CASE REPORT

Chromobacterium violaceum causing catheter-related blood stream infection

Lekshmi Balaraman, Manjusree Shanmugham, Sathyabhama MC

Department of Microbiology, Government Medical College, Thiruvananthapuram, Kerala, India

ABSTRACT

Chromobacterium violaceum is a rare pathogen that causes fatal infections in humans. Prompt diagnosis and specific treatment is important because infections caused by *C. violaceum* have a propensity to develop into fatal septicaemia unless appropriately treated. Here, we report a case of catheter-related blood stream infection caused by *C. violaceum* in a 55-year-old diabetic female patient.

Key words: Catheter-related blood stream infection, *Chromobacterium violaceum*, septicaemia

INTRODUCTION

In the last 60 years, venous access via catheter insertion has become a very common practice in the hospital and outpatient settings for various purposes including haemodynamic monitoring, renal replacement therapy, nutritional support and medication administration.

Unfortunately, these catheters can introduce infection to the blood stream.

The term catheter-related blood stream infection (CRBSI) or central line-associated blood stream infection refers to a blood stream infection that appears in the presence of a central venous catheter or within 48 h of removal of a central venous catheter and cannot be attributed to an infection unrelated to catheter. The most common causative pathogens are coagulase-negative staphylococci, followed by *Staphylococcus aureus*, enterococci, Candida spp. and Gram-negative bacilli (19–21%).[1]

Here, we would like to report a case of CRBSI caused by *Chromobacterium violaceum* in a 55 year old diabetic female, for whom an internal jugular venous catheter was introduced one month back for haemodialysis.

Access this article online

Quick Response Code:

Website: www.jacmjournal.org

DOI: 10.4103/0972-1282.184757

CASE REPORT

A 55-year-old female, who was a known case of Type 2 diabetes mellitus for the past 20 years and suffered from chronic kidney disease for the past three months presented to the Nephrology Outpatient Department with the complaints of fever and chills during dialysis. The internal jugular vein (IJV) catheter was inserted one month back for haemodialysis. The patient continued dialysis from a local hospital.

Two blood samples were sent to the Microbiology Department, Medical College, Trivandrum, Kerala, India, for culture and sensitivity. The first sample was taken from the internal IJV catheter and the second sample was taken from the peripheral vein ½ h apart. Empirically, she was given one dose of parenteral Vancomycin 1 gm and parenteral Amikacin 500 mg after dialysis.

Address for correspondence: Dr. Lekshmi Balaraman, E-mail: lekshmibalaraman@yahoo.com

How to cite this article: Balaraman L, Shanmugham M, Sathyabhama MC. *Chromobacterium violaceum* causing catheter-related blood stream infection. J Acad Clin Microbiol 2016;18:47-9.

INVESTIGATIONS

Fasting blood sugar was 254 mg/dl and renal function tests were deranged.

The blood samples were subcultured on to Blood agar (BA) and MacConkey agar (MA) on the next day and incubated aerobically at 37°C for 24 h.

On the next day, on BA, there was growth of beta haemolytic and pigmented deep violet-coloured colonies, which were circular, smooth, convex and about 1–2 mm in size. Non-lactose fermenting, deep violet-coloured colonies were seen on MA.

A smear taken from the growth on BA and MA showed Gram-negative bacilli which were uniformly stained and motile in a wet film. The subculture on Nutrient agar showed violet-coloured colonies [Figure 1].

The following biochemical reactions were observed:

- Facultative anaerobe
- Catalase-positive
- Oxidase test (by modification of Dhar and Johnson method)[2] – positive
- Triple sugar iron agar: Alkaline slant by acid butt without gas or hydrogen sulphide production
- The organism fermented glucose, but not lactose, sucrose or maltose
- Mannitol not fermented
- Urea not hydrolysed
- Citrate not utilised
- Nitrate was reduced to nitrite
- Aesculin was not hydrolysed
- The isolate was identified as *C. violaceum* based on these morphological and biochemical properties
- Antibiotic susceptibility testing was done on Mueller–Hinton agar plate

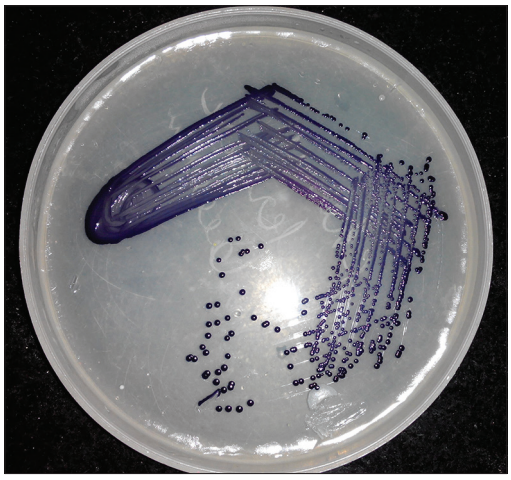

Figure 1: Violet-coloured colonies on Nutrient agar

- The isolate was sensitive to Gentamicin, Amikacin, Cefoperazone-Sulbactam, Piperacillin-Tazobactam, Trimethoprim-Sulfamethoxazole, Ciprofloxacin, Chloramphenicol, Doxycycline and Imipenem.

