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Vancomycin Treatment for Pneumobilia in *Clostridioides difficile* Infection: A Case Analysis

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 **Christos Vallilas**
ABD 1 **Alexandros Avdis**
BCDEF 1 **Olympia Alexandri**
CDEF 1 **Georgia Philippa**
CDE 1 **Konstantinos Cardamakis**
BD 2 **Penelope Lambropoulou**
ABCDEF 1 **Aikaterini Toulitatu**

1 Second Department of Internal Medicine, G. Gennimatas General Hospital of Athens, Athens, Greece
2 Department of Radiology, G. Gennimatas General Hospital of Athens, Athens, Greece

Corresponding Author: Christos Vallilas, e-mail: chris-vallilas@hotmail.com
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Patient: Male, 20-year-old
Final Diagnosis: Pneumobilia
Symptoms: Diarrhea
Clinical Procedure: —
Specialty: Infectious Diseases

Objective: Unusual clinical course





Background: Pneumobilia is the presence of air within the biliary tree. It is a relatively rare condition, usually caused by an abnormal communication between the biliary system and the gastrointestinal tract, or by infection from gas-forming bacteria. Antibiotic agents such as fluoroquinolones have many adverse effects, including *Clostridioides difficile* infection manifesting as colitis. Metronidazole has been used in the past and vancomycin and fidaxomicin can have good therapeutic results.

Case Report: A 20-year-old man presented to Gennimatas General Hospital in Athens, Greece due to multiple episodes of diarrhea. He had received a 7-day treatment of oral levofloxacin, a common antibiotic treatment often used to treat *Clostridioides difficile* infection, until 10 days before presentation to our hospital as an outpatient treatment for mild pneumonia. Blood test revealed neutropenia and thrombocytopenia, and biochemical tests revealed hypokalemia and elevated inflammation markers. A CT scan of the abdomen showed pneumobilia. Blood and urine cultures were sterile, whereas *Clostridioides difficile* toxins A+ and B+ were detected in stool culture. Treatment with oral vancomycin had excellent results. The patient improved clinically and remained afebrile, with cessation of diarrhea, correction of electrolytic disorders, and disappearance of pneumobilia on a repeat CT scan after 1 week.

Conclusions: Pneumobilia caused by *Clostridioides difficile* infection was effectively treated with orally administered vancomycin, which cured our patient's diarrhea and pneumobilia.

Keywords: *Clostridioides difficile* • Colitis • Diarrhea • Tomography Scanners, X-Ray Computed • Vancomycin

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/947628>

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Introduction

Pneumobilia is defined as the presence of air in the biliary system. It can be detected on abdominal ultrasound, computed tomography (CT) or magnetic resonance imaging (MRI). It is a rare condition. Pneumobilia indicates an underlying pathological condition or a previous medical procedure. Procedures such as endoscopic retrograde cholangiopancreatography (ERCP), biliary stenting, or surgical biliary reconstruction can introduce air into the biliary system. Infections like emphysematous cholecystitis, caused by gas-forming bacteria (eg, *Clostridium perfringens*), can lead to pneumobilia. Obstruction of the bile ducts (eg, by a tumor or gallstone) can occasionally cause air to be trapped in the biliary tree. Dysfunction or abnormal relaxation of the sphincter of Oddi (the muscle controlling the flow of digestive juices through the bile and pancreatic ducts) can allow intestinal air to enter the biliary system [1,2].

Case Report

A 20-year-old man presented to Gennimatas General Hospital in Athens Greece due to multiple episodes of diarrhea starting 1 week before presentation at our hospital. He had a medical history of suffocation 3 years ago, being bedridden afterwards and fed through a feeding tube, receiving sachet esomeprazole 10 mg ×1 and lacosamide tablets 50 mg ×2. A year ago, he suffered obstructive ileus, which was surgically treated. Fifteen days before presentation, he was diagnosed with lung infection, for which he received oral levofloxacin.

Upon admission, he had axillary temperature 38.3°C, blood pressure 100/60 mmHg, heart rate 95 bpm, oxygen saturation 95% on ambient air, and respiratory rate 20 breaths per minute. Lung auscultation was normal on both lungs.

