

Case Report



Clinical and microbiological characteristics of *Chryseobacterium indologenes* bacteremia: A case report and review of literature

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Chryseobacterium indologenes is an uncommon human pathogen that is aerobic, non-fermentative, and oxidase and indole positive. Its clinical relevance has yet to be fully determined. An increase in deadly infectious cases has been recorded in recent years, mostly in patients of older age group and immunocompromised states as a result of *C. indologenes* infection of medical equipment involving fluids and implanted devices. Because *C. indologenes* is resistant to the majority of antibiotics, therapy is challenging and this bacterium is thought to be an emerging cause of high mortality in critically ill patients. In our study, we describe a case of *C. indologenes* producing bacteremia in an elderly female patient with a history of ovarian cancer and hepatitis B infection who had undergone a right hemicolectomy with end ileostomy and a distal mucus fistula and was effectively treated with levofloxacin.

Introduction

Chryseobacterium species, formerly known as *Flavobacterium* belong to the family *Flavobacteriaceae*.¹ *Chryseobacterium indologenes* is an aerobic, gram negative, non-fermenting, and oxidase- and catalase-positive non-motile bacteria. *Chryseobacterium* is found in food, plants, and soil, and is not a part of the natural human flora.^{2,3} It is a rare organism that is known to infect mostly hospitalized patients with serious underlying conditions and in patient with impaired immune system. It can result in number of infections such as bacteremia, nosocomial pneumonia, biliary tract infections, peritonitis, and surgical site infections. Since *C. indologenes* hasn't been regularly isolated from clinical specimens, its clinical relevance is yet to be determined. After 24 hours at 37 °C, the majority of *C. indologenes* strains grow well on blood agar but not on MacConkey agar.^{3,4} The appropriate antibiotic choice is challenging for this organism as it shows resistance to multiple antibiotics. This report describes a case of *C. indologenes* nosocomial septicemia in an elderly patient with hepatitis B infection & ovarian tumor and reviews previously reported infections by *C. indologenes* in all age groups.

Case Report

A 60-year-old female with known case of ovarian cancer and hepatitis B infection, who have undergone a right hemicolectomy with end ileostomy with distal mucus

fistula one month back, presented to us with complain of vomiting and generalized weakness for five days. The vomiting was bilious in nature and contained undigested food particles; more frequent in the evening and was not associated with any abdominal pain. On examination, the patient had pallor, stable vital signs, a soft, non-tender abdomen, audible bowel sounds, and a healthy, functioning stoma with daily output of around 250–300 cc. The patient was admitted, and relevant investigations were carried out as listed in [Table 1](#).

Blood parameters revealed pancytopenia, which led to multiple blood transfusions for the patient. Chest X-ray was suggestive of a consolidation patch on the right side. An injection of piperacillin/tazobactam 4.5 g was started every 8th hourly IV by prolonged infusion. Monitoring of electrolytes and vital signs was continued along with conservative management. Additionally, the patient was receiving chemotherapy for ovarian malignancy.

On 7th day of admission, the patient was transferred to the intensive care unit (ICU) because of a sudden deterioration in vital signs and evidence of refeeding syndrome. Inotropic support and oxygen support was initiated with escalation of antibiotics to meropenem 1 g IV 8th hourly by prolonged infusion. Computerized tomography (CT) scan of the chest and abdomen was performed. A pelvic collection was observed, with no leak. The pelvic collection was aspirated under ultrasound guidance and sent for culture and susceptibility testing.

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Table 1. Blood parameters of patient

Investigations	Day 1 (of admission)	Day 7	Day 15	Day 22	Day 32	On discharge
WBC (per microliter)	9780	2900	7500	3200	6200	4700
Haemoglobin (g/dL)	8.6	8.3	8.1	8.8	10.6	9.6
Platelets (per microliter)	65000	105000	90000	40000	61000	196000
Neutrophils	82%	73%	78%	95%	77%	73%
Sodium (mmol/L)	133	139	138	140	135	131
Potassium (mmol/L)	3.9	2.9	4.5	3.1	3.4	3.8
SGOT/SGPT (U/L)	20/16	28/16	79/51	82/62	33/52	42/66
Alkaline Phosphatase (U/L)	249	162	228	350	415	383
Creatinine (mg/dL)	0.6	0.6	0.5	0.5	0.3	0.4
PT (seconds)/INR	15.4/1.275			13.1/1		
Procalcitonin (ng/mL)	3.2	62.9	36.7	9.7	0.35	0.2

WBC, White blood cells; SGOT, Serum glutamic oxaloacetic transaminase; SGPT, Serum glutamic pyruvic transaminase; PT, Prothrombin time, INR, International normalized ratio.

