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Community-acquired *C. indologenes* septic shock in an immunocompetent patient: a case report

I. Benedetti[1], E. Novara[2], R. Bonometti[3], C. E. Lauritano[3], R. Boverio[3]

[1]Department of Internal Medicine, IRCCS San Matteo Hospital Foundation University of Pavia, Pavia, Italy
[2]Department of Emergency Medicine, IRCCS San Matteo Hospital Foundation University of Pavia, Pavia, Italy
[3]Department of Emergency Medicine, Santi Antonio e Biagio e Cesare Arrigo Hospital, Alessandria, Italy

ABSTRACT: *Chryseobacterium indologenes* is a gram-negative bacillus and is an uncommon human pathogen. It is responsible for severe infections such as septicaemia and ventilator-associated pneumonia in immunocompromised patients or after prolonged hospitalization. The pathogenicity and virulence factors of *C. indologenes* remain unclear. We describe a case of a septic shock in a 77-year-old immunocompetent woman with positive blood culture for *Chryseobacterium indologenes*, successfully treated with piperacillina/tazobactam. This case indicates that *C. indologenes* might cause severe disease in immunocompetent persons with otherwise no associated underlying risk factors.

Keywords: *Chryseobacterium indologenes*, Septic shock, Disseminated intravascular coagulation, Immunocompetent.

INTRODUCTION

Chryseobacterium indologenes is a gram-negative bacterium commonly distributed in nature and in the hospital environment. Infections due to this microorganism are rare and generally affect infants, hospitalized patients with severe underlying diseases or with medical device implants. Appropriate choice of antimicrobial agents is challenging due to the unpredictability and multiple drug resistance of this microorganism to antibiotics. The purpose of this case report is to highlight the role of *C. indologenes* as important pathogen even in immunocompetent patients and to evaluate the efficacy of a prompt antibiotic treatment in the resolution of the septic shock induced by this microorganism.

CASE REPORT

On January 4, 2020, a 77-year-old woman was admitted to the Emergency Unit with fever and progressive confusion since the day before. The patient's medical history was unremarkable apart from hypertension in treatment and previous right femur fracture treated surgically years before. On admission, she had hypotension with low peripheral pulse (blood pressure of 100/50 mmHg), heart rate of 80/min, tachypnea (respiratory rate of 25 breaths/min), marked desaturation with oxygen saturation (SpO_2) of 76%. Her body temperature was 38°C. Chest exam was normal; heart sounds were rhythmic and no organomegaly or lymphadenopathy was detected. Skin and mucous membranes were dry, there was cyanosis especially in the limbs and lips. Arterial blood gas analysis revealed respiratory insufficiency and metabolic acidosis with hyperlactatemia (pH 7.343, lactates 2.8 mmol/L). Laboratory examination showed a white blood cell (WBC) count of 3.09 x 1000/mcL (83.6% neutrophils), thrombocytopenia (a platelet count of 18 x 1000 mcL confirmed also on a sample with sodium citrate), a serum level of C-reactive protein of 15.97 mg/dL (normal value 0-0.8 mg/dL) and procalcitonin 161 ng/mL (normal value 0-0.5 ng/mL). Acute kidney injury (serum creatinine 2.49 mg/dL with normal value 0.7-1.20 mg/dL) and an elevated alanine aminotransferase (179 U/L normal value 0-49 U/L) were found. Coagulation screening showed prolonged prothrombin time (PT 38.3 sec and PT ratio 2.83, normal ratio 0.80-1.20), elevated D-dimer level (> 40 mcg/mL, normal value 0-0.50 mcg/mL), low level of antithrombin III protein (AT III 53%, normal value 80-120%) and fibrinogen (fibrinogen 120 mg/dL, normal value 150-450 mg/dL),