Routine laboratory blood results showed neutropenia, thrombocytopenia, low potassium serum levels, and elevated

inflammation markers (Table 1). The neutropenia and thrombocytopenia were attributed to lacosamide, which gradually was substituted with sodium valproate. The hypokalemia was caused by diarrhea. A CT scan of the abdomen demonstrated colitis and pneumobilia (Figure 1A-1C).

The patient was first treated as having neutropenic fever with IV piperacillin/tazobactam and vancomycin. Multiple blood cultures were sterile, and a urine culture was negative. *Clostridioides difficile* toxins A+ and B+ were detected in stool culture. As soon as *Clostridioides difficile* infection was confirmed, the intravenous antibiotics and esomeprazole were stopped and treatment with oral vancomycin 125 mg 4 times every day was started. Watery stools gradually reduced and inflammatory markers subsided. The patient remained afebrile, with normal blood pressure. A week later he underwent a second CT scan of the abdomen, which showed normal liver without pneumobilia (Figure 2A, 2B).

Discussion

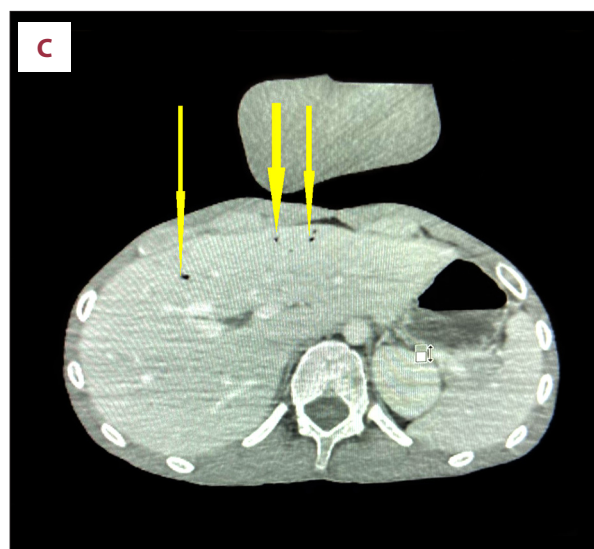
This is a medical case that combines diarrhea with pancytopenia in a patient with epilepsy, long-term bed rest, and recent antibiotic intake. Computed tomography results directed the attending physicians to investigate the presence of air in the biliary system. The rapid detection of *Clostridioides difficile* in stool and the immediate initiation of treatment with oral vancomycin resulted in reduction of diarrhea. The absence of other predisposing factors that potentially could induce pneumobilia and the disappearance of the air in the biliary tree on the second CT scan, after the successful treatment of the *Clostridioides difficile* infection, suggested that the latter was the cause of the pneumobilia.

Clostridioides difficile is a gram-positive, anaerobic, spore-forming, toxin-producing bacterium. It grows best at 37°C and is transmitted via the fecal-oral route. There are 2 forms of the

Table 1. Blood and biochemical tests at specific times of hospitalization.

