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Human taeniasis is a foodborne parasitic disease caused by intestinal infection with the adult tapeworm belonging to the genus *Taenia*. There are three species that can be transmitted to humans through the ingestion of infective larvae (cysticerci) in meat: *Taenia saginata* in beef, *T. solium* in pork, and *T. asiatica* in pork liver. Whereas the former two species have a worldwide distribution, *T. asiatica* is geographically limited to Asian countries (1). In Japan, *T. asiatica* was previously believed not to be endemic (2). However, a recent outbreak of autochthonous *T. asiatica* infection implies that the parasites were imported and spread to local pig farms, at least temporarily (3). Herein we report a case of *T. asiatica* infection, suggesting the possibility of a reintroduction of the parasites into Japan.

The patient was a 48-year-old Japanese man who lived in Chiba, a neighboring prefecture of Tokyo, in the Kanto region. He presented to our hospital with a one-week history of daily passage of small motile pieces in his stool in mid-March of 2017. He thought that the pieces might be parasitic worms and at first took an over-the-counter antihelmintic medication (pyrvinium pamoate) without medical consultation, but did not see any improvement. He had no other symptoms. There were no remarkable findings on physical examination and laboratory tests revealed an IgE level of 1,475 IU/ml. Although a stool examination performed at that time was negative for ova and parasites, a sample of pieces he expelled a few days before his first visit and presented to us looked like tapeworm segments. Therefore the piece was subjected to molecular identification. DNA was extracted from a single piece using a DNeasy Blood & Tissue Kit (QIAGEN, Germany) and analyzed using PCR amplification and subsequent sequencing of the mitochondrial cytochrome *c* oxidase subunit 1 (*cox1*) gene (4); the sequence (LC405943) was completely identical to an isolate of *T. asiatica* (AB107236). It has been reported that there is the existence of hybrids between *T. asiatica* and *T. saginata* (5). To identify the presence of hybridization, we analyzed two nuclear genes, elongation factor-1-alpha (*ef1*) and ezrin-radixin-moesin-like protein (*elp*).
The allelic analysis revealed that the present worm was homozygous for both loci (B/B at \textit{efl} and B/B at \textit{elp}), and therefore precluded the possibility of hybridization (LC405944 for \textit{efl} and LC405945 for \textit{elp}). As a result, the patient was treated with praziquantel (20 mg/kg body weight) as a single dose, and three hours later, he excreted a 2.8 m-long strobila (Figure 1), but no scolex was recovered. He has been followed up for one year without recurrence.

The patient had never been abroad, but he used to consume raw pork liver several times a year. In Japan, pigs are usually produced, slaughtered and consumed within a region. He had purchased and consumed such pork livers from retail stores of an abattoir. Because of this dietary history, he was diagnosed as a case of local \textit{Taenia asiatica} infection. Although \textit{T. asiatica} infection was first described in Japan in 1998, it appears not to be distributed in the country. However, from 2010 through 2013, domestic infections of \textit{T. asiatica} due to the ingestion of raw pork liver have been diagnosed in the Kanto region, including Tokyo, Gunma, Tochigi, Saitama, Chiba, and Kanagawa Prefectures (3, 6-9). The outbreak disappeared without any intervention, but the route of importation remains uncertain until now. In 2016, a \textit{T. asiatica} infection was identified in a resident of Chiba Prefecture (10) and, like our case, the patient acquired the infection through the consumption of the pork liver from pigs that raised and processed in the Kanto region. These two new cases suggest that \textit{T. asiatica} was reintroduced to pig farms in the region. If the delivery of the infected pigs continues it could result in an outbreak of \textit{T. asiatica} taeniasis again.

Intestinal tapeworm infections can be easily treated with praziquantel, and therefore physicians tend to have less interest in identifying the causative agent of a case. Nonetheless, we underline the importance of having exact species identification. The recent increase in the number of both Japanese overseas travelers and immigrant workers may result in the
importation of an exotic parasite such as *T. asiatica*. We wish physicians as well as public health professionals to pay their attention to this issue.

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References


Figure legend

Figure 1: *Taenia asiatica* strobila expelled after treatment with praziquantel.