The pus culture showed growth of *Acinetobacter baumannii*, which was susceptible only to minocycline and intermediately sensitive to colistin. Injection of polymyxin-B 7.5 lac units IV were added 8th hourly. Rest supportive care was continued.

On 22nd day of admission, patient was intubated, and ionotropic support was escalated due to further deterioration in general condition and hemodynamics of patient. The patient started having frequent spikes in temperature. Cultures of blood and urine were sent. Due to a persistent fever, the CT abdomen was performed once more, and a leak was found. Antipyretics were used continuously with cold sponging and temperature monitoring. Blood culture identified the growth of a rare organism *C. indologenes*, which was susceptible to minocycline and intermediate susceptible to levofloxacin (Table 2). Injection Levofloxacin 500 mg IV 24th hourly was added after discussion with the microbiologist. The patient underwent additional surgery to repair the leak, including resection of terminal ileal segment with refashioning of ileostomy with a distal mucus fistula. On the first postoperative day, stoma started functioning. There were multiple blood and platelet transfusions given. On day 32nd, the patient was extubated, and ionotropic support was tapered off. The patient gradually improved and was shifted to ward. Supportive care was continued. The patient was successfully discharged with stable vital signs and good feed tolerance.

Discussion

Chryseobacterium spp. (previously *Flavobacterium*) is widely distributed in soil, plants, and water. It may be recovered from a variety of food items too.^{2,3} Even after chlorination, they can still survive in public water sources. Waterways at medical facilities may act as a potential reservoir. Therefore, a variety of contaminated medical devices, such as an endotracheal or a tracheostomy tube, indwelling venous catheters, ampoules, sink traps, feeding

Table 2. Antimicrobial susceptibility pattern of *Chryseobacterium indologenes* isolated from blood culture

Antimicrobials	Interpretation
Piperacillin/Tazobactam	R
Ceftazidime	R
Cefoperazone/Sulbactam	R
Cefepime	R
Aztreonam	R
Imipenem	R
Meropenem	R
Amikacin	R
Gentamicin	R
Ciprofloxacin	R
Levofloxacin	I
Minocycline	S
Colistin	R
Trimethoprim/Sulfamethoxazole	R

R: Resistant; I: Intermediate; S: Sensitive.

tubes, fluid-related equipment, and even disinfectants can serve as *Flavobacterium* reservoirs, serving as nidus of infection.

Chryseobacterium indologenes causes a number of uncommon human illnesses. The first clinical sample from which *C. indologenes* was isolated in 1993, came from a patient with ventilator-associated pneumonia.⁵ Low pathogenicity *Chryseobacterium* spp. are most likely to cause infection in hospitalized patients with associated risk factors such as underlying illness, extremes of age (newborn or elderly), immunocompromised states, the presence of indwelling intravenous devices, and long-term use of broad-spectrum antibiotics. The risk factors in the current case were ovarian cancer, presence of endotracheal tube and prolonged use of broad-spectrum antibiotics.

Flexirubin, a pigment generated by *C. indologenes*

colonies, is converted in culture to a dark-yellow pigment (Figure 1).^{6,7}

Chryseobacterium indologenes has been found to have inherent resistance to antibiotics such as extended spectrum penicillins, carbapenems, aminoglycosides, ticarcillin-clavulanate, macrolides, and chloramphenicol. Additionally, it is resistant to aztreonam and cephalosporins (except ceftazidime and cefepime). Most studies have found that *C. indologenes* is still sensitive to quinolones, ceftazidime, piperacillin-tazobactam, minocycline, rifampicin, and trimethoprim-sulfamethoxazole.^{3,4,8} In our case, *C. indologenes* was also found susceptible to minocycline and levofloxacin (Table 2).

