Bacteremia by *Chryseobacterium indologenes* in a Patient with Lung Cancer: A Clinical and Microbiological Investigation

Gitali Bhagawati¹, Ashutosh Bhardwaj², Rekha Sajikumar³, Sukhwinder Pal Singh⁴, Sanjeev Prajapati⁵

**Abstract**

We present a case of bacteremia by an unusual, intrinsically multidrug resistant organism, *Chryseobacterium indologenes* in a 59 year old gentleman with squamous cell carcinoma of lung with multiple metastasis. Despite of treating as per sensitivity report after isolating *Chryseobacterium indologenes*, patient could not be survived. The pathogenicity and predictability of the organism towards antibiotics, both in vivo and in vitro needs further research.

**Keywords:** *Chryseobacterium indologenes*, Multidrug resistant (MDR), Lung cancer

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**Introduction**

*Chryseobacterium indologenes* (previously classified as *Flavobacterium indologenes*), a Gram-negative rod is an environmental organism. Infection by this organism is usually rare; however, reported cases are there causing serious infections in immunosuppressed patients from various parts of the globe. The troublesome fact with this organism is that it presents a high rate of natural resistance against broad-spectrum cefem compounds including carbapenems.

**Case Report**

This document reports a 59-year-old gentleman diagnosed with moderately differentiated squamous cell carcinoma (SCC) of left lung with multiple metastasis in liver, brain, bone, subcutaneous tissue in chest and back, left adrenal gland, lymph nodes including right pulmonary hilar, mediastinal, bilateral axillary and right cardiophrenic angle. Tumour marker cytokeratin (CK)7 was found to be positive. Blood was transfused (1 unit packed red blood cells) on the day of admission in view of low hemoglobin (7 gm/dL). Patient also had complaints of loss of appetite and generalized weakness for 3-4 days. Patient was planned for palliative external beam radiotherapy (EBRT) to address painful bony metastasis followed by systemic chemotherapy. Blood transfusion was received for the day of admission in view of low hemoglobin (7 gm/dL). Patient also had complaints of urinary retention, but due to resistance during Foley's catheterisation attempts failed and therefore cystostomy had to be done. On 3rd day of admission, patient was shifted to medical intensive care unit (ICU) due to low Glasgow Coma Scale (GCS). Central venous line (CVP) insertion was done on the same day. Investigations revealed high TLC, thrombocytopenia, dyselectrolytemia including hypernatremia, hypokalemia, deranged Kidney function test (KFT). After admission to ICU, blood and urine samples were sent for culture. Both blood and urine cultures showed growth of multidrug resistant (MDR) *E. coli*. Patient was receiving injection cefepime-tazobactum for 10 days; injection polymyxin B for 6 days.

After one week of stay in the ICU, repeat paired aerobic blood (right femoral line and central venous line) samples were taken in repeat sets. Patient was receiving injection cefepime-tazobactum for 10 days; injection polymyxin B for 6 days. Patient was shifted to medical intensive care unit (ICU) due to low Glasgow Coma Scale (GCS). Central venous line (CVP) insertion was done on the same day. Investigations revealed high TLC, thrombocytopenia, dyselectrolytemia including hypernatremia, hypokalemia, deranged Kidney function test (KFT). After admission to ICU, blood and urine samples were sent for culture. Both blood and urine cultures showed growth of multidrug resistant (MDR) *E. coli*. Patient was receiving injection cefepime-tazobactum for 10 days; injection polymyxin B for 6 days.

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| Antibiotic | MIC  | Interpretation |
|------------|------|----------------|
| CEFTAZIDIME | >64  | R              |
| AMIKACIN   | >64  | R              |
| MINOCYCLINE| <=1  | S              |
| CIPROFLOXACIN | >16  | R              |
| GENTAMYCIN | >16  | R              |
| COLISTIN   | >16  | R              |
| CEFEPIME   | >64  | R              |
| LEVOFLOXACIN | 4   | I              |
| MEROPENEM  | >16  | R              |
| AZTREONAM  | >64  | R              |
| TICARCILLIN CLAVULANIC ACID | >128 | R |
| IMIPENEM   | >16  | R              |
| CEFOPERAZONE-SALBACTUM | >64  | R |
| TRIMETHOPRIM-SULFOMETHAZOLE | 160  | R |
| PIPERACILLIN-TAZOBACTUM | >128 | R |
| TIGECYCLINE | >8   | R              |

Table 1: Antimicrobial susceptibility pattern of Chryseobacterium indologenes isolated from blood culture

Discussion

Chryseobacterium spp. is not usually found in human flora but widely distributed in soil, plants, food-stuffs and water. In health care institutes, water systems can act as a potential reservoir for the bacteria; thus, patients may get colonized by this bug via various contaminated medical devices like endotracheal tube, tracheostomy tube etc. Although the pathogenicity of Chryseobacterium indologenes has not been clearly defined, biofilm production and their highly active protease have been found to be responsible for its virulence.

In 1993, the first case of infection by Chryseobacterium indologenes was reported from a patient with ventilator associated pneumonia (VAP). During the period 1997 to 2001, SENTRY Antimicrobial Surveillance Program reported from a patient with ventilator associated pneumonia (VAP) and chest infectionemy of Chryseobacterium indologenes in an Infant. Case Reports in Infectious Diseases. 2014; Article ID 270521, p. 4.

Some authors believe that after introduction of colistin and tigecycline, prevalence of Chryseobacterium indologenes infections have been increased. The organism is intrinsically resistant to carbapenems and cephalosporins due to production of molecular Class A Beta lactamases and Class B carbapenem hydrolyzing B-lactamase. However, most active agents against this bug were found to be trimethoprim-sulfamethoxazole (TMP-SMZ) and cefoperazone-sulbactam. According to the results of the SENTRY Program, ≥95% susceptibility was found with newer quinolones (garenoxacin, gatifloxacin, and levofloxacin) and TMP-SMX followed by piperacillin-tazobactam (90% susceptibility). Worldwide newer quinolones may represent the most appropriate antimicrobial agents against this pathogen.

On 20th day of admission in ICU, there was further deterioration of patients’ general condition including sensorium and Glasgow coma scale (GCS). In view of advance nature of the disease, sepsis refractory to antibiotics, dyselectrolytemia and aspiration, the patient was put on non-invasive ventilation with informed consent. However, the patient had an episode of bradycardia which was followed by cardiopulmonary arrest.

The present case report suggests that Chryseobacterium indologenes can cause nosocomial bacteremia in terminally ill cancer patients with other risk factors like previous MDR infections and use of broad spectrum antibiotics against them. Appropriate selection of antimicrobials is difficult despite the proper culture and sensitivity report due to unpredictable nature of the organism against the antibiotics. Further study on pathogenesis of this organism may help in future to get the proper empiric antibiotic.

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