Urinary balantidiasis: A rare incidental finding in a patient with chronic obstructive pulmonary disease

ABSTRACT
Balantidiasis is a rare zoonotic disease in humans. Balantidium coli is the causative ciliated protozoan. We present a case of urinary balantidiasis in a patient having chronic obstructive pulmonary disease (COPD) who was on steroids for a long time. He has no symptoms of bowel or urinary involvement. We are reporting this case because of its rarity in human urine and also for future references.

Key words: Balantidiasis; Balantidium; Balantidium coli (B. coli); stool; urine; zoonotic

Introduction
Balantidium coli (B. coli) is the only ciliated protozoan that is known to infect humans.[1] Balantidiasis is a zoonotic disease occurring in humans via the feco-oral route from the normal host, the pig. Water is the vehicle for most cases. Human-to-human transmission may also occur. Balantidium’s habitats in humans are the cecum and colon. However, it may be found in rare extraintestinal sites such as liver, lung, and genitourinary tract.[2] B. coli can become an opportunistic parasite in immunosuppressed hosts living in urban environments, where pigs are not a factor in infection. In this case report, B. coli was incidentally found in the urine of a patient having chronic obstructive pulmonary disease (COPD) who was on steroids for a long time. This case is presented because of its rarity and for the purpose of documentation.

Case Report
A 60-year-old male presented with complaint of dyspnea. He was a known case of COPD for 10 years and was on steroids. The patient had no history of diarrhea, other gastrointestinal (GI) symptoms, previous urinary tract infection, or urethral discharge. He was also taking bone broth/soup. As a routine work-up urine sample was received. The urine was pale yellow in color and acidic. Sugar and albumin were absent. On wet film microscopy, several oval-to-oblong ciliated parasites that were approximately 75 × 50 µm in size were seen swimming rapidly across the slide [Figure 1a]. Cilia were not identifiable. Two to three pus cells per high power field and few candidal pseudohyphae and spores were also present. Cytosmears were prepared from the urine sediment to identify the morphology. Both hematoxylin and eosin (H&E) and Giemsa staining were done. In H&E stained smears [Figure 1b], cytoplasmic food vacuoles and macronucleoli were seen and faint impression of cilia was noted. In Giemsa stained smears [Figure 1c and d], the parasite was identified and

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the body was covered with short and delicate cilia that were all of uniform length. To exclude contamination, we examined two repeat urine samples that were collected under sterile condition. These samples also revealed similar organism. Based on the morphology and swimming pattern, a diagnosis of urinary balantidiasis was made.

Complete hemogram and biochemistry profiles were within normal limits. Serology for human immunodeficiency virus (HIV) and hepatitis B surface antigen (HbsAg) were negative. His fecal samples and bronchoalveolar lavage fluid samples were negative for trophozoites/cysts of *B. coli*. No history of contact with pigs or overcrowded environment was present.

The patient was very sick at the time of admission, later he was intubated and kept on ventilator. The patient died after 4 days of admission. The death was most likely due to complications of COPD.

**Discussion**

Malmsten was the first to recognize *B. coli* in two humans with dysentery in the year 1857.\(^1\)\(^,\)\(^3\) It is the largest ciliated protozoal parasite inhabiting the large intestine of human being. The pig is the common reservoir of infection but the parasite is harmless to the host as the parasite thrives mainly on starchy food that is abundant in pig’s intestine.\(^4\) The scarcity of starchy food in the human bowel explains the rarity of balantidial infection in man. Balantidium has a simple life cycle. Cyst is the infective stage, when ingested liberates trophozoites in the large intestine, which may remain in the bowel or may invade submucosal coat of the bowel. They multiply by binary fission. The trophozoites and cysts of *B. coli* are shed in feces and if the cysts, in particular, contaminate drinking water or food, the infection can be spread to other pigs or humans. No intermediate host is needed. The trophozoite measures 30-150 µm in length and 25-120 µm in width; the cyst, which may be spherical or slightly ovoid, measures 40-60 µm in diameter. The mouth (oral apparatus) is located at the tapering anterior end, and the cytopyge (anus) is located at the rounded posterior end. A groove leading to mouth is noted at the anterior end. It contains two nuclei and many cytoplasmic vacuoles. The body is covered with a delicate pellicle showing longitudinal striations. The cilia are short and delicate and are of uniform length. Balantidium causes no serious disease of the GI tract; however, in conditions such as malnutrition, alcoholism, or a compromised immune system, it can lead to disease.\(^1\)\(^,\)\(^4\)

In our case, the source of infection is not clear. The patient had no history of contact with pigs, but he had history of intake of bone broth. One possible cause that we think is infection through improperly cooked bone broth. Second possibility is immunosuppression because of the long-term steroid intake. Third hypothetical possibility is the ascending infection from the urine pot that was washed with plain contaminated water.

*B. coli* should be differentiated from *Trichomonas vaginalis* (*T. vaginalis*), *Entamoeba histolytica* (*E. histolytica*), Ciliocytophthoria phenomenon. In urine, we can sometimes find *T. vaginalis*, a flagellated motile parasite. It can be differentiated easily from *B. coli* by its morphology and motility.\(^5\) In stool, the differential is trophozoite stage of *E. histolytica*. It moves on the slide surface by means of an anterior ectoplasmic pseudopod and is smaller (around 25 µm) in diameter. In addition, mature cysts are smaller and quadrinucleate as compared to binucleate *B. coli* cysts. In case of samples taken from anatomic locales that are lined by ciliated columnar epithelium, ciliocytophthoria phenomenon should be excluded.\(^5\) Ciliocytophthoria are much smaller (average 12 × 10 µm) anucleated cells with cilia along one edge.

Many cases of *B. coli* infection in the stool sample have been reported worldwide. However, in urine there were only a few case reports available. We have found only two case reports\(^6\)\(^,\)\(^7\) of isolated urinary balantidiasis from India while the rest showed coinfection with *T. vaginalis*.\(^8\)\(^-\)\(^10\) Umesh reported a case of a 29-year-old woman with cystitis due to *B. coli*.\(^6\)

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**Figure 1:** (a) (wet film microscopy of urine). Oval-to-oblong ciliated trophozoites containing cytoplasmic food vacuoles (thin arrows). (b) (H&E, 40×) Trophozoites of *B. coli* in urine showing cytoplasmic food vacuoles and faint impression of cilia (thick arrow). (c and d) (Giemsa, 40×) Trophozoite of *B. coli* in urine covered with short and delicate uniform length cilia (thin arrows)
Karuna et al. reported urinary balantidiasis in a 68-year-old farmer having diabetes and chronic kidney disease.\[7\] To the best of our knowledge, this is the third case report of isolated urinary balantidiasis from India.

**Conclusion**

*B. coli* can be found in urine in the absence of diarrhea or urethritis. An experienced pathologist should review such cases. Rapid spiraling motility and cytosmears stained with Giemsa and H&E stains are very useful in morphological identification. An experienced cytologist has an added value in the diagnosis. Balantidiasis may occur as an opportunistic infection in immunosuppressed states. Effective sanitation, use of clean water, and consumption of properly cooked food are probably the most effective ways to prevent balantidiasis in humans.

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**Conflicts of interest**

There are no conflicts of interest.

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