Corresponding Author: Irene Benedetti, MD; e-mail: irene.benedetti89@gmail.com

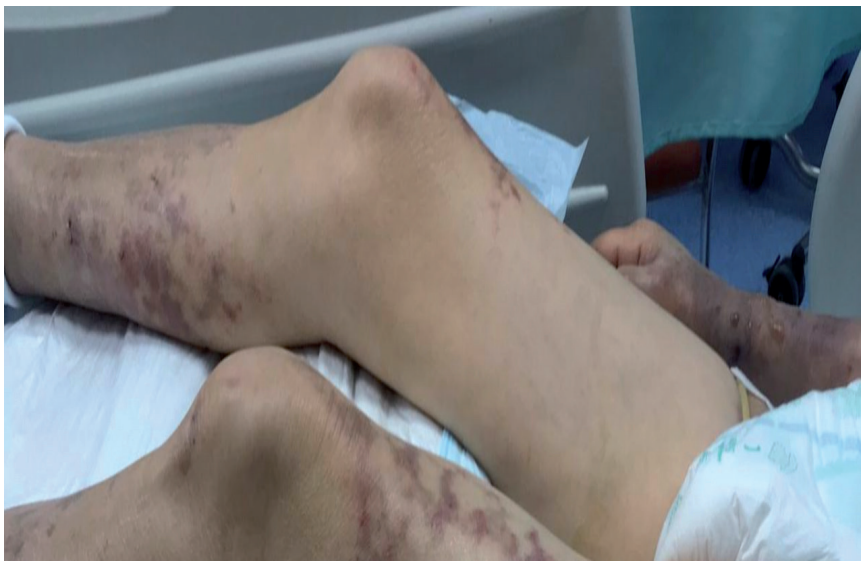

Figure 1. Confluent petechiae appeared in the lower limbs on the day two from admission.

suggested a disseminated intravascular coagulation (DIC). Chest X-ray film was normal. Color duplex sonography of the lower limbs revealed evidence of bilateral deep venous thrombosis. Medical therapy for cardiogenic shock and DIC was instituted: aggressive intravenous fluid resuscitation, continuous i.v. infusion of dobutamine and noradrenaline were immediately started, the alteration of coagulation screening and reduction of platelet count requested transfusion of fresh frozen plasma. Oxygen therapy was also started with low flow. Empiric antibiotic therapy with piperacillin/tazobactam and vancomycin was started. Because the patient presented persistent hypoglycemia infusion of glucose solution 33% was started, then switched to glucose solution 20%. Because of the rapidly raising of serum levels of creatinine and BUN associated to oliguria and signs of volume expansion, hemodialysis was started. Blood cultures were performed at the time of admission and resulted subsequently positive for an aerobic gram-negative bacillus, later identified as *Chryseobacterium indologenes*. Antibiotic treatment was adjusted according to this result with stopping of vancomycin, while piperacillina/tazobactam was continued for 14 days. On the day two from admission, confluent petechiae (Figure 1) appeared at first in the lower limbs and rapidly spreading all over the body, soft tissue induration was also present. Moreover, after few days in the same site, serous bullae appeared, rapidly enlarging and flaring up leaving the underlying skin erythematous and easily bleeding (Figures 2 and 3). In association with this petechial rash, at the tips of the fourth and fifth fingers of the right hand appeared a painful and dark cyanosis rapidly involving in dried gangrene. The day after similar lesions appeared also at feet and left arm (Figures 4 and 5). Moreover, labial and oral mucosal ulcerations were observed. Her clinical condition improved after antimicrobial therapy and renal function return to normality with no further need for hemodialysis. Unfortunately, the cutaneous lesions evolved in eschars and required surgical and plastic evaluation (Figure 6).

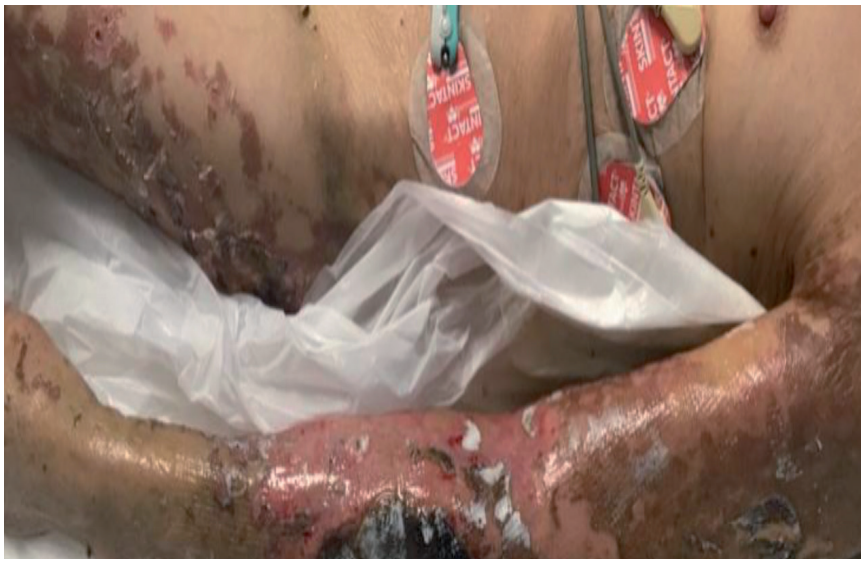

Figure 2. Serous bullae appeared in the upper limbs. They were rapidly enlarging and flaring up leaving the underlying skin erythematous and easily bleeding.

