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Case Report

Chryseobacterium Indologenes as a Cause of Healthcare-Associated Meningitis after Retrosigmoid Suboccipital Craniotomy: A Case Report

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Abstract

Introduction: Chryseobacterium indologenes is an uncommon, multidrug-resistant, non-fermenting Gram-negative bacillus increasingly recognized as an opportunistic nosocomial pathogen. Although typically associated with device-related infections and hospital water sources, central nervous system involvement remains sporadic. Its intrinsic resistance to many broad-spectrum antibiotics makes timely identification and tailored therapy of paramount importance.

Case presentation: A 55-year-old man with metabolic comorbidities developed fever, neck stiffness and generalized body ache several weeks after undergoing retrosigmoid suboccipital craniotomy for tumor removal. CSF culture confirmed C. indologenes, a multidrug-resistant organism requiring targeted antimicrobial therapy. The patient improved with directed treatment and supportive care.

Conclusion: This case illustrates a rare but clinically significant instance of C. indologenes meningitis, emphasizing the importance of considering atypical pathogens in patients with recent neurosurgical procedures or healthcare exposure.

Keywords: Chryseobacterium indologenes; multidrug resistant; rare pathogen; postoperative meningtis; healthcare-associated infection

Highlighting points

- Chryseobacterium indologenes is an emerging healthcare-associated pathogen with sporadic but serious CNS involvement.
- Clinicians should consider this organism in postoperative neurosurgical infections, particularly when empirical therapy is ineffective.
- Timely culture-based identification and targeted antimicrobial therapy are of paramount importance.

Introduction

The cerebellopontine angle (CPA) is an anatomically intricate region containing essential neurovascular structures, making tumor surgery particularly demanding. In addition, advances in imaging and microsurgical techniques have improved early detection and functional outcomes. [1]

However, healthcare-associated bacterial meningitis is a serious complication following CPA tumor surgery, often resulting from intraoperative breaches such as cerebrospinal fluid (CSF) leaks. [2] While a range of pathogens can be responsible, Chryseobacterium indologenes meningitis is particularly concerning due to its multidrug resistance and hospital-acquired

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nature, posing significant therapeutic challenges. [3] Clinical presentation typically includes fever, headache, and neck stiffness, and timely diagnosis via CSF analysis with prompt, targeted antibiotic therapy is crucial.

Prognosis depends on the patient's underlying health, infection severity, and treatment timeliness; with appropriate management, recovery without long-term sequelae is possible, whereas delayed or inadequate therapy can result in high mortality. [4]

We report a case of postoperative meningitis caused by Chryseobacterium indologenes, confirmed by CSF culture, in a patient following retrosigmoid suboccipital (retromastoid) craniotomy and CPA tumor excision, detailing the clinical course and targeted antimicrobial management that led to recovery.

Case presentation

A 55-year-old Bangladeshi male with a history of diabetes, hypertension, and benign prostatic enlargement presented with a 7-day history of fever, neck pain and generalized body ache. Approximately four months prior, the patient experienced right-sided facial numbness, slurred speech, dizziness with headache following minor trauma, imbalance, and intermittent fever. An MRI of the brain was done which suggested right CPA acoustic neuroma having tumor necrosis extending into the internal acoustic meatus with gross compression over the brain stem and 4th ventricle resulting mild obstructive supratentorial hydrocephalus. Upon diagnosis, the patient underwent right retrosigmoid suboccipital (retromastoid) craniotomy with tumor excision. The post-surgical period was uneventful.

Three months later, he came up with the febrile illness for which he was admitted. Upon arrival, his vitals were stable and Glasgow Coma Scale (GCS) was E3 V4 M5. Before admission, a CT scan of brain was performed, which suggested: status post-craniotomy in right half of occipital and right temporal bones; no focal brain lesion. Routine laboratory investigations including complete blood count, electrolytes, and renal and hepatic function tests were largely unremarkable, except for an elevated white blood cell count of 15,280 cells/mm^3. ICT for Dengue NS1ag was done which was negative. Blood culture subsequently grew Staphylococcus hominis. In addition, ECG and Chest X-ray reports were also normal; the abdominal screening ultrasound revealed right-sided mild hydronephrosis and prostatic enlargement, findings consistent with his pre-existing urologic conditions.

Now coming to the neurological reports, CSF analysis revealed- physical appearance: hazy; total WBC: 1120 cells/mm3; total RBC: 850 cells/mm3; differential count: polymorph: 70%; lymphocyte: 30%; chloride: 106.5 mmol/L; glucose: 0.05 mmol/L; total protein 2.78 g/L; culture & sensitivity showed growth of Chryseobacterium indologenes; RT-PCR and GeneXpert testing for Mycobacterium tuberculosis were negative.

Conservative treatment was provided based on the clinical features and laboratory parameters as follows: antimicrobial regimen for 14 days including: Tigecycline 100 mg IV q12h, Ceftazidime/avibactam 2.5 g IV q8h and Levofloxacin 500 mg IV q12h; supportive measures consisted of: antipyretics, gastroprotection, electrolyte correction, acetazolamide, zinc, probiotics and tamsulosin. Glycemic optimization was maintained through regular glucose monitoring and corrective insulin.