It was resistant to Ampicillin and first-, second- and third-generation Cephalosporins.

The patient was started on parenteral Piperacillin-Tazobactam. Meanwhile, we requested a second blood sample of the patient which was received after five days. Culture of the second blood sample also yielded *C. violaceum* with the same antibiotic sensitivity pattern. As the patient had generalised oedema, obesity and due to difficulty in accessing another central line. So parenteral Piperacillin-Tazobactam 4.5 mg twice daily was continued for 21 days and the catheter was retained. Blood sample received after the completion of treatment was sterile.

DISCUSSION

C. violaceum is a common water and soil inhabitant in tropical and subtropical areas. It was first identified in 1881. Its pathogenic potential was first described by Woolley in 1905, where he isolated it from a fatal infection in buffalo.[3] The first case in humans was reported from Malaysia in 1927.[4]

C. violaceum is a motile, Gram-negative, non-spore-forming facultative anaerobic rod-shaped bacterium. *C. violaceum* infection occurs in infants, children and adults almost always in summer months and usually after exposure of non-intact skin to contaminated water (often stagnant) or soil.[5]

Local cellulitis, pustules, ulcers with necrotic base and lymphadenitis precedes an evidence of systemic infection. Urinary tract infection, conjunctivitis, orbital cellulitis, retropharyngeal infection with pre-vertebral abscess, neutropenic sepsis, osteomyelitis, brain abscess, meningitis and puerperal sepsis have been reported.[5]

Most strains produce violacein, an insoluble pigment that imparts a violet-black colour to the colonies on solid media under aerobic conditions. Violacein can induce apoptosis in leukemic cell lines and it is being investigated as a potential chemotherapeutic agent.[5]

A case of fatal septicaemia caused by *C. violaceum* in a 4-year-old child was reported from Columbia. Despite the use of Ciprofloxacin, clinical improvement was not observed and the child died on the 5th day.[6]

Another case of *C. violaceum* sepsis was reported in a 6-month-old infant who was treated with Piperacillin and Ciprofloxacin for 21 days. The child responded well to treatment.[7]

Antibiotics having the greatest activity against *C. violaceum* generally include fluoroquinolones, Chloramphenicol, Tetracycline, Trimethoprim-Sulfamethoxazole and Imipenem. The ureidopenicillins are often active, but resistance to Cephalosporins is common. Susceptibility to aminoglycosides and broad-spectrum third-generation Cephalosporins is variable.[8]

About 150 cases have been reported worldwide, of which 10 cases are from India.[9] Majority of the cases have been reported from South East Asia, South America, Australia and South Eastern United States, particularly Florida.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Naomi PO, Mary A, Lillian AB, Patchen D, Jeffrey G, Stephen OH, *et al*. Health care infection control practices advisory committee, CDC guidelines for the prevention of intravascular catheter-related infections. USA: CDC; 2011.
2. Dhar SK, Johnson R. The oxidase activity of *Chromobacterium*. J Clin Pathol 1973;26:304-6.
3. Woolley PG. *Bacillus* violaceous manilae, a pathogenic organism. Bull John Hopkins Hosp 1905;16:89-93.
4. Sneath PH, Whelan JP, Bhagwan Singh R, Edwards D. Fatal infection by *Chromobacterium violaceum*. Lancet 1953;265:276-7.
5. Steinberg JP, Burd ME. Other gram negative and gram variable *Bacilli*. In: Blaser JM, Bennett JE, Dolin R, editors. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases. 8th ed. Philadelphia: Elsevier Saunders; 2015. p. 2672-3.
6. Martinez P, Mattar S. Fatal septicemia caused by *Chromobacterium violaceum* in a child from Colombia. Rev Inst Med Trop Sao Paulo 2007;49:391-3.
7. Vijayan AP, Anand MR, Remesh P. *Chromobacterium violaceum* sepsis in an infant. Indian Pediatr 2009;46:721-2.
8. Chang CY, Lee YT, Liu KS, Wang YL, Tsao SM. *Chromobacterium violaceum* infection in Taiwan: A case report and literature review. J Microbiol Immunol Infect 2007;40:272-5.
9. Karthik R, Pancharatnam P, Balaji V. Fatal *Chromobacterium violaceum* septicemia in a South Indian adult. J Infect Dev Ctries 2012;6:751-5.