Figure 3. Erythematous and easily bleeding skin in the upper limbs, petechiae in the lower limbs.

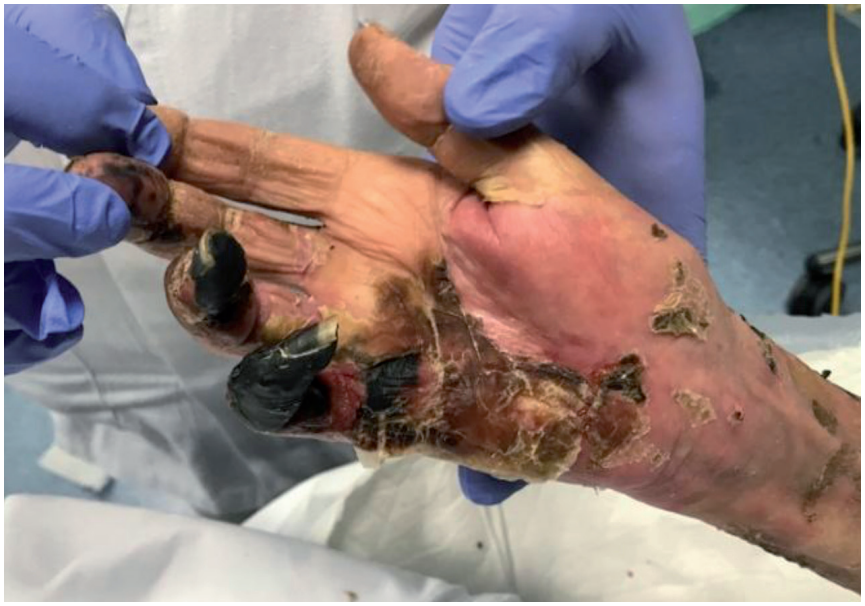

Figure 4. Dried gangrene at the tips of the fourth and fifth fingers of the right hand.

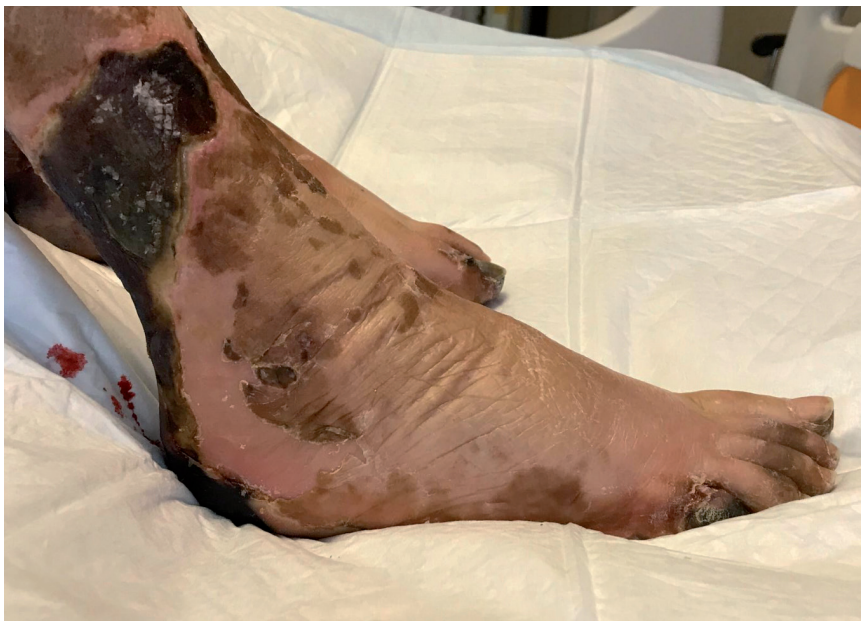

Figure 5. Dried gangrene at the right ankle.

