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Chromobacterium violaceum lymphadenitis successfully treated in a Northern Italian hospital

Marco Arosio[1], Annibale Raglio[1], Maurizio Ruggeri[2], Paula Serna Ortega[1], Laura Morali[2], Chiara De Angelis[2], Antonio Goglio[1]

[1]Unit of Microbiology and Virology;
[2]Unit of Paediatrics, AO Ospedali Riuniti, Bergamo, Italy

SUMMARY

Lymphadenitis can be caused by different gram positive and gram negative bacteria and non-tuberculous mycobacteria. Cervical lymphadenitis in children is thought to result from ingestion of or contact with environmental microrganisms.
Chromobacterium violaceum is a common inhabitant of soil and water in tropical and sub tropical countries. In these parts of the world *Chromobacterium violaceum* is able to cause skin infection with diffuse pustular lesions and also multiple liver abscess with often fatal evolution in sepsis.
We describe a case of cervical lymphadenitis caused by *Chromobacterium violaceum* in a 14-year-old boy, born in Guinea and resident in Italy for 7 years in a fair condition with general measurable swelling in the right lateral cervical region and with blood tests that showed increased inflammatory indices. The patient was subjected to surgical incision. Antibiotic therapy with ceftriaxone was continued for 10 days, then replaced successfully with oral ciprofloxacin on the basis of purulent material culture positive for *Chromobacterium violaceum* sensitive to fluoroquinolones.

KEY WORDS: Chromobacterium violaceum, Lymphadenitis, Italy

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INTRODUCTION

Chromobacterium violaceum is found in tropical and sub tropical countries (Ray *et al*., 2004; Tee *et al*., 2006). It is a gram negative rod, non sporing, non-fastidious, facultatively anaerobic, fermentative and positive for oxidase and catalase. Both pigmented and non-pigmented strains are observed, though the latter are rare. Woolley described its pathogenicity in 1905 from a fatal infection in buffalo while Lessler reported a human case in 1927 in Malaysia (Jitmuang, 2008; Guevara *et al*., 2007).
Chromobacterium violaceum pigmented culture shows large smooth convex colonies of a violet-black colour for a fermentative degradation of carbohydrates. This pigment is not diffusible, known as violacein (a natural antibiotic), soluble in ethanol and insoluble in water and chloroform (Moore *et al*., 2001).
Frequently, the source of infection is a skin lesion that comes into contact with contaminated soil and water.
Main clinical features include sepsis, multiple liver abscesses and diffuse pustular lesions that are often fatal (rate >60%). This microrganism penetrates through skin lesions, wounds, cervical abscess, or the pharynx, and can lead to septicemia (Chang-Hua *et al.*, 2003; Baker *et al*., 2008; Teoh *et al*., 2006; Lee *et al*., 1999; Carter *et al*., 2008; Manjunath *et al*., 2007; Mahapatra *et al*., 2006; Brown *et al*., 2006; Sirinavin *et al*., 2005; Ang, 2004; Dromigny *et al*., 2002; Shetty *et al*., 1987; Tucker *et al*., 1979).
The virulence of the *Chromobacterium violaceum* is due in part to endotoxin and poor host defenses with reduced levels of superoxide dismutase

Corresponding author
Dr. Marco Arosio
Unit of Microbiology and Virology
A.O. Ospedali Riuniti
24128 Bergamo, Italy
E-mail: marosio@ospedaliriuniti.bergamo.it

and catalase as occurs in patients with chronic granulomatous disease and polymorphonuclear leukocyte G6PD (glucose-6-phosphate dehydrogenase) deficiency (Miller *et al.*, 1988).
To our knowledge, only one other paper has been published in Italy to date in which *Chromobacterium violaceum* was isolated from a patient with chronic obstructive pulmonary disease (COPD) although the authors concluded that the presence or absence of microrganisms in the distal bronchi could not be predicted on the basis of anthropometric, functional or clinical signs (Pela *et al.*, 1988).
We describe a case of lymphadenitis with positive culture for *Chromobacterium violaceum* observed in a Northern Italian hospital.

PATIENT PRESENTATION

The patient is a 14-year-old boy, born in Guinea and resident in Italy for the last 7 years. His parents reported that he had never returned to his country of origin but we cannot rule out contact with people and materials from those regions.
In early November 2009 there was appearance of fever, sore throat and neck pain for which the general physician prescribed anti-inflammatory therapy with defervescence.
After about 15 days, temperature increase with associated painful swelling in the right lateral cervical region. Due to the persistence of symptoms, the boy was taken to the Emergency Centre where he started antibiotic therapy with amoxicillin (250 mg q8h) as an outpatient. After 4 days there was no improvement and so he returned to the Pediatric ward.
The patient was in fair general condition with a body temperature of 39.7°C and a measurable painful swelling (5x5 cm) in the right lateral cervical region. The swelling showed a hard consistency in the centre, softer in the upper and lower peripheral with a warm overlying skin.
Blood tests presented an increase in the inflammatory markers: protein C reactive (CRP) 7.1 mg/dl, white cells 9.890 µl and neutrophils count 72%.
The patient was admitted to hospital for further investigation and treatment. On admission, because of the lack of resolution after the home treatment with amoxicillin, the therapy was switched to ceftriaxone (80 mg/kg) parenterally for 10 days. Neck ultrasonography revealed a lympho-nodal confluent mass on the right latero-cervical level, partially colliquative and on the left no focal lateral cervical swelling.
After four days, because of objectively increasing volume of the colliquative region, the patient underwent surgery with a spill of about 50 ml of purulent material that was cultured for aerobe and anaerobe bacteria, yeasts and mycobacteria.
The therapy was changed to oral ciprofloxacin on the basis of cultural result, positive for *Chromobacterium violaceum* (Figure 1). On the following days, the patient's condition improved. Blood tests revealed a reduction of inflammatory index (CRP from 7.1 to 8.5 to 3.3 mg/dl).
Further investigations carried out during the hospitalization included:
- Mantoux negative at 72 hours, IGRA (Interferon-gamma realising assays) negative;
- Serology for Cytomegalovirus, Epstein Barr Virus, Human ImmunodeficiencyVirus, Weil-Felix and Widal-Wright negative Toxo and Bartonella: IgG pos / IgM neg;
- Blood culture: negative;
- Lymphocyte subpopulation: CD3+1118 cells/µL (range 1400-2000), CD4+719 cells/µL (range 700-1100), CD8+364 cells/µL (range 600-900), Ratio CD4/CD8 1.97.

