

# Fatal *Chromobacterium violaceum* Infection in Child: A Case Report

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## Abstract

*Chromobacterium violaceum* (*C. violaceum*) is a facultative anaerobic Gram-negative bacterium in soil or water that rarely causes disease with high mortality. An 8.5-year-old boy developed *Chromobacterium violaceum* with a hypoechoic lesion at the abdominal with a diameter of 3.5cm x 4.9cm, pneumonia, and dextral pleural effusion. He had been diagnosed with suspected abdominal tuberculosis granulomatous with tuberculosis contact and decreased body weight history. He had a fever and increased leucocyte count and C-reactive protein. He got ceftazidime, gentamycin as antibiotic therapy, and dexamethasone as support therapy. He died of septic shock, hepatic and respiratory failure after 7 days. This case emphasizes the importance of taking *C. violaceus* infection into account in patients who experience refractory shock while receiving appropriate antibiotic treatment for presumed Gram-negative sepsis owing to abscesses, particularly in those with a history of standing water exposure. Because of *C. violaceum*'s fluctuating resistance patterns, it is important to think about using effective antimicrobial drugs in combination therapy.

Keywords: *Chromobacterium violaceum*, septic shock, immunocompromised;

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## 1. Background

*Chromobacterium violaceum* (*C. violaceum*) is a facultative anaerobic Gram-negative bacterium, the opportunistic pathogen in soil or water that rarely causes disease with high mortality. Timely intervention, with the administration of an antibiotic to *C. violaceum*, was sensitive but must be ensured that the patients healed completely and that the infection did not progress to septicemia. Especially in tropical and subtropical regions. Despite being uncommon, infections in people are associated with high morbidity. The bacterium is well-known for its antimicrobial drug resistance as well as the potential for relapse and reinfection. Mortality can be predicted by the presence of bacteremia, widespread infection, and poor antibiotics.

## 2. Case Report

An 8.5-year-old boy, with a fever 3 weeks before being hospitalized, with tuberculosis contact patient (his playmate suffered TB therapy for 6 months), decreased body weight and had diagnosed with suspected abdominal tuberculosis, differential diagnostic abdomen tumor, and imbalance pleural effusion. USG examination with a hypoechoic lesion at the abdominal, diameter 3,5cmx4,9cm. Chest x-ray has pneumonia and pleural effusion dextra. Physical examination: t=39,8oC, distended abdomen, Hb=9,5mg/dl,

WBC=20,87/ $\mu$ L, AST=140 $\mu$ /L, ALT=64  $\mu$ /L. CT Scan abdomen had thickening of the intestine, minimal free fluid can be a manifestation of abdominal tuberculosis. He got ceftazidime, gentamycin, and dexamethasone as therapy. Diagnosis is made by culture of blood, abscess fluid, or skin exudate. Blood culture single site with *C. violaceum*, susceptible amikacin, ampicillin, cefotaxime, ceftriaxone, chloramphenicol, gentamicin, and trimethoprim-sulphamethoxazole. He died of septic shock, and hepatic and respiratory failure after 7 days hospitalized.

### 3. Discussion

*C. violaceus* is a saprophytic, facultatively anaerobic, gram-negative bacillus that can be found in water and soil. a long, motile, oxidase-positive bacillus that shows up singly or in pairs on Gram stain. It has one to four antigenically different subpolar or lateral flagella in addition to a polar flagellum. First identified in 1927, *C. violaceum* is a rare bacterium that produces the dark violet antioxidant pigment known as violacein.

*Chromobacterium violaceum* produces violacein, a purple pigment with bactericidal, trypanocidal, tumoricidal, and antiviral action (maximum absorption at 570 nm). Particularly on blood agar, this pigment's intensity causes colonies to appear dark purple to black. Leukemia and lymphoma cells are among the cell types in vitro that violacein causes to undergo apoptosis. It is being investigated whether violacein and its structural analogs have medicinal value. Additionally, violacein exhibits mild antiviral, antitrypanosomal, antimalarial, and antibacterial properties. Violacein exhibits immunomodulatory, analgesic, and antipyretic properties in a rat model. Additionally, it guards against gastrointestinal ulcers and works well to cure diarrhea.

Standard agar works well for *C. violaceum* growth because tryptophan-containing media promote it. The colonies lack gelatin and are smooth, violet, low convex, and low in concavity. Colonies create hydrogen cyanide, which results in the presence of a slight almond odor, catalase positivity, and oxidase positivity, however, the latter could be challenging to interpret due to the formation of color. The development of pigment is impeded by anaerobic growth. As an effective treatment is started or due to culturing, pigment loss is also possible. Carbohydrates are attacked by *C. violaceum* through fermentation rather than oxidation.