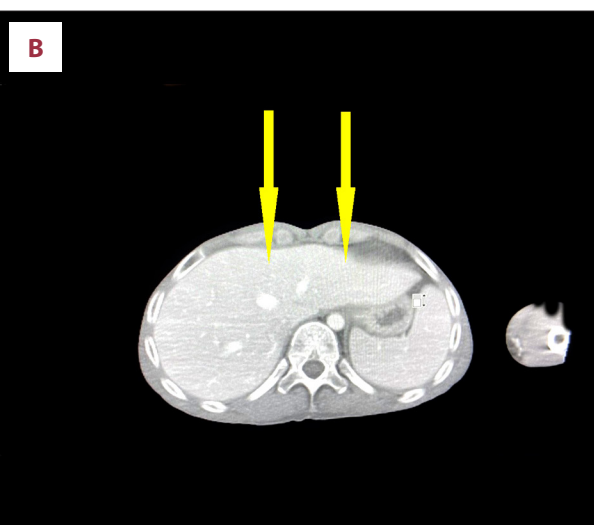
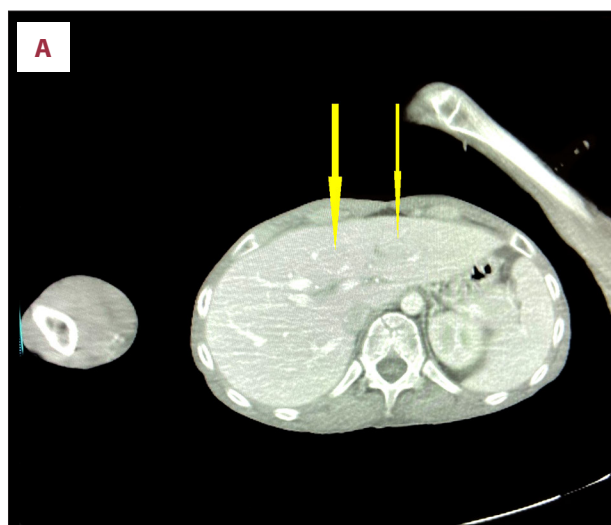
| | Day 0 | Day 1 | Day 7 | Exit | Normal ranges |
|------|---------|--------|--------|--------|------------------------------|
| WBC | 1.0 | 6680 | 5800 | 5800 | 4.0-10.0×10 ³ /μL |
| Neut | 1.0 | 5460 | 3700 | 3800 | 2.0-8.0×10 ³ /μL |
| Ht | 43.1% | 34.7% | 33.7% | 33.3% | 40-50% |
| Plts | 135 000 | 78 000 | 68 000 | 63 000 | 140-440×10 ³ /μL |
| Na | 134 | 146 | 145 | 144 | 135-144 mEq/L |
| K | 2.9 | 3.7 | 4.5 | 3.9 | 3.2-4.8 mEq/L |
| CRP | 75 | 97 | 7.5 | 4.5 | 0-5 mg/L |

Day 0 – admission date; Day 1 – start of vancomycin treatment; Day 7 – 2nd CT performed.



Figures 1. (A-C) Day 0. Arrows show pneumobilia-air within the biliary system.

organism: a dormant spore form that is resistant to medication, and a vegetative form that can produce toxins and is susceptible to activity of some medications [3]. Diagnosis is based on a positive GDH antigen test and detection of toxin A and/or toxin B. In indeterminant cases, NAAT can be also performed. *C. difficile* infections are one of the most common nosocomial (hospital-acquired) infections. There are around 450 000 people infected by *C. difficile* annually in the United States, with 14 000 associated deaths due to CDI. They are easily transmitted between patients from healthcare and community reservoirs, causing a considerable increase in morbidity and mortality in adult hospital patients. Clinical symptoms vary from asymptomatic carriage or mild diarrhea to severe conditions such as pseudomembranous colitis and toxic megacolon with septic shock [4,5].



Figures 2. (A, B) Normal liver on day 7. Arrows show a normal biliary tree without pneumobilia.

Conclusions

Pneumobilia caused by *Clostridioides difficile* infection was treated with orally administered vancomycin, which cured the patient's diarrhea and pneumobilia. This clinical case details a rare complication of a common infection. More cases and studies are needed for a better understanding of the possible association between *Clostridioides difficile* infection and pneumobilia.

References:

1. Sherman SC, Tran H. Pneumobilia: Benign or life-threatening. *J Emerg Med*. 2006;30(2):147-53
2. Okan İ, Tali S, Özsoy Z, et al. The development of pneumobilia after blunt trauma. *Ulus Cerrahi Derg*. 2015;32(3):224-25
3. Zhu D, Sorg JA, Sun X. *Clostridioides difficile* biology: Sporulation, germination, and corresponding therapies for *C. difficile* infection. *Front Cell Infect Microbiol*. 2018;8:29
4. Chiu PJ, Rathod J, Hong YP, et al. *Clostridioides difficile* spores stimulate inflammatory cytokine responses and induce cytotoxicity in macrophages. *Anaerobe*. 2021;70:102381
5. Sinnathamby ES, Mason JW, Flanagan CJ, et al. *Clostridioides difficile* infection: A clinical review of pathogenesis, clinical considerations, and treatment strategies. *Cureus*. 2023;15(12):e51167

Patient Permission/Consent Declarations

Patient consent was obtained.

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