The SENTRY antimicrobial monitoring programme (1997-2001) also revealed that, glycopeptides, chloramphenicol, and linezolid are ineffective for treating infections caused by these bacteria.³ Cefoperazone-sulbactam and cotrimoxazole are considered to be

the most effective drugs, particularly for bloodstream infections, as documented in a study including 215 clinical isolates of *C. indologenes*.⁸

In current case, the patient was receiving chemotherapy for ovarian cancer, when piperacillin/tazobactam treatment was initiated. The antibiotics were changed to meropenem and polymyxin B in accordance with the results of the pus culture which revealed the growth of *A. baumannii*. After isolation of *C. indologenes* on blood agar from paired blood cultures bottles, bacterial identification and susceptibility testing was done using VITEK 2 automated system using the ID-GNB cards & treatment was changed to levofloxacin according to susceptibility report. The patient responded positively to the prescribed treatment plan. The entire course of treatment was completed without any further issues.

The mortality rate for *C. indologenes* infections is approximately 17%.² We suggest that *C. indologenes* is a bacterium that may be able to produce bacteremia in elderly patients with several co-morbidities who have had various hospital procedures, most likely as a result of a breach of infection control guidelines. Some previous studies of bacteremia caused by *C. indologenes* have been summarized in Table 3.

Chryseobacterium indologenes is not widely regarded as a highly pathogenic organism; but because of the patient's already weakened immune system and the several accompanied comorbidities, it causes number of infections and treatment was considered to be difficult due to its high resistance to various antibiotics. Most likely, it's related to using too many antibiotics and



Figure 1. Dark-yellow pigmentation produced by *C. indologenes* on Mueller Hinton Agar (left) and Blood Agar (right)

Table 3. Review of literature of bacteremia caused by *Chryseobacterium indologenes*

Reference	Year of publication	Study design	No. of patients	Source of bacteremia	Immune status	Antimicrobial susceptibility profile	Treatment given	Outcome
9	2021	Case Report	1	ND	Immuno-Compromised (malignancy)	Susceptible to- CFS Resistant to- ND	CFS	Survived
3	2020	Case Report	1	Hemodialysis catheter	Immuno-Compromised (ESRD)	Susceptible to- CIP, LE, P/T, COT Resistant to- AK, ATR, CPM, CTR, GEN, MRP, TOB	P/T	Survived
1	2019	Case Report	1	Central venous catheter	Immuno-compromised (malignancy)	Susceptible to- MIN, LE (intermediate) Resistant to- CAZ, AK, CIP, GEN, CL, CPM, MRP, ATR, TCC, IPM, CFS, COT, P/T, TGC	LE, MIN	Expired
2	2018	Case Series	7	ND	All Immuno-Compromised	Susceptible to- MIN Resistant to-AMP, AMS, CXM, CH, CL, ETP, MRP	CIP (Documented for three patients)	Expired-2 Survived-5
7	2014	Case Report	1	Central venous catheter	Immuno-Compromised (malignancy)	Susceptible to- COT Resistant to-AK, GEN, CAZ, CPM, P/T, CFS, IPM, MRP, CL, TE, CIP	COT	Survived

AK, amikacin; A, ampicillin; AMS, ampicillin/sulbactam; AMC, amoxicillin/clavulanate; ATR, aztreonam; CPM, cefepime; CFS, cefoperazone/sulbactam; CIP, ciprofloxacin; CTR, ceftriaxone; CPM, cefepime; CH, cephalothin; CAZ, ceftazidime; CL, colistin; COT, cotrimoxazole (trimethoprim/sulfamethoxazole); CE, cefotaxime; ETP, ertapenem; GEN, gentamicin; IPM, imipenem; LE, levofloxacin; MRP, meropenem; OF, ofloxacin; PI, piperacillin; P/T, piperacillin/tazobactam; TCC, ticarcillin/clavulanic acid; TOB, tobramycin; TGC, tigecycline; TE-tetracycline; ND, Not documented.

breaking infection control regulations. In this case, the patient shown a satisfactory clinical improvement after the medication was adjusted in accordance with the antimicrobial susceptibility report.

Conclusion

In conclusion, the findings suggest that *C. indologenes* should be taken into consideration as a potential pathogen in cases of bloodstream infections in individuals, particularly when patient is immunocompromised and invasive procedures are being undertaken. This organism is resistant to several antibiotics; make it challenging to find the best therapeutic options. Our perspective is that blood culture results should be periodically monitored, and treatment options should be modified based on the patients' susceptibility report and the local antibiogram data.

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Authors' Contribution

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Competing Interests

Authors declare no conflict of interest in this study.

Ethical Approval

No ethical committee approval required. Informed consent was obtained from the patient to publish this case.

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