The colonies grow on blood agar plates and Mac Conkey agar plates appear specifically black and very dark purple and smell of ammonium cyanide (almond likes), producing deep purple pigment (violacein). It's a rare systemic case that raises the fatality rate, especially in immunocompromised patients. Mortality rates are high (~55%) despite treatment. Identification of *C. violaceum* versus *Aeromonas* spp must be done by biochemical and physiologic testing. Among them, only two case reports have documented *C. violaceum* septicemia.

Young age, neutrophil dysfunction, and persistent granulomatous illness are additional risk factors for infection. The isolation of the organism from a wound or blood culture is necessary for diagnosis. usually susceptible to fluoroquinolones, carbapenems, aminoglycosides, chloramphenicol, trimethoprim-sulfamethoxazole, and tetracyclines, but resistant to penicillin and cephalosporins

Combining carbapenem and quinolone antibiotic therapy seems to be a wise choice. To stop recurrence, prolonged maintenance therapy with an oral antibiotic is required. Because *C. violaceum* infection might resemble melioidosis, doctors in tropical and subtropical areas need to be aware of this condition. Mortality can be decreased by combining suitable antibiotics with antimicrobial therapy.

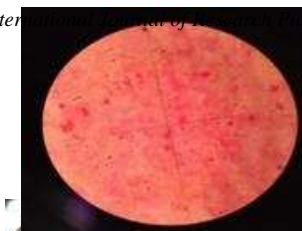


Fig. 1. Gram staining C. Violaceum



Fig. 2. C. Violaceum producing deep purple pigment (violacein) in blood agar plate



Fig. 3. C. Violaceum produces black and very dark purple and smell of ammonium cyanide in Mac Conkey

This case report emphasizes how crucial it is to take *C. violaceum* infection into account when treating abscess patients who have sepsis and multi-system organ failure, when receiving enough Gram-positive coverage for more common pathogenic sources, or if cultures show the presence of Gram-negative rods. In general, fluoroquinolones, chloramphenicol, tetracycline, trimethoprim-sulfamethoxazole, imipenem, and gentamicin are the antibiotics with the greatest action against *C. violaceum*. Ureidopenicillins are frequently effective, however, cephalosporin resistance is widespread. Although some strains of *C. violaceum* naturally produce aztreonam, most clinical isolates are vulnerable to this medication.

The ideal antibiotic therapy is uncertain due to the rarity of the infection, the frequent fulminant course, and the high fatality rate. The most effective antibiotic in vitro is ciprofloxacin, and fluoroquinolones have recently been used successfully in case reports, frequently in conjunction with other medications. Chloramphenicol or penicillin (carboxypenicillin or ureidopenicillin) in combination with an aminoglycoside was used to treat most infection survivors. Relapse has happened more than two weeks after the end of therapy and an apparent cure, most likely because of a lingering suppurative focus. After 2 to 4 weeks of intravenous therapy with various antibiotics, oral trimethoprim-sulfamethoxazole, doxycycline, or ciprofloxacin have been utilized. The oral regimen has been continued for a few weeks to a few months to prevent relapse. Antibiotics have been demonstrated to increase quorum sensing-related virulence factors, such as violacein production, chitinase synthesis, and biofilm formation, when used at subinhibitory concentrations, as is the case throughout the post-antibiotic periods of clinical therapy.

#### 4. Conclusions

This case emphasizes the importance of taking *C. violaceum* infection into account in patients as an important human pathogen and taking that into account early in temperate climates, especially in cases of fulminant sepsis linked to multi-organ abscesses. To successfully treat patients who develop refractory shock despite adequate antibiotic coverage for presumed Gram-negative sepsis secondary to abscesses, it is

important to identify *C. violaceum* as soon as possible. This is especially important in patients who have a history of exposure to stagnant water. Due to the varying *C. violaceum* resistance patterns, it is important to think about using combination therapy with powerful antimicrobial drugs. In our situation, this type of infection may be predisposed to a flaw in the host's defensive mechanism. There are currently no recommendations for the selection of antibiotics or the length of treatment because this infection is so uncommon. Early diagnosis, swift surgical drainage, and adequate antibiotics are most likely what leads to a successful outcome.

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## Conflict of interest

The other authors have no conflicts of interest to disclose.

## Financial disclosure

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