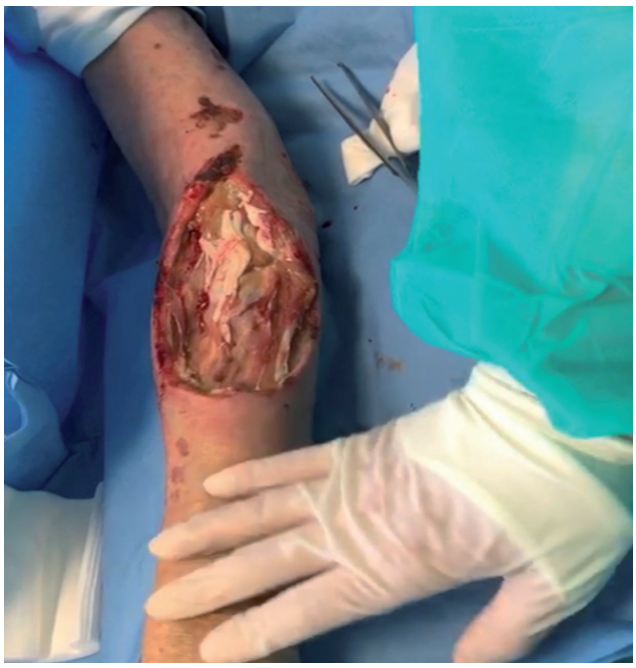

Figure 6. Eschars at the left upper limb that required surgical and plastic evaluation.

DISCUSSION

Chryseobacterium indologenes is an oxidase-positive, non-glucose-fermenting Gram-negative bacillus belonging to the *Chryseobacterium* genus, previously known as Flavobacterium[1,2]. The genus *Chryseobacterium* includes six species of low virulence, and their presence in clinical specimens usually represents colonization and not infection[3]. *C. meningosepticum* is the most pathogenic member of the genus, being a frequent cause of neonatal meningitis especially in premature infants during the first two weeks of life[4]. *C. indologenes*, although it is widely distributed in nature, is a rare human pathogen and it is not normally present in the human microflora[1]. In the literature, most cases of *C. indologenes* referred to nosocomial infections detected in immunocompromised patients with mechanical ventilation or indwelling catheters or with severe underlying disease, such as malignancies, diabetes mellitus, neutropenia and prolonged treatment with antibiotics[5]. Recently even non-catheter-related community-acquired *C. indologenes* bacteremia in immunocompetent patients have been reported[6-9]. The most common clinical manifestations of *C. indologenes* infections are primary bacteremia, catheter-related bacteremia, wound sepsis, cellulitis, ocular infections, meningitis, pyelonephritis, peritonitis, biliary tract infections and ventilator-associated pneumonia[3,5]. Despite not being virulent bacteria, infections have often been associated with high mortality rate due to patients' immunocompromised conditions and to its multidrug resistance. These bacteria are intrinsically resistant to carbapenems and cephalosporins due to their production of molecular class A β-lactamase and class B carbapenem-hydrolysing β-lactamase and metallo-β-lactamase. Although the increasing incidence of reported cases, there are no gold standards or guidelines for the management of *C. indologenes* infections, the susceptibility study is not standardized, and MIC values have not been established[1,2]. With the exception of one report in literature of *C. indologenes* bacteremia, the present case is the first description of a community-acquired *C. indologenes* septic shock with DIC, skin involvement, multiorgan failure and renal impaired so severe that requires several days of amine and hemodialysis. Moreover, our patient was an immunocompetent patient without known risk factors or underlying conditions causing immunosuppression. This is probably the reason why she had a good response to antibiotic therapy and survived in the first 30 days.

CONCLUSIONS

Infection from *C. indologenes* was initially rarely reported outside Taiwan and often occurred in immunocompromised patients with risk factors as underlying prolonged hospitalization, prolonged broad-spectrum antibiotic courses, indwelling devices and having comorbidity. However, an increasing number of cases of community acquired *Chryseobacterium indologenes* bacteremia in immunocompetent patients have been recently reported in literature. *C. indologenes* is actually considered an emerging threat whose infections may be community-acquired and occur even in the absence of an underlying condition.

We report a case of community-onset *C. indologenes* severe sepsis evolved in acute kidney failure and extensive skin lesions in an immunocompetent woman with no risk factors. This corroborates the idea that the organism has the potential to be highly pathogenic.

The choice of appropriate antibiotics is difficult, as a large number of drugs have no efficacy, the clinical data on the treatment response is limited and there is no consensus for the empiric treatment regimen. Most authors suggest using antimicrobial agents based on minimal inhibitory concentration results from properly performed susceptibility test. Our case demonstrates that it is essential to start antibiotic therapy immediately. Prognosis could be favorable if appropriate antibiotic therapy is promptly initiated, despite the absence of susceptibility testing.

Authors' contributions:
IB wrote the paper. EN, RB, CEL, RB gave clinical assistance to the case. CEL revised the paper. All authors read and approved the final manuscript.

Statement of human and animal rights :
All procedures performed in the study were in accordance with the ethical standards of the Institutional and/or National Research Committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent:
The patient was informed of the scientific and clinical interest of her disease and was informed of this anonymous publication. She gave an informed verbal consent to the anonymous publication.

Funding:
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Conflict of Interest:
The authors declare that they have no conflict of interest.

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