Quiz Case

Rare infection diagnosed by cytology in a bronchoalveolar lavage specimen in a patient with massive pulmonary hemorrhage

Megha Joshi, MD1, Geetanjali Scarff, EMT2

1Department of Pathology, Winchester Hospital, Winchester MA, 2Department of Biology, Northeastern University, Boston MA, United States.

A 62-year-old male presented with hemoptysis. At bronchoscopy, the pulmonologist could not visualize the bronchial tree due to massive pulmonary hemorrhage. Bronchial alveolar lavage fluid was sent to the microbiology laboratory for examination. Wet prep revealed numerous, large ciliated organisms with rapid spiraling movement. Multiple videos captured from the wet prep show a large organism with continuous movement rotating around itself and moving rapidly. Various sizes of organisms are noted, some quite large in size.

Video 1: Wet preparation of bronchial lavage shows ciliated organism with spiraling movement

Q1. On reviewing the video (Video 1), what is your interpretation?

A. Entamoeba histolytica
B. Trophozoite of lung fluke
C. Cyst of Balantidium coli
D. Trophozoite of Balantidium coli.
The correct answer is

Q1-D. Trophozoite of Balantidium coli.

*Balantidium coli* infection occurs throughout the world,[1] but is most common in tropical countries. It is a zoonotic infection,[1] with pigs being the most common cause of human infection. Humans, like pigs, are often asymptomatic.[2] The most common manifestation in symptomatic patients is diarrhea. The infection can mimic acute colitis,[3] with abdominal pain, nausea, vomiting, diarrhea, and weight loss. Extracolonic manifestations with pulmonary hemorrhage[4,5] and involvement of the urinary system are rare.[6] The infection is easy to treat with tetracycline or metronidazole. Doxycycline has also been employed.[7] Drug resistance has not been reported.[8]

*B. coli* is the largest protozoan ciliate parasite that infects humans.[1] Humans get infected when *B. coli* cysts from the pig feces contaminate water and food.[5] Once ingested, the cysts form trophozoites which are ciliated protozoans. The trophozoites, in turn, form cysts that are excreted through the stool, and the disease is thus transmitted. Organic farmers who use aerosolized pig manure can get infected, and inhalation of the cysts can result in pulmonary cavities and hemorrhage.[5] Pulmonary disease can occur without an enteric infection. The trophozoites can be of varying sizes, with some trophozoites as large as 200 microns.[1] *B. coli* does not stain well on permanent smears,[9] and the diagnosis is best made by examining wet preps.[6] On unstained wet preps, the trophozoite is recognized by its large size, cilia, and spiraling motility [See Video 1].[8] *B. coli* is often a neglected organism, and as such, it has not been widely researched.[1]

The organism was first recognized by Malmsten[1] in 1857, in two Swedish patients who presented with dysentery. Malstern thought it was a *Paramecium*, and since it was from the colon, coined the name *Paramecium coli*. This name was short-lived. Soon after in 1861, Leuckart[1] discovered the organism in pigs. Later, Stein discovered that Leuckart’s organism from the pigs, and Malmsten’s organism from the humans was the same, and called it *B. coli* (Greek Balanto = bag).

Although *B. coli* is most known for causing diarrhea and infecting the colon, extraintestinal manifestations[7] are possible. Because of the rarity of *B. coli* in Western countries, the infection may go undiagnosed, especially in an extracolonic location. *B. coli* infections have been reported to cause necrotizing cavities in the lung,[5] infections in immunocompromised hosts,[2,7] serious infections in transplant patients, and even infections in the bone causing vertebral osteomyelitis.[2] Infections of the peritoneal cavity, genitourinary tract, and appendix have been reported.[2] Occasionally, *B. coli* infections can be seen in immunocompetent hosts without exposure to pigs. With the advent of the internet, and the use of Google, timely, immediate diagnosis of *B. coli* is possible in an unusual clinical setting. YouTube videos can be used as important learning tools, to demonstrate the motility of the organism, so that they are easily recognized in unusual clinical settings. The patient recovered completely after treatment with antibiotics.

**ADDITIONAL QUIZ QUESTIONS**

Q2. What is the best way to diagnose *Balantidium coli*?

a. Wet preparations  
b. Stained smears  
c. Culture  
d. Serum tests.

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Q3. *Balantidium coli* can cause extracolonic diseases involving which sites?

a. Lung with pulmonary hemorrhage and necrotizing cavities  
b. Peritonitis  
c. Appendicitis  
d. Genitourinary tract infections  
e. All of the above.

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Q4. Which of the following is true regarding *Balantidium coli*?

a. It is the largest ciliated parasite to infect humans  
b. It is a zoonotic disease  
c. Pig to humans is the most common mode of transmission  
d. Most pigs and humans are asymptomatic  
e. All of the above.

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Corrected answer for Q2 to Q4:
Q2-a, Q3-e, Q4-e

SUMMARY

*Balantidium coli* is an unusual organism in a bronchial lavage specimen and hence may be missed. *B. coli* are usually detected in the stool and can cause diarrhea. In unusual and rare instances, *B. coli* can lead to massive pulmonary hemorrhage. A clue to the diagnosis is the large size of the trophozoites, the presence of cilia and the characteristic spiraling movement.

COMPETING INTERESTS STATEMENT BY ALL AUTHORS

The authors declared that they have no competing interests.

AUTHORSHIP STATEMENT BY ALL AUTHORS

Each author has participated sufficiently in the work and take public responsibility for appropriate portions of the content of this article. All authors read and approved the final manuscript. Each author acknowledges that the final version was read and approved.

ETHICS STATEMENT BY ALL AUTHORS

As this is case without identifiers, our institution does not require approval from the Institutional Review Board (or its equivalent).

LIST OF ABBREVIATIONS (In alphabetic order)

*B. coli* – *Balantidium coli*.

EDITORIAL/PEER-REVIEW STATEMENT

To ensure the integrity and highest quality of CytoJournal publications, the review process of this manuscript was conducted under a **double-blind model** (authors are blinded for reviewers and vice versa) through automatic online system.

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