Sepsis Due to *Chryseobacterium gleum* in a Diabetic Patient with Chronic Obstructive Pulmonary Disease: a Case Report and Mini Review

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15%). The blood was sent for culture. On MacConkey agar, lactose non-fermenting colonies were seen with non-diffusible orange-yellow pigment, which were better discernable on nutrient agar. On blood agar, colonies were non-hemolytic. The organism was non-motile, catalase and oxidase positive. In Triple Sugar Iron agar, no sugars were fermented, and neither gas nor hydrogen sulfide was produced. Indole production was detected, and the organism hydrolyzed urea. Further, it was negative for citrate utilization. It was nitrate non-reducing, and amino acids were not decarboxylated. None of the sugars were fermented. The NFGNB was conventionally identified as *C. gleum* due to indole production, hydrolysis of urea, and absence of growth at 42°C (2). To exclude contamination, a repeat sample was obtained 34–36 h after the first one from a site different to that selected for the first blood culture, before changing the antibiotic. It revealed a morphologically identical, cytochrome oxidase-positive, and pigmented pathogen. The identification was confirmed by the Matrix-Assisted Laser Desorption Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS; Bruker Daltonics, Bremen, Germany) using the MALDI Biotyper 3, and the isolate was identified as *C. gleum* from the high score (≥ 2; 2.1).

To trace the source of infection, environmental surveillance was conducted by the ICU. Various samples were taken from the ventilator, patient’s bed, intubation tubes, humidifiers, and disinfectants; nonetheless, growth of *C. gleum* was not observed in any of the samples.

Antimicrobial susceptibility testing was performed by the Kirby-Bauer disk diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) 2016 guidelines. The organism was susceptible to amikacin, cotrimoxazole, ciprofloxacin, levofloxacin, piperacillin-tazobactam, and tetracycline. It was resistant to imipenem, ceftazidime, cefepime, ceftriaxone, and amoxicillin-clavulanic acid. Based on the antibiogram pattern, the patient was successfully treated with the administration of levofloxacin 750 mg o.d. in 100 mL normal saline for 7 days. Blood culture obtained on seventh day was sterile, and patient made an uneventful recovery.

*Chryseobacterium* spp. are emerging opportunistic pathogens that can survive in a hospital environment. In this report, we have presented on a highly immunocompromised diabetic patient with severe COPD, who had 2 recent episodes of prolonged hospitalization. He had been treated with multiple antibiotics during each admission. Diabetes has been identified as a risk factor in
other reported cases as well (7). The patient in our study was on ventilator, had indwelling devices, and required prolonged ICU stay. He was also given imipenem for treating pseudomonal infection, which could have led to selective infection by \textit{C. gleum}, as it is resistant to imipenem. These factors could have contributed to sepsis by \textit{C. gleum}, and sepsis cases due to this uncommon organism are very rarely reported in the literature. To the best of our knowledge, the present case is the second reported case of sepsis due to \textit{C. gleum} in the world. In 2015, Brkic et al. reported a case of a 35-year-old female patient with extreme malnutrition and a hepatic lesion, whose blood and tracheal aspirate cultures showed growth of \textit{C. gleum} (8).

According to the SENTRY Antimicrobial Surveillance Program, \textit{Chryseobacterium} spp. represented about 0.27% (50 of 18,569) of the processed NFGNBs from 33 medical centers in 16 countries, among which only 2 isolates (4%) were identified as \textit{C. gleum} (11). Nonetheless, in the Indian subcontinent, this pathogen is being increasingly reported in the last few years. Various cases of \textit{C. gleum} along with the underlying comorbidity are described in Table 1.

According to Chang et al., \textit{Chryseobacterium} species are susceptible to agents like vancomycin, erythromycin, and clindamycin (12); however, the majority of other studies have reported resistance to all of these antibiotics. Most of the cases of \textit{C. gleum} infections have been treated successfully with a fluoroquinolone (ciprofloxacin and levofloxacin) or piperacillin-tazobactam (1,6,7). In contrast, Garg et al. reported resistance to fluoroquinolones and susceptibility to only tetracycline and minocycline (9). Abdalhamid et al. have reported successful treatment of an infected infant with levofloxacin (1). Likewise, in our case, the patient was successfully treated with levofloxacin.

It is imperative to identify \textit{C. gleum} because the therapy for frequently isolated NFGNBs, such as \textit{P. aeruginosa}, is ineffective against this organism. In addition, due to the production of class A beta-lactamase, it is resistant to carbapenems and cephalosporins, and this may contribute to its rise as a notorious nosocomial pathogen (13).

Here we re-emphasize the importance of accurate identification of NFGNBs due to their contrasting susceptibility patterns. Furthermore, increased awareness amongst microbiologists and clinicians about \textit{C. gleum} is required, especially with regard to diabetic patients, who are treated with broad-spectrum antibiotics.

**Conflict of interest** None to declare.

**REFERENCES**