

Chromobacterium violaceum: A rare bacterium isolated from a wound over the scalp

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ABSTRACT

Infection due to *Chromobacterium violaceum*, a large motile gram-negative bacillus, is a rare entity that typically starts with a localized skin infection or localized lymphadenitis after contact with stagnant water or soil. It can progress to fulminating septicemia, with necrotizing metastatic lesions and multiple abscesses in the liver, lung, spleen, skin, lymph nodes, and brain, and result in fatal multiorgan failure. We report a case of a young male with a history of fall from a bike into stagnant water who subsequently developed *C. violaceum* infection at the site of the sutured scalp wound.

Key words: *Chromobacterium violaceum*, saprophyte, septicemia

INTRODUCTION

Chromobacterium violaceum is a large, motile, gram-negative bacillus having a single polar flagellum and, usually, one or two lateral flagella. It is a facultative anaerobe. It grows readily on simple nutrient media, including MacConkey agar, at 35–37°C. It is positive for catalase and oxidase reactions.^[1,2] The organism is a common inhabitant of soil and water in tropical and subtropical regions.^[3] Occasionally, it can act as an opportunistic pathogen in animals and humans and the initial skin lesion can lead to multiple liver and lung abscesses and fatal septicemia. Serious, and in some cases fatal, infections in humans have been reported from Argentina, Australia, Brazil, Cuba, Nigeria, Singapore, Taiwan, United States, and Vietnam. In most of these cases the route of entry was through the broken skin, following contamination with soil or water.^[4]

The organism produces a natural antibiotic called violacein (violet nondiffusible pigment), which may be useful in the

treatment of colon and other cancers.^[5] It was first described as a human pathogen in Malaysia in 1927.^[6] The disease typically starts with a localized skin infection or localized lymphadenitis following contact with stagnant water or soil and then progresses to fulminating septicemia, with necrotizing metastatic lesions and multiple abscesses in the liver, lung, spleen, skin, lymph nodes, and brain, resulting in fatal multiorgan failure.^[7] There are also reports of chronic granulomatosis, osteomyelitis, cellulitis, and periorbital and ocular infections.^[2]

CASE REPORT

A 42-year-old male came with a history of a fall from the bike 7 days earlier. He had fallen into a drainage canal containing stagnant water and sustained injuries on the head and both the legs. His head and face had been submerged in the drain water. He also gave history of loss of consciousness for half an hour. He was nondiabetic and normotensive, but was a chronic smoker.

After the incident he was taken to a local hospital where the wound over the scalp, measuring about 6 × 1 cm [Figure 1], was sutured and the abrasions on the legs dressed. He had been discharged with oral Ampiclox™ 500 mg TID on the following day. Over the next 5 days he developed pain and edema over the sutured area and was admitted to our hospital on the seventh day post injury.

On examination, the patient was conscious and alert. His vitals were normal. Local examination showed a wound that was edematous and discharging pus. The sutures

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were removed and a pus sample was collected with aseptic precautions and sent to the microbiology laboratory for bacteriological culture and antimicrobial susceptibility. The routine laboratory investigations showed: hemoglobin, 13.6 g/dl; total white blood cell count of 13000 cells/mm³, with 80% neutrophils; and fasting blood sugar, 70 mg/dl. CT scan (brain) was normal.

Gram stain of the discharge from the wound showed plenty of pus cells along with gram-negative pleomorphic rods. The sample was inoculated on nutrient agar, blood agar, and MacConkey agar and incubated aerobically at 37°C for 24 hours. The next day smooth, round, convex, butyrous, violet-colored colonies were noticed on all the three plates. On blood agar, deep violet colonies with beta-hemolysis was seen [Figure 2]. The organism was a facultatively anaerobic, motile, gram-negative rod. It was catalase and oxidase positive. Biochemically, indole, methyl red, and Voges-Proskauer test were negative. The organism fermented glucose (producing acid but no gas) and trehalose but did not ferment lactose or mannitol. Triple sugar iron medium showed an alkaline slant and acid butt (K/A) without gas and H₂S production. Citrate was utilized and nitrate was reduced. Arginine was decarboxylated but not lysine and ornithine. Biochemically, the isolate was identified as *Chromobacterium violaceum*.

Antibiotic susceptibility of the organism was tested by the disc diffusion method [Figure 3]. The organism was found to be sensitive to gentamycin, chloramphenicol, ciprofloxacin, tetracycline, ceftazidime, imipenem, and amikacin. It showed intermediate sensitivity to cefotaxime but was resistant to penicillin and cephalixin.

Based on the results of the antibiotic susceptibility testing, the patient was given injection gentamycin 80 mg IV twice a day for 7 days. With this treatment the wound healed completely. A repeat sample was collected the following day of first sample and the same organism was isolated again, which proved that the organism was a pathogen and not a contaminant. The patient was followed up for 15 days and the wound healed completely with no signs of recurrence or septicemia

DISCUSSION

Human infections caused by *C. violaceum* are uncommon. Only 150 cases have been reported worldwide, including patients from Vietnam, Taiwan, Japan, United States, Brazil, Argentina, Australia, Senegal, Cuba, Nigeria, Singapore, and Sri Lanka.^[2,4] Quick diagnosis, accurate bacterial identification, and specific treatment is very important because *C. violaceum* may cause serious infection in healthy people. The main features in most of the cases with fatal outcome seem to be sepsis, multiple



Figure 1: Wound over the scalp



Figure 2: Deep violet-colored colonies with beta-hemolysis on blood agar

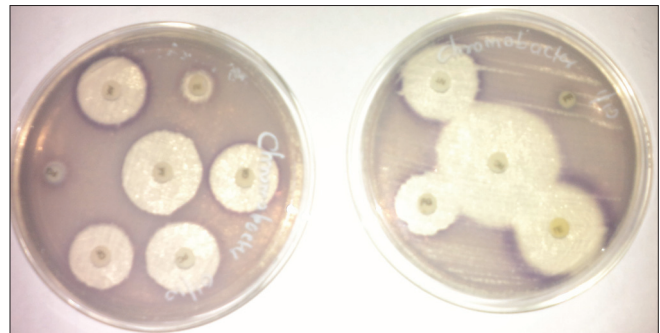


Figure 3: Antibiotic susceptibility pattern of the isolate

liver abscesses, and diffuse pustular dermatitis.^[8] Some studies have reported instances of untreated *C. violaceum* causing brain abscess and diarrhea.^[9]

Although *C. violaceum* generally gives rise to pigmented colonies, some nonpigmented strains have been reported, which may make diagnosis even more difficult.^[10] A study by Cheong *et al.*^[11] showed a fatal case of pulmonary *C. violaceum* infection in an adult following aspiration of drain water. Another study from Taiwan isolated nonpigmented *C. violaceum* from a case of bacteremic cellulitis following fish bite.^[12] Similarly, the

bacteria has been isolated from cases of septic spondylitis, conjunctivitis, and intra-abdominal abscess.^[13-15] The organism is generally sensitive to aminoglycosides, chloramphenicol, and tetracycline and resistant to ampicillin, penicillin, and first-generation cephalosporins. Susceptibility to the newer cephalosporins is variable.^[1]

In our patient the following points favored the diagnosis of *C. violaceum*: Classical history of fall into stagnant water, no response to treatment with Ampiclox™, repeat isolation of the organism from the pus sample, and response to treatment with aminoglycoside. Timely intervention, with administration of an antibiotic to which the organism was sensitive, ensured that our patient's wound healed completely and that the infection did not progress to septicemia.

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