For microbiological investigation, the pus sample was observed at microscopy disclosing white

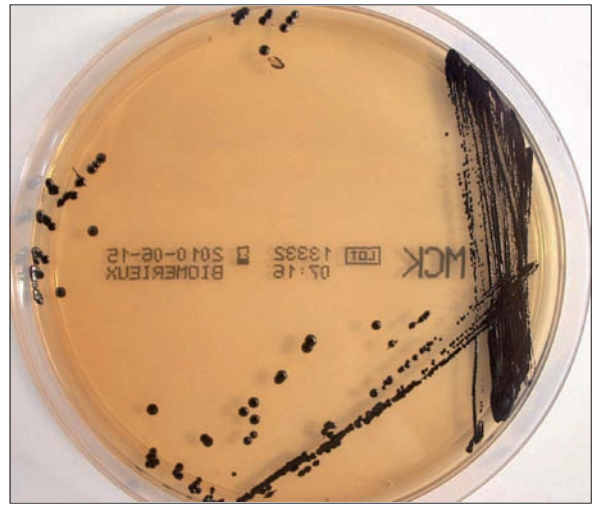

FIGURE 1 - *Culture of Chromobacterium violaceum on Mueller Hinton Agar.*

FIGURE 2 - *Antibiotic susceptibility test by E-test method. Legend: TS (trimethoprim sulphametoxazole), TZ (ceftazidime), LE (levofloxacin) and CL (chloramphenicol).*

cells and absence of microrganisms, therefore it was plated on chocolate, blood and McConkey agar (*bioMerieux*). After 24 h colonies growth was observed on all media and identified by Vitek 2 (*bioMerieux*) as C*hromobacterium violaceum*, then confirmed by sequencing of 16S rDNA gene (MicroSeq 1500 16S rDNA Bacterial Identification PCR kit, *Applied Biosystems*).
The strain was susceptible to levofloxacin MIC (minimum inhibitory concentration) 0.004 µg/mL, trimethoprim sulphametoxazole MIC 0.032 µg/mL, chloramphenicol MIC 6 µg/mL and resistant to ceftazidime MIC 32 µg/mL by E-test method (*bioMerieux*) on Mueller Hinton agar plate (*bioMerieux*) (Figure 2).
Microbiological culture was negative for anaerobe bacteria, yeasts and mycobacteria.
The boy was discharged in good general condition, apyretic, with the lateral cervical swelling remaining high, with a diameter of about 4-5 cm. The patient was treated by ciprofloxacin (250 mg) tablets twice a day for three weeks.
Check-up visit was fixed after three weeks, the examinations showed a reduction in inflammatory index. Detection of lymphocyte subpopulations was confirmed with a reduction of CD3 1206 cells/µL and CD8 382 cells/µL and CD4/CD8 2.03. The patient was in a good condition, apyretic with a resolution of symptoms.

DISCUSSION

Chromobacterium violaceum is able to cause severe infections in healthy people in tropical and sub tropical regions; only imported cases have been observed in Western countries (Tee *et al.*, 2006).
There is no clinical evidence of factors predisposing to this disease except for chronic granulomatous disease. The infection usually occurs in summer and these cases are related to skin trauma and exposure to soil and stagnant water (Sureisen *et al.*, 2008; Kaufman *et al.*, 1986).
In tropical and subtropical countries, *Chomobacterium violaceum* infection should be suspected when there are skin lesions and/or abscesses in different organs. The same applies to Western medical staff who care people from those nations.
The virulence of *Chromobacterium violaceum* can be caused by the biochemical characteristics of the outer membrane, leading to greater endotoxicity of the microrganism and the increased resistance to phagocytosis may be due to the massive production of enzymes presented in inactivating toxic oxygen species within the phagocyte (Miller *et al.*, 1988).
A recent study based on complete bacterial genome sequence has led to knowledge of bactericidal activities, cytotoxicity and drug resistance mechanisms (Scholz *et al.*, 2006)
For diagnosis, *Chromobacterium violaceum* can be isolated from wounds and blood cultures. Oxidase-negative non pigmented strains may be difficult to differentiate from *Haemophilus aphrophilus* or *Pasteurella spp*. However the *Chromobacterium violaceum* isolates were distinguished by their ability to grow on a salmonella-shigella agar plate and by their arginine dihycrolase activity (Lee *et al.*, 1999).
Ciprofloxacin is the most effective antimicrobial *in vitro* although other fluoroquinolones are also effective (Moore *et al.*, 2001; Bosch *et al.*, 2008).
In conclusion, infections caused by *Chromobacterium violaceum* are sporadic, occurring more often in Western countries but the prognosis is frequently grim. For this reason a high suspicion should always be entertained by the clinician when the patient's medical history includes stays in countries where *Chromobacterium violaceum* is endemic or as in our case by contact

with people and any materials from those geographic regions.

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