

## A Case of *Chromobacterium* Infection after Car Accident in Korea

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*Chromobacterium violaceum* is a gram negative straight rod, 0.8-1.2 by 2.5 to 6.0  $\mu\text{m}$ , which is motile by one polar flagella and one to four lateral flagella. The organism inhabits soil and water and is often found in semitropical and tropical climates. Infections in humans are rare. We report a case of infection caused by strains of *C. violaceum*. A 38-year-old male patient was admitted to KyungHee University Hospital, Seoul, Korea on July 28<sup>th</sup>, 2003, after a car accident. The patient had multiple trauma and lacerations. He had an open wound in the left tibial area from which *C. violaceum* was isolated. The strain was resistant to ampicillin, tobramycin, ampicillin/sulbactam, ceftriaxone and cefepime, but was susceptible to amikacin, gentamicin, ciprofloxacin, levofloxacin, trimethoprim/sulfamethoxazole and piperacillin/tazobactam. The patient was treated successfully by debridement, cephalosporin sodium and astromicine sulfate.

**Key Words:** *Chromobacterium violaceum*, wound infection

### INTRODUCTION

*C. violaceum* inhabits soil and water and is often found in semitropical and tropical climates.<sup>1,2</sup> *C. violaceum* is generally considered nonpathogenic and infections are rare. The pathogenic potential of this organism was first described by Wooley in 1905.<sup>3</sup> The first human infection caused by *C. violaceum* was reported in Malaysia in 1927.<sup>4</sup> In Korea, two cases of *C. violaceum* infections were

reported in patients injured in a Guam airplane accident.<sup>5</sup> We describe the first reported case of a local *C. violaceum* infection in Korea, as opposed to an imported case.

### CASE REPORT

A 38-year-old-male patient had multiple trauma due to a car accident while fishing on the Soyang River in Kangwon province, in Korea. He was first admitted to Wonju-Christian Hospital and then transferred to KyungHee University Hospital. He had hemothorax and empyema, a 4th rib fracture, an open wound in the left tibial bone, liver hematoma and kidney hematoma. From the open wound in the left tibial bone, the organism was cultured. The colony was colorless on blood agar and MacConkey agar plates. It was gram negative rods on Gram-stained smears. On blood agar it showed beta hemolysis. The isolate was identified as *C. violaceum* by conventional biochemical test and API 20 NE and Vitek system (Table 1). Antibiotic susceptibility tests were performed by the disk diffusion method. The stain was resistant to ampicillin, tobramycin, ampicillin/sulbactam, ceftriaxone and cefepime, but was susceptible to ciprofloxacin, amikacin, gentamicin, levofloxacin, trimethoprim/ulfamethoxazole and piperacillin/tazobactam (Table 2).

The patient was successfully treated with cephalosporin sodium, astromicine sulfate and debridement. After 1 week, the organism was not isolated.

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**Table 1.** Biochemical Characteristics of *Chromobacterium violaceum* Isolate

Test	% of isolates positive*	Reaction of isolate
Gas from glucose	0	-
Violet pigmentation	91	-
Acid from :		
D-Glucose	100	+
D-Mannitol	0	-
D-Xylose	0	-
Lactose	0	-
Maltose	0	-
Sucrose	20	-
Catalase reaction	97	+
Oxidase reaction	67	+
Simmons citrate reaction	68	+
Urea hydrolysis	5	-
Nitrate reduction	97	+
Indole production	21	+
TSI slant, acid	8	-
TSI butt, acid	94	+
H <sub>2</sub> S production	0	-
Methyl red reaction	37	+
Voges-Proskauer reaction	0	-
Gelatin hydrolysis	86	-
Esculin hydrolysis	5	-
Lysine decarboxylase	0	-
Arginine dihydrolase	100	+
Ornithine decarboxylase	0	-
API 20 NE No.		5140555

\*Data are from Weyant et al.<sup>14</sup>

## DISCUSSION

*C. violaceum* infections have been reported in Vietnam, Taiwan, Malaysia, the United States and so on.<sup>6-10</sup> The pathogenic potential of this organ-

**Table 2.** Antibiotic Susceptibilities of *Chromobacterium violaceum* Isolate

Antimicrobial agent	Susceptibility of isolate
Ampicillin	R
Ampicillin/Sulbactam	R
Piperacillin/Tazobactam	S
Cefotaxime	S
Ceftriaxone	R
Cefepime	R
Imipenem	I
Amikacin	S
Gentamicin	S
Tobramycin	R
Ciprofloxacin	S
Levofloxacin	S
Trimethoprim/Sulfamethoxazole	S

R, resistant; I, intermediate; S, susceptible.

ism was first described by Wooley in 1905,<sup>3</sup> the first human infection was reported in Malaysia in 1927<sup>4</sup> and few human cases have been reported since.<sup>6-10</sup> The organism inhabits soil and water and is often found in semitropical and tropical climates. Although Korea is located in a temperate region, the hot summer weather might contribute to this infection. Hence, *C. violaceum* can exist in the Korean climate. The two prior Korean infection cases were both imported cases,<sup>5</sup> so this is the first reported local case. *C. violaceum* is a potentially serious threat to patients with chronic granulomatous disease who visit or live in the endemic states in the months of June through September.<sup>3</sup> In our case, the patient was a heavy drinker and his liver enzyme was elevated, so he had abnormal liver function which partially contributed to the infection. The portal of entry is a skin lesion leading to wound infection. Septicemia may develop, is significantly associated with neutrophil dysfunction, and has a high fatality rate.<sup>10</sup> From the wound, only *C. violaceum* was isolated, suggesting that *C. violaceum* was the causative agent of the infection. The organism enters the body through a minor trauma to the

skin or ingestion of contaminated water. In this case the patient suffered skin injury in a car accident. Sepsis is the most common feature of this infection, but this patient did not show sepsis.

In our case, a non-pigmented strain was isolated. There has been strong debate regarding the pathogenicity of the nonpigmented strains, but the reported infectivity rates of pigmented and non-pigmented strains are comparable. Pigmentation is not an essential characteristic in the definition of the genus *Chromobacterium*.<sup>11</sup>

In our case, *C. violaceum* was oxidase positive, indole positive, Voges-Proskauer reaction negative and esculin negative. The strain may be differentiated by fermentation of D-glucose, mannitol, maltose, and their lysine decarboxylase and ornithine decarboxylase activities from *Vibrio* or *Aeromonas*.<sup>5</sup>

*C. violaceum* is generally resistant to narrow-, extended-, and broad-spectrum  $\beta$ -lactam antibiotics, but is susceptible to ciprofloxacin, cotrimoxazole, tetracycline and imipenem.<sup>1</sup> Rifampin and vancomycin are inactive, and erythromycin appears ineffective regardless of the susceptibility results.<sup>12</sup> The virulence of nonpigmented cultures of *C. violaceum* and the pathology of their infections have been found to be similar to that of pigmented cultures for mice.<sup>13</sup> It has been known for some time that nonpigmented variants arise upon subcultures of pigmented strains on artificial media. The patient was successfully treated with cephapirin sodium and astromicine sulfate.

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