



A RARE CASE OF SEPSIS BY DELFTIA ACIDOVORANS IN A PATIENT WITH CHEMOTHERAPY INDUCED PANCYTOPENIA

Clinical Microbiology

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ABSTRACT

Delftia acidovorans is an aerobic, non-fermentative, Gram-negative bacillus commonly found in soil and water. Its clinical significance is not well-established firstly due to infrequent isolation from patient samples and secondly due to its low virulence. We report a rare case of sepsis caused by Delftia acidovorans in a 56-year-old male who developed chemotherapy-induced pancytopenia following treatment of gastric carcinoma. The patient presented with fever, chills, burning micturition, and oral ulcers. Blood culture revealed infection with Delftia acidovorans. His initial empirical therapy was modified based on susceptibility testing of the isolate. The patient responded well to piperacillin-tazobactam and recovered without any further complications. This case highlights the importance of identifying rare pathogens in immunocompromised patients and tailoring antimicrobial therapy accordingly.

KEYWORDS

Delftia acidovorans, Pancytopenia, Rare pathogen, Sepsis.

INTRODUCTION

Delftia acidovorans is a non-sporing, non-capsulated, motile Gram-negative bacillus, straight to curved, which may occur singly or in pairs. It is a member of Pseudomonas ribosomal RNA homology 3 groups. It can be commonly found in the environment i.e soil & natural water sources and can be isolated from raw milk and animal infections as well.^[1] The pathogenicity of the organism is often questionable due to seldom clinical isolation and perceived low virulence of the organism. Hereby, we report a rare case of sepsis due to Delftia acidovorans in a patient with gastric carcinoma who developed complications following chemotherapy, diagnosed and treated successfully with appropriate antibiotics.

Case Presentation

A 56-year-old male patient presented with chief complaints of high-grade intermittent fever with chills and rigors, documented to 102 °F for last 3 days. He also complained of burning micturition, painful oral ulcers and 5-6 episodes of loose stools of similar duration.

His history revealed that he was a known patient of gastric carcinoma for last 2 years, for which he received 12 cycles of chemotherapy during last 8-9 months. His last chemotherapy was completed 10 days ago.

The laboratory reports showed pancytopenia with haemoglobin=8.3 gm/dL (Reference range -Male: 13-18 g/dL), total leukocyte count = 0.66×1000/ μ L (Reference range=4000-10,000/ μ L), platelet count=31×1000/ mm^3 (Reference range - 1,50,000-4,00,000/ mm^3), his ESR was 70 mm/hour. Total proteins level was 4.40 g/dl (Reference range – 6.4-8.3 g/dl), suggestive of hypoproteinaemia. CRP was 88.8 mg/L on admission suggestive of sepsis. His provisional diagnosis was pancytopenia induced by chemotherapy for gastric carcinoma.

Despite empirical antimicrobial therapy with intravenous ceftriaxone and azithromycin, the patient displayed features of continued sepsis. Specimens of blood were taken from peripheral site before antimicrobial administration and sent as paired sets of BACTEC blood culture bottles to the department of microbiology for blood culture and sensitivity testing.

The incubated aerobic blood culture bottle of the two sets flagged as positive after 24 hours of incubation. Gram staining showed the presence of gram-negative bacilli. Further subculture was done on blood agar and MacConkey agar, and plates were incubated overnight at 37 °C. These colonies were identified as Delftia acidovorans, by BD BACTEC M50 automated system.^[2]

DISCUSSION

Delftia acidovorans is an aerobic, Gram-negative, non-fermenting

bacillus that belongs to the Comamonadaceae family. Despite its ubiquitous environmental presence in soil, water, and even hospital plumbing systems clinical isolation remains rare, and its pathogenic potential is still underappreciated.^[3]

Our case adds to the growing yet limited literature documenting D. acidovorans as a causative agent of bloodstream infections. The patient described here was severely immunocompromised due to underlying malignancy and recent chemotherapy, resulting in profound pancytopenia. These risk factors provided an ideal setting for opportunistic infection, supporting the increasing recognition of D. acidovorans as a relevant pathogen in immunocompromised hosts.^[4]

The clinical diagnosis of D. acidovorans infections can be particularly challenging. Its rarity in clinical settings may lead to its misidentification or dismissal as a contaminant, particularly when isolated from single cultures.^[5] However, in our patient, blood cultures were appropriately taken from peripheral sites before antibiotic administration, increasing the likelihood of true pathogenic isolation. Additionally, the presence of systemic signs of sepsis, lack of improvement on empirical therapy, and correlation with neutropenia highlighted the significance of this isolate.

