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An emerging bacterium, *chryseobacterium indologenes* a case report and literature review

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ABSTRACT
Aerobic, Gram-negative, non-fermenting *Chrysobacter endologins* are bacilli that are inherently multidrug resistant. Among the infections that have been reported include keratitis, polymyositis, meningitis, pneumonia, and bacteremia in immobilized devices. We describe a rare instance of *C. indolognes* infection that resulted in bacteremia in a patient receiving intensive care and offer an analysis of cases that are comparable. This report emphasizes the importance of individualized treatment and promotes awareness about this organism as one of many emerging pathogens in immunocompromised adults who are often ICU residents. The most effective agents reported against *C. indologes* are the quinolones (gatifloxacin and levofloxacin) and trimethoprim-sulfamethoxazole (more than 95% sensitivity). Ciprofloxacin, cefepime, ceftazidime, piperacillin, and rifampin showed significant sensitivity. *C. indologenes* was obtained from blood cultures. Based on sensitivity, a successful response was observed with piperacillin/tazobactam. Guidelines for this pathogen's management should be taken into consideration given the rise in cases that have been documented in the literature. Levofloxacin, Ciprofloxacin, Piperacillin/Tazobactam, Trimethoprim/Sulfamethoxazole, Piperacillin/Tazobactam, and Rifampin were other effective antimicrobials against *C. indologenes*.

CONTENTS

1. Introduction:

Gram-negative, aerobic, non-fermenting, oxidase- and catalase-positive, non-motile, bacilli are the characteristics of *Chryseobacterium* species. On blood agar, they create a characteristic yellow to orange pigment [1,2]. *C. indologenes*, *C. gleum*, and C. *meningosepticum* are the three species of *Chryseobacterium* that are most frequently isolated. *Flavobacterium indologenes* was the previous name for *C. indologenes*. Hsueh *et al*. [3] in Taiwan were the first to describe bacterialemia caused by *C. indologenes*.

It naturally occurs in food, water, plants, and soil. The human microbiota generally does not

contain it [2,4]. Water systems and wet surfaces in hospitals may contain *C. indologenes*, which could act as an infection reservoir. It may live in public water supplies and is resistant to chlorination [5]. The use of indwelling devices during hospital stays, especially in the intensive care unit, has been associated with nosocomial infections caused by *C. indologenes*. Additionally, it has been documented that patients can become colonized via contaminated medical equipment that uses fluids, including syringes, endotracheal tubes, humidifiers, incubators for babies, and mist tents [1, 5, 6]. The infections most frequently linked to indwelling devices are bacteremia, pyomyositis, pneumonia, meningitis, keratitis, and infections of the urinary tract, surgical wounds, and burn wounds [7]. Since *C. indologenes* has not been regularly found in clinical specimens, its clinical significance has not yet been determined. After 24 hours of incubation at 37°C, the majority of *C. indologenes* strains grow well on blood agar but not on MacConkey agar [1,4,7].

The virulence of invasive infections may be significantly influenced by the bacteria's ability to form biofilms on foreign objects (such as indwelling devices) and to create proteases [2,8]. The first case of *C. indologenes* in a patient with ventilator-associated pneumonia was documented in 1993 by Bhagawati *et al.* [9]. Later, more cases that manifested as bacteremia, pneumonia, meningitis, pyomyositis, keratitis, as well as contaminated surgically implanted devices, have been documented [4,6,10, 11]. Due to the unpredictable nature of this bacteria and its numerous drug resistance to antibiotics, choosing the right antimicrobial drugs might be difficult [1,12].

2. Presentation of the case

A 56-year-old man from Sana'a city with a previous medical history of hypertension and end-stage renal disease (ESRD) was on dialysis for 2 years. Blood cultures were obtained. The patient was treated with meropenem based on the initial report until a final report of culture was obtained. Culture from blood obtained *C. indologenes is* resistant to carbapenems and only sensitive to quinolones (ciprofloxacin and levofloxacin), trimetropin sulfametoxazol, Rifampain, and piperacillin-tazobactam. Piperacillin-tazobactam 2.25 g every 8 h was initiated to complete 10 days of therapy. He discharged, and one more set of blood cultures prior to discharge was negative.

***Chryseobacterium indologenes* antibiotic sensitivity:** The most potent agents reported against C. indologenes are quinolones (gatifloxacin and levofloxacin) and trimethoprim sulfamethoxazole (>95% susceptibility). Ciprofloxacin, cefepime, ceftazidime, piperacillin, and rifampin showed significant susceptibility. In our case the antibiotic sensitivity results were as follows:

Amikacin = Resistant
Aztreonam = Resistant
Cefepime = Resistant
Ceftriaxone = Resistant
Ciprofloxacin = Sensitive
Gentamicin = Resistant
Levofloxacin = Sensitive
Meropenem = Resistant
Piperacillin/Tazobactam = Sensitive
Tobramycin = Resistant
Trimethoprim/Sulfa = Sensitive
Rifampin = Sensitive

3. Discussion

Inherently resistant to aminoglycosides, first-generation cephalosporins, aminopenicillins, and aztreonam are the non-motile Gram-negative bacilli known as *Chryseobacterium indolognes* [5,12,13]. There have been serious issues in the critical care situation as a result of the increased clinical usage of colistin and tigecycline against newly emerging carbapenem-resistant bacteria [1,8]. Alon *et al.* (2018) [4] presented a cohort of seven patients

with *C. indologenes* bacteremia, with the most prevalent characteristics of these patients being an immunocompromised state, several comorbidities, and surgical procedure history. Additionally, they reported resistance sensitivity patterns that matched those of earlier publications in the literature. The quinolones (gatifloxacin and levofloxacin) and trimethoprim sulfamethoxazole (>95% susceptibility) have been reported as the most effective treatments against *C. indologenes*. Significant susceptibility was seen for the antibiotic's ciprofloxacin, cefepime, ceftazidime, piperacillin, and rifampin. Vancomycin, chloramphenicol, linezolid, and glycopeptides are also not recommended for the treatment of infections caused by this organism, according to the SENTRY antimicrobial surveillance program (1997-2001) [6,9]. In most cases, duration of therapy for bacteremia ranges from 7 to 14 days. Our patient responded successfully to the regimen received; therefore, the decision was made to provide a 10-day course of antibiotics. The suggested mortality rate associated with infections with *C. indologenes* is around 17% [4].

4. Conclusions

Despite being a rare infection, *C. indologenes*, the number of cases documented has grown over time. This growth is probably due to the development of better diagnostic techniques. There are no recommendations for the care of individuals who arrive with these infections, nevertheless. With some successful examples documented in the literature, the removal of indwelling devices may not be clinically necessary in patients without bloodstream infections.

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Conflict of interest

No conflict of interest associated with this work.

Author contributions

First author Eshtiaq A. Al-Yousafi did the fieldwork for this study as part of a PhD in the department of medical microbiology. Additional authors assisted with data analysis, drafting and reviewing the manuscript, and giving final clearance to the study.

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