# *Chromobacterium violaceum* infection

## Introduction

*Chromobacterium violaceum* is a common facultative anaerobic, gram-negative rod found in the soil and water of tropical and subtropical climates. Its human infection is rare but fatal. The authors report a case of *C. violaceum* infection presenting with liver abscesses, skin pustules and pneumonia.

## Discussion

*C. violaceum* grows well in all standard bacteriological media used in a clinical laboratory. After 18 hours of incubation, the colonies appear smooth, convex and violet in colour.

In this case, *C. violaceum* strains were isolated from blood cultures and from pus aspirated from the pustules. The organism grew well on blood and MacConkey's agars. Preliminary identification was made based on the morphology and purple colouration of the colonies besides catalase and nitrate tests. The isolates were subsequently confirmed with API 20 NE (BioMeriéux, France) and BBL Crystal enteric/nonfermenter identification system (Becton Dickinson, USA). Both of them gave a high index score of identification (more than 90%) for *C. violaceum*. The antibiotic susceptibility of the isolates is shown in *Table 1*.

The first reported human infection of *C. violaceum* was from Malaysia in 1927 (Sneath et al, 1953). Since then there have been sporadic cases from Singapore, Taiwan, Korea, Brazil, Argentina, Senegal and the USA. Shao et al (2002) analysed 62 case reports worldwide and concluded that the mortality of blood dissemination of *C. violaceum* can be as high as 75%.

The most common route of entry is via non-intact skin and rarely followed near drowning. There was one report of infection via conjunctival exposure (Feldman et al, 1984) and one through an insect bite (Petrillo et al, 1984). Chromobacterium infection has been reported in individuals as young as 4 months old (Moore et al, 2001).

**Table 1. Antibiotic susceptibilities of *Chromobacterium violaceum* isolates**

| Sensitive to | Resistant to |
|---|---|
| Amikacin | Ampicillin |
| Gentamicin | Ampicillin-sulbactam |
| Cefepime | Cefotaxime |
| Cefoperazone | Ceftazidime |
| Ciprofloxacin | Cephalexin |
| Imipenem | Ceftriazone |
| Netilmicin | Cefuroxime |
| Sulfamethoxazole-trimethoprim | |

### Case Report

A 22-year-old Indonesian oil palm plantation worker presented with a 1-week history of fever associated with severe headache, pain in the right upper abdomen and seizure a day earlier. He had a cough with expectoration but no bowel symptom. There was no history of injury reported before the present illness.

The patient was febrile, dehydrated and drowsy on admission, with Glasgow coma score of 14/15. His blood pressure and pulse rate were 100/60 mmHg and 96/min respectively. Lung examination showed right-sided crackle, with no neck stiffness or any signs suggestive of immunocompromized state. Abdominal examination revealed tender hepatomegaly of 10 cm in length.

The initial chest radiograph showed opacity in the right middle lobe. Total white cells count was 11.1 x $10^9$/litre. Platelet count was 100 x $10^9$/litre with normal haemoglobin. Random blood glucose and renal profile were normal. Coagulation profiles were deranged with international normalization ratio of 4.5 and activated partial thromboplastin time ratio of 3.4. Liver function tests revealed alanine aminotransferase of 446 U/litre, aspartate aminotrasferase of 253 U/litre and albumin of 30.5 g/litre.

The patient was given empherical intravenous ceftriaxone, metronidazole and acyclovir for possibility of meningo-encephalitis. Despite fluid resuscitation, he remained hypotensive and required inotropic support. On the second day, multiple pustular skin lesions *(Figure 1)* were noted on the patient's trunk, upper and lower limbs. Aspiration of the pustules revealed pus that contained gram-negative bacilli. Lumbar puncture was done and cerebrospinal fluid was normal. He required multiple platelet concentrates and plasma transfusions for disseminated intravascular coagulation. Abdomen ultrasound revealed multiple liver abscesses *(Figure 2)*. He was intubated and ventilated for worsening respiratory failure. Samples of pus and blood cultures were positive for *Chromobacterium violaceum*. Intravenous imipenem 500 mg four times daily and ciprofloxacin 400 mg twice daily were administered. However, he died the same evening.

