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Case Report

The first case of human invasion by *Clinostomum complanatum* in the European part of Russia

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ABSTRACT

The article presents a rare case of human invasion by the trematode *Clinostomum complanatum* in the European part of Russia. The diagnosis was established based on a parasitological study of flukes removed from the tonsils and pharynx of a 42-year-old woman, a resident of the Tambov region of Russia.

Introduction

Zoonotic biohelminthiasis caused by the trematode *Clinostomum complanatum* (Rudolphi, 1814) is widespread throughout the world. The definitive hosts of the helminth are many species of piscivorous birds. The biological cycle of this helminthiasis is complex and occurs with a change of two intermediate hosts - freshwater gastropods (pond snails of the genus *Lymnaea*, etc) and various species of freshwater fish, including catfish, pike, pike perch, perch, and about 20 species of carp fish as well as amphibians. Definitive hosts (piscivorous birds) become infected by eating infected fish [1]. It should be noted that among the rare helminthiasis registered in Russia, zoonotic trematodes are not uncommon [2].

Mature *C. complanatum* has a flat, elongated, translucent reddish-yellow body 4-5 mm in length and about 1.5 mm in width.

Migratory birds fly over long distances, spreading clinostomiasis and infecting freshwater ecosystems all over the world. The infection rate of some species of piscivorous birds, in particular the family Ardeidae, can reach 100% [3]. The larvae (metacercariae) of *C. complanatum* are often found in fish living in rivers flowing into the Black, Azov, and Caspian Seas [4]. Data on high infestation of freshwater fish by *C. complanatum* larvae in some European countries (Italy and Croatia) [1,5], as well as Latin America (Brazil) [6,7], have appeared in recent years.

Humans become infected with *C. complanatum* extremely rarely by eating fish containing viable metacercariae [8,9]. In these rare cases, these flukes act in relation to a person as a "guest parasite" or "xenoparasite". These terms refer to obligate parasites that accidentally enter a host other than their natural host but can parasitize in its body for some time. The clinical prognosis for clinostomiasis is favorable; complications from this infection have not been recorded. Treatment of patients involves mechanical removal of helminths from the oropharynx, after which recovery occurs. Drugs for anthelmintic therapy have not been developed due to the peculiarity of the localization of helminths.

Case description

A 42-year-old woman, a resident of the city Kotovsk, Tambov region (Central region of Russia) previously healthy, became ill on August 29, 2022, when she felt a slightly sore throat. She consulted a doctor on the 2nd day of illness with complaints of a sore throat, discomfort, pain when swallowing and a sensation of a foreign body in the throat, salivation, and cough when inhaling. Based on the results of the examination, the doctor diagnosed tonsillitis and prescribed treatment (antibiotics, antimicrobial and antiseptic medications). The doctor did not attach due importance to the patient's complaints about the presence of foreign ob-

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Figure 1. Mature *C. complanatum* natural size (a); mature *C. complanatum* microscopy x10 (Scale bar = 1 mm) (b); egg of *C. complanatum* microscopy x400 (Scale bar = 1 μm) (c).

jects in the throat, referring to possible subjective sensations that can be observed with tonsillitis.

Despite the treatment during the next 2 days, the patient had an increased feeling of constant moving and crawling of foreign bodies on the back wall of the pharynx and the tonsils.

On March 09, 2022, the patient on their own examined the oropharynx using a mirror and discovered a “small moving object” that was located on the back wall of the pharynx. She attempted to self-dislodge the foreign body using a cotton swab or gargle unsuccessfully. Then the patient visited an otolaryngologist at a commercial medical center.

During laryngoscopy, the otolaryngologist found two mobile parasites on the back wall of the pharynx and removed them with tweezers. The helminths were placed in a container with 0.9% NaCl and sent for identification to the laboratory of the Center for Hygiene and Epidemiology in the Tambov region. Despite the manipulations, over the next 2 days, the patient continued to have an unpleasant feeling of a foreign body, which moved in the pharynx and was accompanied by a sore throat. The woman visited a parasitologist, who referred the patient for additional examination to the otorhinolaryngology department of the Tambov City Clinical Hospital.

The general clinical blood test and main biochemical parameters (alanine transaminase, aspartate aminotransferase, bilirubin, alkaline phosphatase) were within the population average values. During laryngoscopy, the doctor discovered and removed two more similar parasites from the back wall of the pharynx and one from the right posterior palatine arch. The patient was diagnosed with chronic tonsillitis and parasitic infestation. The removed parasites were sent for identification to the Rostov Research Institute of Microbiology and Parasitology and to the parasitological laboratory of the S.M. Kirov Military Medical Academy (St. Petersburg). There the parasites were identified as sexually mature egg-producing specimens of *Clinostomum complanatum* (Figure 1).

Later, it was estimated that 3 days before the onset of the first clinical symptoms, the patient and his family fished in the Kotovsky Reservoir in the Tambov region and caught perches. The fish was fried and eaten by the whole family. However, the patient, a follower of Korean cooking, “for herself” some of the perches were cold-marinated (water, salt, sugar, and vinegar) and eaten. Other family members did not eat marinated fish.

A total of five specimens of *C. complanatum* were removed from the patient’s oropharynx, after which all clinical symptoms disappeared within 2 days and complete recovery occurred. Stool examinations for the presence of fluke eggs showed a negative result.

Discussion

Sporadic cases of clinostomiasis in humans are extremely rare and have been reported in Asia. The first case of human infection with *C. complanatum* in Japan described by the literature date back to 1938 [8]. According to researchers, by 2014, 19 cases of human infection with clinostomiasis were reported in Japan [9].

From 1995 to 2019, four cases of human clinostomiasis were registered in Korea, however, according to Korean experts, there are many more such cases in this territory. The largest number of cases of human infection was noted in the countries of Southeast Asia (Japan, Korea) [10], where local cuisine has traditions of eating river fish without adequate processing. Only two cases were reported in Israel in 1944 and in India - 1 in 1945 [8].

Metacercariae of *C. complanatum*, like metacercariae of other trematodes, can remain viable when heated to a maximum of 55-65°C. Thus, the thermal processing of fish completely prevents the possibility of infection with clinostomiasis. Table salt is also harmful to metacercariae. Salting fish on an industrial scale in compliance with technological protocols makes the fish safe for consumption. However, salting freshly caught freshwater fish at home does not always lead to the destruction of metacercariae. The spread of culinary traditions of Southeast Asian countries in almost all countries of the world (rolls, sushi, sashimi), which do not provide for adequate processing of fish, increases the risk of infection by this helminthiasis in humans.

The Tambov region is located in the southern part of the East European Plain, in the central part of the Oka-Don Plain. (52°43'12" N 41°27'11" E). There are no data in the literature on human cases of clinostomiasis outside Asia. Thus, the case of infection of a resident of the Tambov region of Russia is particularly interesting. This case represents the first description of the invasion with *Clinostomum complanatum* (Rudolphi, 1814) in humans in Europe.

Declarations of competing interest

The authors have no competing interests to declare.

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Author contributions

Sergey Kozlov, Larisa Ermakova, and Marina Zotova managed the clinical case and drafted the first version of the manuscript. Sergey Nagorny, Natalia Golovchenko, Victoria Telicheva, and Julia Kiosova performed parasitological studies and reviewed and supervised the final version of the manuscript. Natalia Pshenichnaya contributed substantially to the critical revision of the manuscript.

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