INTRODUCTION

Balantidium coli is considered the largest protozoon and the only ciliated protozoon known to infect humans and nonhuman primates [1]. However, human infection with B. coli is uncommon despite its potential for worldwide distribution [1], which predominantly occurs in tropical and subtropical regions [2]. To our knowledge, only 18 single-case reports of human infections with B. coli have been found in English literature in limited countries from 2001 until now (Table 1). As for China, very few human B. coli infections have been detected and it is rarely seldom for Chinese clinicians or laboratory technicians to consider B. coli as a possible pathogen in patients with diarrhea or dysentery; however, here we report a case of intestinal balantidiasis in China, which indicates possible occurrence of Balantidium coli-related disease in cooler climates. This case is presented not only because of its rarity but also for future references.

CASE DESCRIPTION

A 68-year-old man from Liulin County, Luliang City, Shanxi Province, North China (37°25′48.89″ N, 110°53′21.73″ E) was admitted to Emergency Department with complaints of a one-week history of abdominal pain, tenesmus, diarrhea with blood and mucus. He also reported a series of symptoms of anorexia, nausea, vomiting, muscular weakness and weight loss. An epidemiological investigation revealed that he was employed as a pig farmer for 4 months.

Routine blood testing upon admission displayed mild anemia (hemoglobin 111 g/L, reference interval 130-175 g/L). Serum potassium (2.94 mmol/L, reference interval 3.5-5.3 mmol/L), sodium (133.6 mmol/L, reference interval 137-147 mmol/L) and chloride (98.0 mmol/L, reference interval 99-110 mmol/L) were all outside normal limits. Stool occult blood testing was positive. Unpreserved bloody and mucus-containing stool was submitted to the laboratory. Microscopic observation in wet preparation demonstrated 4+ red blood cells and 4+ white blood cells per high power field. Uniformly covered with short cilia, some large oval trophozoites (approximately 50 μm by 80 μm) exhibiting rapid rotary-type motion were captured (Fig. 1A). Two nuclei within the trophozoite were displayed in Wright-Giemsa stained smear, a smaller round micronucleus nestling against a larger kidney-shaped macronucleus (Fig. 1B).

According to the result of morphological observation, the large active ciliated trophozoites were identified as B. coli easily. Combining clinical manifestations, diagnosis of dysentery caused by B. coli was soon established, which was further substantiated by the patient’s experience of working as a pig farmer because swine serves as the most important reservoir host for human infection with B. coli [1]. Once diagnosis was clear, oral metronidazole therapy for 2-weeks (750 mg 3 times daily) was administered to the patient which resulted in a full recovery. There were no further recurrences of B. coli in stool after 6 months of follow-up.
The clinical manifestations of human infections with *B. coli* can range from mild asymptomatic cases to cases of severe dysentery, which can even progress to life-threatening consequences [1]. Theoretically, the symptoms of *B. coli*-induced colitis may be confused with amebic colitis, hence *B. coli* and *Entamoeba histolytica* should be considered within a differential diagnosis of parasitic diarrhea or dysentery [2], which is not difficult, in fact, because of their different sizes and modes of motion. Meanwhile, many extraintestinal sites of *B. coli* disease have been reported, which can be seen from the results of cases review (Table 1). It is worth mentioning that it should be careful to differentiate between *B. coli* trophozoites and ciliated epithelial cells from pulmonary specimens [20].

The life cycle of *B. coli* consists of cysts or trophozoites. Trophozoites and cysts are both characterized by 2 nuclei. However, the micronucleus is usually not visible within the tropho-

**Table 1.** Literature reports of human infections caused by *Balantidium coli* (since 2001)

| Sex | Age | Country   | Detected specimen                   | Year of publication | Reference |
|-----|-----|-----------|------------------------------------|---------------------|-----------|
| F   | 71  | Greece    | bronchial secretions                | 2003                | [3]       |
| M   | 32  | Venezuela | stool                               | 2003                | [4]       |
| M   | 42  | Canada    | bronchoalveolar lavage fluid        | 2003                | [5]       |
| F   | 58  | Greece    | bronchoalveolar lavage fluid        | 2003                | [6]       |
| F   | 47  | Turkey    | stool                               | 2004                | [7]       |
| M   | 54  | France    | anatomic colon specimen             | 2004                | [8]       |
| F   | 29  | India     | urine                               | 2007                | [9]       |
| M   | 20  | South Africa | bronchoalveolar lavage fluid      | 2010                | [10]      |
| M   | 56  | Italy     | urine                               | 2010                | [11]      |
| M   | 60  | India     | histological examination           | 2013                | [12]      |
| F   | 72  | India     | urine                               | 2013                | [13]      |
| M   | 23  | France    | stool                               | 2013                | [14]      |
| M   | 68  | India     | urine                               | 2014                | [15]      |
| F   | 55  | India     | urine                               | 2014                | [16]      |
| M   | 37  | India     | stool                               | 2016                | [17]      |
| M   | 48  | India     | liver aspirate                      | 2016                | [2]       |
| M   | 22  | India     | corneal scrapings, CL cleaning solution | 2016       | [18]      |
| M   | 60  | India     | urine                               | 2016                | [19]      |
zoite or cyst in both stained preparations and on wet mounts [20]. Surprisingly, the micronucleus in trophozoites was observed in Wright-Giemsa stained smear in our case. It is often difficult to distinguish motionless trophozoites from cysts. One important difference is that cilia are visible surrounding trophozoites but invisible in cysts form because cilia are contained within cysts wall [20].

Laboratory diagnosis of B. coli-induced infection is relatively easy because of rapid spiraling motility and large size of trophozoites. Routine stool examinations, particularly wet-preparation examinations of fresh stools are of practical significance and permanent stained smear is not strictly necessary because B. coli are so large that they tend to stain very darkly, which is not conducive to observe the ciliate and internal structure. Some clearer images of trophozoite in Wright-Giemsa stained smear were lucky to be captured in this case.

In conclusions, the present case is a rare report of human infection caused by B. coli in China, which imply the likelihood of development of B. coli-induced human infections in cooler climates. The cases review since 2001 provides valuable data for the framework of human infections in B. coli worldwide.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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