***Figure 1. Multiple pustular lesions over right forearm.***

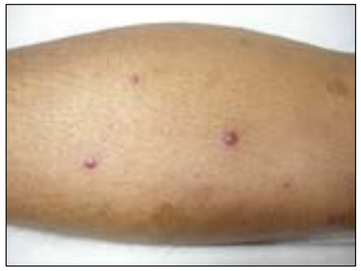
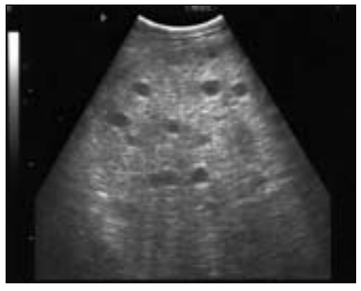


***Figure 2. Abdominal ultrasound: multiple hypoechoic lesions in the liver.***



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As with *Burkholderia pseudomallei* infection (melioidosis), immunocompromized individuals are more susceptible to Chromobacterium infection. Patients with chronic granulomatous disease are particularly vulnerable to *C. violaceum* infection (Macher et al, 1982). Glucose-6-phosphate dehydrogenase deficiency and leukocyte dysfunction were reported associations (Mamlok et al, 1987). Unfortunately, the patient in the current case died before being tested for possible immunodeficiency.

Symptoms of Chromobacterium infection vary, depending on the organs that are involved. Other than pneumonia, liver abscesses and skin pustules, as seen in this case, *C. violaceum* also causes local cellulites, lymphadenitis, nasopharyngeal abscess (Shao et al, 2002), exudative conjunctivitis, periorbital cellulites, meningitis and osteomyelitis.

Generally Chromobacterium demonstrates resistance to penicillins and cephalosporins, indeed the patient in this case did not respond to the initial antibiotics. Aldridge et al (1988) studied 25 antibiotics against *C. violaceum* and concluded that ciprofloxacin was the most active antibiotic. The organism is generally susceptible to piperacillin, imipenem, chloramphenicol, doxycycline, trimethoprim-sulfamethoxazole and aztreonam.

It is important to differentiate Chromobacterium infection from the more common *B. pseudomallei* infection. Both organisms are tropical soil saprophytes and therefore common among agricultural workers. Other clinical similarities include formation of disseminated abscesses and higher prevalence among immunosuppressed persons. However, ceftazidime, which is recommended in melioidosis, is not effective against *C.violaceum*. Therefore delay in recognizing the less common Chromobacterium infection can prove fatal.

## Conclusions

*C. violaceum* infection is a rare but highly fatal infection. The presentation mimics melioidosis and awareness of the disease can guide physicians in instituting early, appropriate antibiotics. BJHM

*The authors would like to thank Dr CL Ong, Head of the Dermatology Department, for providing* Figure 1.

Aldridge KE, Valainis GT, Sanders CV (1988) Comparison of the in vitro activity of ciprofloxacin and 24 other antimicrobial agents against clinical strains of *Chromobacterium violaceum*. *Diagn Microbiol Infect Dis* **10:** 31–9

Feldman RB, Stern GA, Hood CI (1984) *Chromobacterium violaceum* infection of the eye. *Arch Ophthalmol* **102:** 711–13

Macher AM, Casale TB, Fauci AS (1982) Chronic granulomatous disease of childhood and *Chromobacterium violaceum* infections in the southeastern United States. *Ann Intern Med J* **97:** 51–5

Mamlok RJ, Mamlok V, Mills GC et al (1987) Glucose-6-phosphate dehydrogenase deficiency, neutrophil dysfunction and *Chromobacterium violaceum* sepsis. *J Pediatr* **111:** 852–4

Moore CC, Lane JE, Stephens JL (2001) Successful treatment of an infant with *Chromobacterium violaceum* sepsis. *Clin Infect Dis* **32:** e107–10

Petrillo VF, Severo V, Santos MM, Edelweiss EL (1984) Recurrent infection with *Chromobacterium violaceum*: first case report from South America. *J Infect* **9:** 167–9

Shao PL, Hsueh PR, Hang YC et al (2002) *Chromobacterium violaceum* infection in children: A case of fatal septicaemia with nasopharyngeal abscess and literature review. *Pediatr Infect Dis J* **21:** 707–9

Sneath PHA, Whelan JPF, Singh RB, Edwards D (1953) Fatal infection by *Chromobacterium violaceum*. *Lancet* **ii:** 276–7