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Case Report

Chryseobacterium indologenes as a Rare Pathogen of Bacteremia in Febrile Neutropenia

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ABSTRACT

Chryseobacterium indologenes (C. indologenes) is nonmotile, oxidase-, and indole-positive gram-negative aerobic bacillus. Immunosuppression, comorbidities, use of broad-spectrum antibiotics are known risk factors for C. indologenes-related infections. We report a neutropenic fever caused by C. indologenes in a 16-month-old boy who was treated due to the neuroblastoma. According to the antimicrobial susceptibility test result, he was treated with cephaperazone/sulbactam.

INTRODUCTION

Chryseobacterium indologenes (C. indologenes) is aerobic, non-fermentative, non-motile, oxidase- and indole- positive, Gram-negative bacillus.[1] *C. indologenes* is known to cause different types of infections such as bacteremia, pneumonia, meningitis and shunt infection, especially in patients hospitalized long-term with indwelling devices and using long-term broad-spectrum antibiotics. *C. indologens* can also be the cause of serious infections in immunocompromised patients. With increased use of colistin and tigecycline against carbapenem- resistant microorganisms such as *Acinetobacter baumannii, Escherichia coli* and *Klebsiella pneumoniae*, there is an increase in the incidence of infections associated with *Chryseobacterium* spp.[1,2] Herein, we describe a neuroblastoma patient with febrile neutropenia who had a bloodstream infection due to *C. indologenes* which was successfully treated with cephaperazone/sulbactam.[1,2]

CASE REPORT

A 16-month-old boy was admitted to our hospital with complaints of high fever, weakness and pallor. On physical examination, a 2 cm palpable mass on the right upper quadrant was detected. An adrenal mass was detected on the right side of abdomen on abdominal computed tomography. The patient was diagnosed with neuroblastoma and the neuroblastoma protocol of Turkish Pediatric Oncology Group,

including A9 (vincristine 1,5 mg/m^2 on days 1 and 5; dacarbasine 200 mg/m^2 on days 1-5; Ifosfamid 1500 mg/m^2 on days 1-5; adriamycin 30 mg/m^2 65 on days 4 and 5) and A11 (cyclophosphamide 300 mg/m^2 on days 1-5, etoposide 80 mg/m^2 on days 1-4; cisplatin 30 mg/m^2 on days 1-5) was started alternately for each 21 days.

Febrile neutropenia was diagnosed after the fourth course of treatment. The patient underwent a detailed physical examination and blood culture was obtained before starting antibiotic and cephaperazone/sulbactam monotherapy was begun. Vancomycin was added to the treatment after the fever persisted for 72 hours. On the fifth day of fever, *C. indoligenes* was isolated using the BACTEC 9120 system (Becton-Dickinson Diagnostic Systems, USA). Identification and antimicrobial susceptibility testing of the isolate was performed using the Vitek2® system (bio-Mérieux, France) according the recommendation of the Clinical and Laboratory Standards Institute.[3] According to the antibiotic susceptibility test result, treatment regimen was not changed as *C. indologens* were sensitive to cephaperazone/sulbactam. The patient became afebrile on the seventh day of cephaperazone/sulbactam treatment and treatment was completed before any complications developed.

DISCUSSION

Children treated with solid tumors or hematological malignancies have an increased risk of infections. In these patients, the incidence of bacteremia is still reported as 10-40%, and mortality rates reach to 9-24% due to serious complications.[4,5]

With the developing modern culture systems, previously unidentifiable microorganisms have become identifiable and in many infectious diseases, new microorganisms have been reported as causative agents. One of them is *C. indologenes*, a member of the *Chryseocabterium* spp. The SENTRY Antimicrobial Surveillance Program is a worldwide study that monitors the susceptibility and resistance of bacteria and fungi to antibiotics based on results from more than 119 sentry hospitals and laboratories in North America, Latin America, Europe and the Asia-Pacific region. According to the data of this study, which was carried out between 1997 and 2001, *Chryseobacterium* spp. appear to be a rare pathogen representing only 0.27% of non-fermentative Gram-negative bacilli and 0.03% of all bacterial isolates collected from adults and children. In addition, in this study, it was reported that *Chryseobacterium* spp. can only be isolated in 0.10% of the culture samples taken from the respiratory tract and 0.03% of the blood culture samples.[2,6]