A thorough literature search has revealed that Delftia acidovorans infections have been sporadically reported in both immunocompetent and immunocompromised individuals, including those with haematological and solid organ malignancies.^[6] Clinical manifestations range from pneumonia and catheter-related bloodstream infections to empyema, endophthalmitis, peritonitis, urinary tract infections, and ocular infections.^[7]

Our case is distinct in that D. acidovorans was isolated as the sole pathogen in a patient with gastrointestinal malignancy and chemotherapy-induced pancytopenia. This suggests that direct bloodstream invasion from mucosal surfaces compromised by chemotherapy may be a possible route of infection in such cases.

On nutrient agar, the colonies were 2-3 mm in size, circular, smooth, greyish white translucent with butyrous consistency, irregular edges, low convex, easily emulsifiable without any particular odour and without pigment production on nutrient agar. The colonies on blood agar were non haemolytic, non-pigmented while non-lactose fermenting colonies were seen on MacConkey agar as shown in figure 1. On hanging drop examination, the bacilli were actively motile. Gram staining revealed gram-negative rods arranged singly and in pairs as seen in figure 2. Catalase & oxidase tests were positive. On biochemical testing, indole, methyl red, urease and mannitol test were negative, no sugars were fermented on triple sugar iron and citrate test was positive as seen in figure 3. With the addition of Kovac's reagent,

the organism produces anthranilic acid using tryptophan leading to pumpkin orange colour which is characteristic for the organism.^[8]

Although typically susceptible to only broad-spectrum cephalosporins, ureidopenicillins, co-trimoxazole, fluoroquinolones and tetracyclines, *D. acidovorans* is often resistant to aminoglycosides.^[9]

In our case, the isolate was resistant to meropenem, which aligns with emerging data suggesting that carbapenems may not always be effective against *D. acidovorans* due to efflux mechanisms or intrinsic resistance genes.^[10] The organism was susceptible to most antimicrobials including piperacillin-tazobactam, ciprofloxacin, cefixime and gentamicin but resistant to meropenem. Treatment was modified to include intravenous piperacillin-tazobactam and continued for a week. Patient recovered well without any complications and was discharged 10 days after hospital admission.



Figure 1: Colony morphology of *Delftia acidovorans* culture on blood, MacConkey and nutrient agar plates

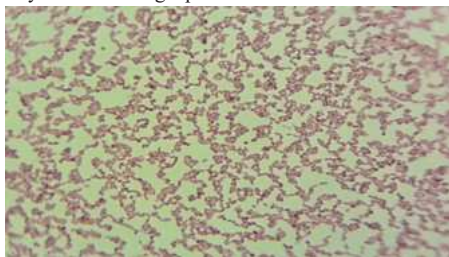


Figure 2: Gram-stained view of *Delftia acidovorans* as seen under 100X magnification



Figure 3: Biochemical test characteristics of *Delftia acidovorans*

*From left to right indole, methyl red, urease, citrate, triple sugar iron agar and mannitol test.

CONCLUSION

Our case emphasizes that *Delftia acidovorans*, although traditionally viewed as a rare pathogen, is capable of causing clinically significant bloodstream infections in patients with underlying malignancy and chemotherapy-induced immunosuppression. Prompt diagnosis, accurate species identification, and susceptibility-guided therapy are critical for successful outcomes. As more cases are identified and reported, the medical community's awareness and understanding of this pathogen's behaviour, resistance mechanisms, and clinical relevance will continue to evolve.

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