient brought an expelled proglottid, which had a thick muscularity appearance (Fig. 1A), with more than 20 lateral uterine branches found after injection of India ink into the genital pore (Fig. 1B). Based on these findings and the clinical history, *T. saginata* or *T. asiatica* was suspected, and oral administration of praziquantel at 1200 mg was given. An approximately 1-meter tapeworm was excreted along with several pieces of torn-off proglottids (Fig. 1C), though the scolex was not found. Two months later, eggs were still detected in a stool examination and she was treated with two additional doses of praziquantel (1500 mg).

Genetic analysis was performed to identify the tapeworm species using multiplex PCR testing and DNA sequencing for the mitochondrial NADH target fragment with total genomic DNA extracted from the proglottid, using methods previously reported². Multiplex PCR results showed two bands, suggesting either *T. saginata* or *T. asiatica*, while DNA sequencing showed a 99% similarity to the reference sequence of *T. saginata* (GenBank: LC480765.1). We also requested diagnostic testing of the proglottids at the Department of Parasitology of the National Institute of Infectious Diseases (NIID), Tokyo, where DNA analysis targeting the mitochondrial cytochrome c oxidase subunit 1 gene (Cox1) sequences was performed³ and confirmed a high similarity to *T. saginata*. Details of Case 1 have also been previously reported as a single case⁴.

Case 2

A Thai male (age 35 years) who had lived in Japan for 20 years without leaving the country recognized for the first time white string-like objects in feces in April 2019. After several more such experiences in the

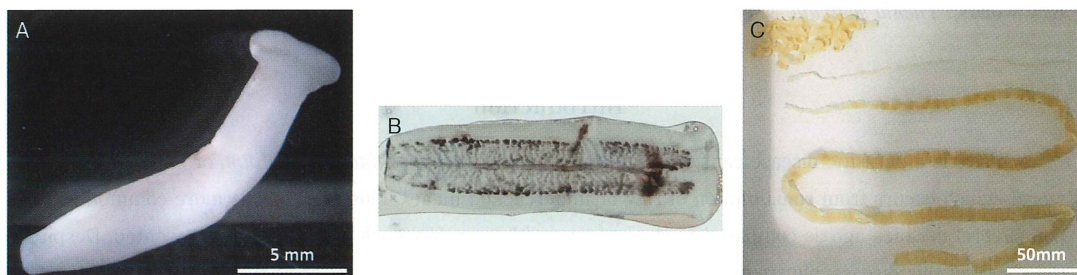


Fig. 1.

A. Stereoscopic image of one of the expelled proglottids in Case 1.

B. More than 20 lateral uterine branches were revealed following injection of India ink into the genital pore.

C. A tapeworm approximately 1 m in length and proglottids were excreted along with several pieces of torn-off proglottids.

following two months, he visited us. Based on the morphology of a sample proglottid passed in feces (Fig. 2A), the worm species was considered to be *T. saginata*. There were no symptoms, such as abdominal pain, diarrhea, or nausea, and no pathological findings in the initial physical examination. Laboratory examination results revealed no abnormalities in blood chemistry or urine, except for eggs in feces, which showed a radially striated shell (Fig. 2B). A medical interview confirmed that that patient had not visited Thailand or any country outside of Japan during the recent 20 years, though it was also noted that he had begun to eat uncooked meat dishes, mainly beef and sometimes pork, in recent years because of a nostalgic feeling for Thai foods, suggesting that the infection had occurred in Japan. Praziquantel was administered at 1200 mg and one worm was excreted (Fig. 2C). Although the expelled worm lacked the scolex, no passing of additional proglottids occurred after that treatment. Based on DNA analysis of the proglottid targeting Cox1 sequences, the worm was identified as *T. saginata*.

Discussion

Taeniasis is caused by infection with an adult *T. solium*, *T. saginata*, or *T. asiatica* species tapeworm, and occurs in individuals who have ingested raw or undercooked beef or pork, with the distribution of first two species worldwide, while that of the latter is restricted to Asian countries^{1, 5, 6}. The Case 1 patient had consumed raw beef and pork while visiting Thailand, where a taeniasis infection caused by any of *T. solium*, *T. saginata*, and *T. asiatica* is known to be prevalent, suggesting that this infection had occurred during that visit. As for Case 2, the patient had never travelled outside of Japan during the 20-year period prior to our initial examination. However, he had recently started to consume raw beef and pork because of a feeling of nostalgia for life in Thailand, suggesting that the infection was domestic and had occurred in Japan.

Most individuals with a tapeworm infection are asymptomatic, except for some discomfort due to persistent expulsion of the proglottids, as seen in the present cases. Therefore, the diagnosis of taeniasis is usually confirmed based on proglottid morphology findings. The proglottids expelled in both cases were thick and actively motile, and showed more than 20 lateral uterine branches, consistent with known characteristics of *T. saginata* rather than *T. solium*. However, a morphological approach has some limits for accurate determination of tape worm species. In addition, recent awareness of taeniasis due to infection with *T. asiatica* occurring inside Japan has increased the necessity of diagnosis based on nucleotide sequence



Fig. 2.

A. Stereoscopic image of one of the expelled proglottids in Case 2.

B. Egg found in feces with radially striated shell.

C. Expelled worm after praziquantel administration lacking scolex.

analysis of targeted genes. We performed differential diagnosis using multiplex PCR for Case 1 using a previously reported method²⁾ and determined the worm to be *T. saginata*. Furthermore, analysis of the COX1 nucleotide sequence performed at the Department of Parasitology of NIID confirmed that the worms were *T. saginata* in both of the present cases.

According to recent reviews concerning taeniasis in Japan⁶⁻⁹⁾, 183 cases were reported during the period from 1990 to 2017, of which details of 110 were presented. The most commonly encountered cases were infection due to *T. saginata* (n=68), followed by that due to *T. asiatica* (n=37) or *T. solium* (n=5). Sixty of the 68 cases caused by *T. saginata* occurred in Japan residents who had recently visited Asia, Africa, and Europe and consumed raw beef, the same as the present Case 1. In contrast, very few cases of domestic infection were found, less than 8 in the 27-year period from 1990 to 2017.

We have investigated recent outbreaks of *T. asiatica*-caused taeniasis that occurred in Tokyo and surrounding suburbs, which totaled approximately 40 patients, including autochthonous^{1, 10, 11)} and imported¹²⁾ cases. It is considered that macroscopic observation findings of worms or proglottids are indistinguishable between *T. saginata* and *T. asiatica*¹³⁾. Therefore, for the present patients, we decided to employ DNA diagnosis and requested the Department of Parasitology of the NIID to perform identification of the worm species.

In summary, we encountered two cases of taeniasis caused by *T. saginata*, one in a Japanese individual who was infected while travelling in Thailand and the other a Thai individual who was infected in Japan. Both were largely asymptomatic except for passing proglottids and praziquantel administration was successful to expel the causative worm. In addition to morphological observation of obtained proglottids, DNA analysis was helpful to determine the species of the worms.

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Conflict of interest

There are no conflicts of interest to declare.

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