Bacteremia due to *C. indologenes* is becoming increasingly common.[7] It has been reported that bacteremias due to *C. indologenes* are associated with nosocomial pneumonias, biliary tract infections, peritonitis, urinary tract infections, surgical wound infections, cellulitis, intravascular catheter-related bacteremia and primary bacteremia.[2,8] Also it has been reported that most cases with *C. indologenes* sepsis, have either severe underlying diseases such as malignancy or diabetes mellitus, either taking long-term broad-spectrum antibiotic therapy or using indwelling devices.[9,10]

C. indologenes has been rarely reported to be a causative agent in febrile neutropenia in children. In their studies evaluating *Flavobacteriaceae* bacteria in children, Cooper et al found that nine out of the 13 flavobacteiaceae growths in the last 20 years were *C. indologenes* [(11)]. Five of nine cases with growth of *C. indologenes* in their culture media were immunosuppressive patients (two patients with acute lymphoblastic leukemia and one patient each with hemophagocytic lymphohistiocytosis, aplastic anemia and acute myeloid leukemia) in that study. Although it was reported that three cases had neutropenic fever, it was thought that leukostasis in T-ALL patient with fever at the stage of diagnosis may be due to the presence of lymphoblasts in peripheral blood, although it was not mentioned in the article, a total of four cases had neutropenic fever. Only one of these five patients was not catheterized and diagnosed with febrile neutropenia. To our knowledge, *C. indologenes* were not identified as the causative agent of febrile neutropenia, except in the cases mentioned in this study. This shows us that *C. indologenes* are rarely seen among microorganisms that cause bacteremia in febrile neutropenia. In our case, *C. indologenes* was isolated from blood cultures, and our case had not central catheter,

which was among the risk factors for *C. indologenes* bacteremia.

An empirically effective drug selection in infections caused by *C. indologenes* is difficult due to the limited antimicrobial susceptibility of the organism. Studies have shown that *C.indologenes* is susceptible to piperacillin-tazobactam, piperacillin, cefoperazone, ceftazidime, cefepime, cefpiroma, minocycline, rifampicin, TMP-SMZ and new fluoroquinolones (garenoxacin, gatifloxacin, levofloxacin); conversely, resistant to extended- spectrum penicillins, first and second generation cephalosporins, carbapenems, ceftriaxone, aztreonam, ticarcillin clavulonate, chloramphenicol, erythromycin, clindamycin, aminoglycosides, tetracycline and teicoplanin. *C. indologens* can produce a variety of β-lactamase species, which contribute to multiple antibiotic resistances.[12]

We started the treatment with cefaperazone/sulbactam, which is an antipseudomonal antibiotic as empirically recommended in febrile neutropenia guidelines.[13] As our patient did not have a blood culture result at 72 hours and his fever continued, vancomycin, an antibiotic in the glycopeptide group, was added to the treatment as stated in the guidelines. On the 5th day of the treatment, the treatment was continued without antibiotic change due to bacterial sensitivity to cefaperazone/sulbactam according to the blood culture and antibiogram results and the treatment was successfully completed without any complications.

In our case, cephaperazone/sulbactam treatment, which was started empirically, was continued after the antibiogram showed its antimicrobial sensitivity and the treatment was successfully completed without any complication. We think that blood culture results should be monitored closely and treatment options should be adjusted according to antibiotic susceptibility in these patients.

In conclusion, this case shows us that although the majority of *C. indologenes* infections are associated with indwelling catheter use, non-catheter-related bacteremia can also be a causative factor, and *C. indologenes* should be considered as a possible cause of febrile neutropenia in children.

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