Clostridium tertium Polymicrobial Bacteremia in the Setting of Non-Neutropenia, Cirrhosis, and Enterocolitis

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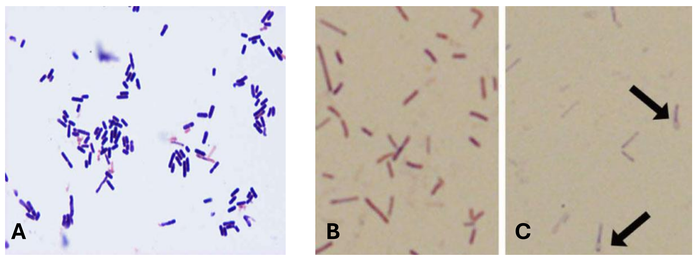
Introduction

- ***Clostridium tertium*** is an aerotolerant, non–toxin-producing, gram-positive bacillus
- Previously considered apathogenic with only **rare occurrences in mixed infections of traumatic wounds**, but with recent increased incidence in isolated bacteremias
- Often **misidentified** as *Bacillus* or *Corynebacterium* **due to easy decolorization** on Gram stain, appearing gram negative/variable and mistaken as contaminant
- C. tertium accounts for **less than 10% of Clostridium bacteremias** with **more than 50%** occurring **in the setting of neutropenia or malignancy**
- In **non-neutropenic cases**, it is associated with hepatobiliary disease, solid tumors, intra-abdominal infections, or secondary peritonitis.
- 30-day mortality for C. tertium bacteremia is estimated to be around 15%.
- C. tertium bacteremia in **non-neutropenic patients** is rare, frequently polymicrobial, and often misidentified.

Gram Stain Variability of Clostridium Sp.



(A) Typical Gram-positive appearance (deep purple) of *Clostridium perfringens*.
(B) *Clostridium tertium* grown aerobically demonstrates Gram-variable bacilli, which may be misidentified as *Bacillus* or *Corynebacterium*.
(C) *Clostridium tertium* grown anaerobically shows Gram-positive bacilli with terminal spores (black arrows).

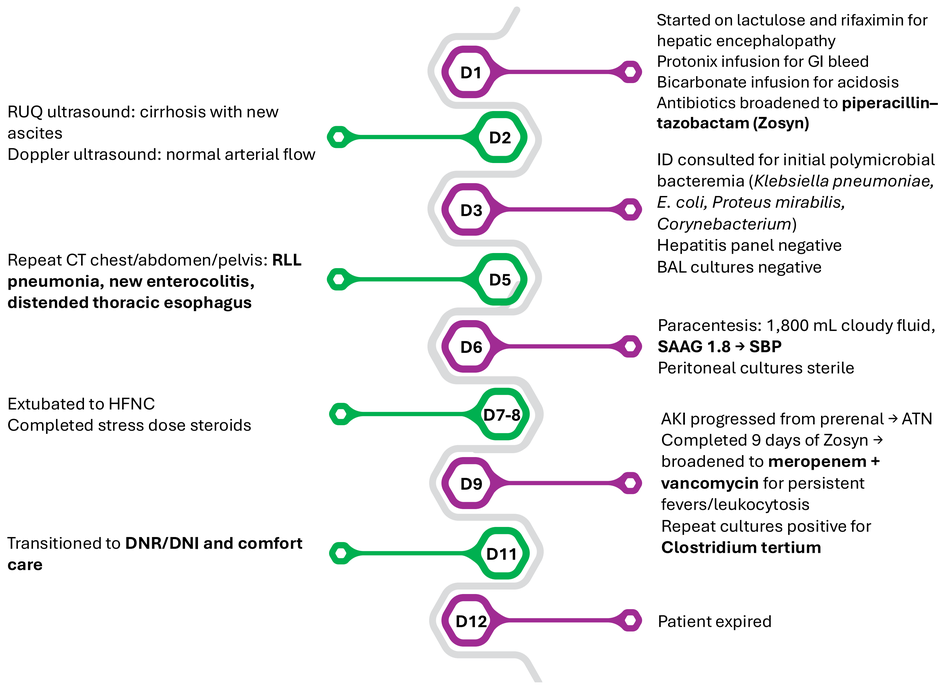
Patient Presentation

60-year-old female with alcohol use disorder and cirrhosis presented with **5 days of altered mental status**.

Hospital Day 0:

- Initially a level 2 trauma alert for AMS, abdominal pain, and signs of trauma (trauma scans negative)
- Vitals: HR 114, BP 125/71, afebrile, SpO_2 100% RA
- **Physical exam:** Jaundice, tremors, hepatomegaly, distended/tender abdomen (LLQ), right-sided rhonchi, scattered ecchymoses, vaginal bleeding, rectal bleeding
- **Labs:** Hyperammonemia (177 µmol/L), anemia (Hgb 7.6 g/dL), AKI (Cr 3.5 mg/dL, BUN 59 mg/dL), hyperbilirubinemia (~3 mg/dL), lactate 3.7 mmol/L, UA suggestive of infection
- **Scores:** MELD-Na 27; Child-Pugh 11 (Class C)
- **Interventions:** Initiated on ceftriaxone/azithromycin for CAP coverage, lactulose, IV fluids, 1 unit pRBC transfusion, vasopressors; intubated for airway protection
- **Disposition:** Admitted to ICU for hepatic encephalopathy, septic/hypovolemic shock, anemia, and acute kidney and liver failure

Hospital Course



Discussion

- *C. tertium* bacteremia in non-neutropenic patients remains **rare** with uncertain pathogenicity.
- Frequently misidentified and not initially considered in **polymicrobial settings and due to aerotolerant nature imposing difficulties on gram stain**
- Possible sources in our patient include decompensated cirrhosis, SBP, or enterocolitis
- Antibiotic considerations:
  - Frequently **resistant** to **cephalosporins**.
  - Often **susceptible** to **carbapenems**, vancomycin, and metronidazole - **consider earlier broadening** of antibiotics
- Misidentification risk underscores the importance of microbiology expertise in unusual bacteremias.

Limitations

- Lack of definitive localization of source (possible overlap between cirrhosis, SBP, and enterocolitis).
- Given polymicrobial nature, difficult to confirm of C. tertium is a true pathogen vs contaminant vs colonizer
- Repeat cultures taken after broad spectrum antibiotics initiated could have altered flora
- Limited diagnostic testing, may require mass spectrometry for reliable identification.
- Rare organism: limited literature and no established guidelines for management in non-neutropenic patients.

Key Learning Objectives

- *C. tertium* bacteremia is rare outside neutropenic settings but can occur with advanced liver disease and intra-abdominal infections.
- Presence of **polymicrobial bacteremia** may signal more pathogenic organisms such as *C. tertium*.
- Resistant to standard empiric regimens (e.g., broad-spectrum cephalosporins) so consider early antibiotic broadening to carbapenems.
- Should prompt consideration of **gastrointestinal or hepatobiliary sources**.
- Early recognition and multidisciplinary efforts with infectious disease teams should not be delayed.

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