After first few doses of the antibiotic treatment, the patient had improved clinically. Investigations were continuing parallelly to assess the condition of the patient. After a couple of days, CSF analysis was again done which revealed: 1.55 mmol/L; protein: 167 mg/dL; ADA: 6.02 U/L; CBC revealed WBC count: 16,210 cells/mm3; however, repeat CBC after 3 days reported WBC count to be 9,230 cells/mm3. It is noteworthy that, serum sodium and potassium levels showed mild fluctuations during treatment, but these were promptly corrected as they arose.

At the end of 10 days, he was hemodynamically stable and GCS was 15/15. He was discharged with advice.

On follow-up, some tests were performed which reported- CBC, S. Creatinine, S. Electrolytes: all parameters within range; CSF analysis: physical appearance: clear; total WBC: 3 cells/mm3; RBC: 950 cells/mm3; polymorph and lymphocyte: nil; chloride: 127.5 mmol/L; glucose: 1.98 mmol/L; total protein 0.78 g/L; in CSF culture, no organism was isolated.

Table 1: Cerebrospinal fluid laboratory parameters

Order	Appearance	WBC (/mm³)	Differential	RBC (/mm³)	Protein	Glucose (mmol/L)	Chloride (mmol/L)	Comment
1st	Hazy	1120	70% polymorphs	850	2.78 g/L	0.05	100.5	Neutrophilic meningitis profile
2nd	Clear	3	Nil	Nil	0.78 g/L	1.98	127.5	Biochemical & cytologic normalization

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Table 2: Antibiogram of Chryseobacterium indologenes

Antibiotics	Sensitivity pattern of isolates
Amikacin	Resistant
Aztreonam	Resistant
Cefepime	Resistant
Ceftazidime	Resistant
Ceftazidime + Avibactam	Resistant
Ciprofloxacin	Resistant
Colistin	Resistant
Levofloxacin	Resistant
Meropenem	Resistant
Minocycline	Susceptible
Piperacillin + Tazobactam	Resistant
Polymixin B (300 U)	Resistant

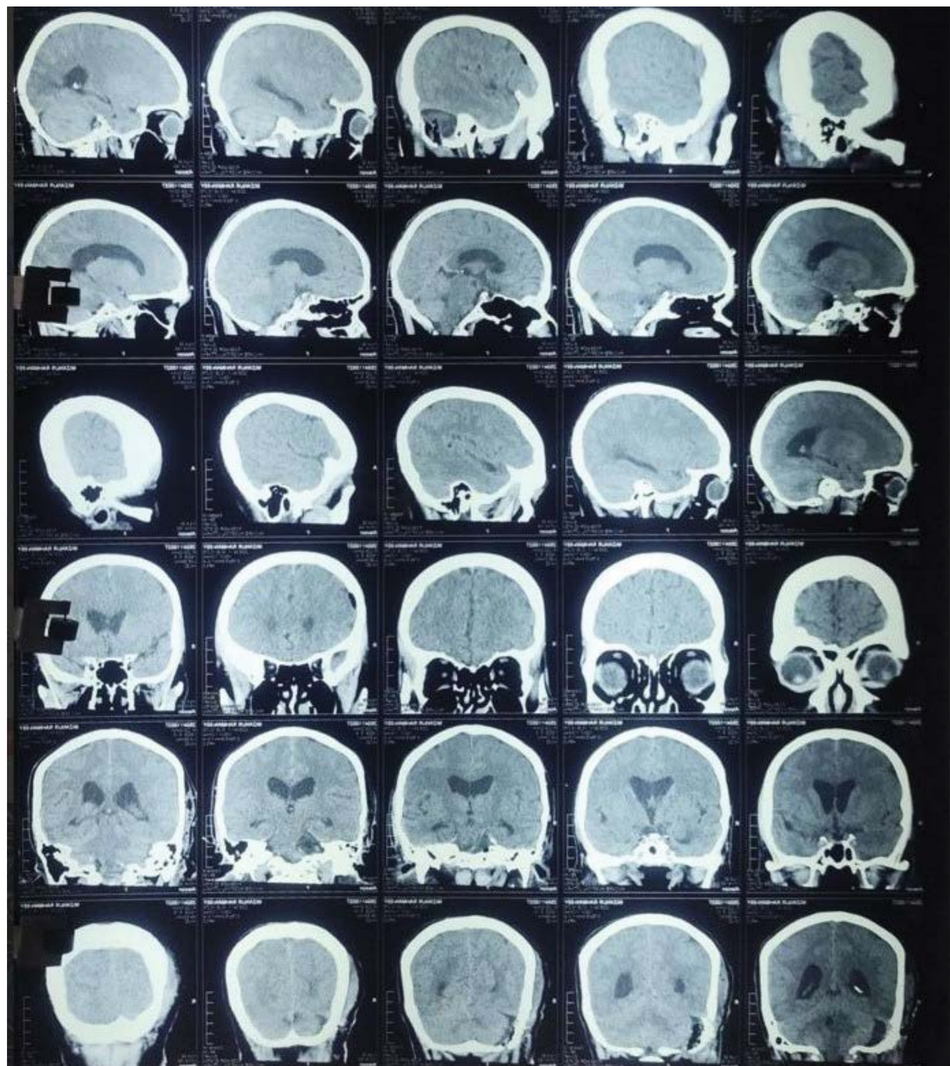

Figure 1: Image showing MRI of the brain suggesting right CPA acoustic neuroma having tumor necrosis extending into the internal acoustic meatus with gross compression over the brain stem and 4th ventricle resulting mild obstructive supratentorial hydrocephalus.

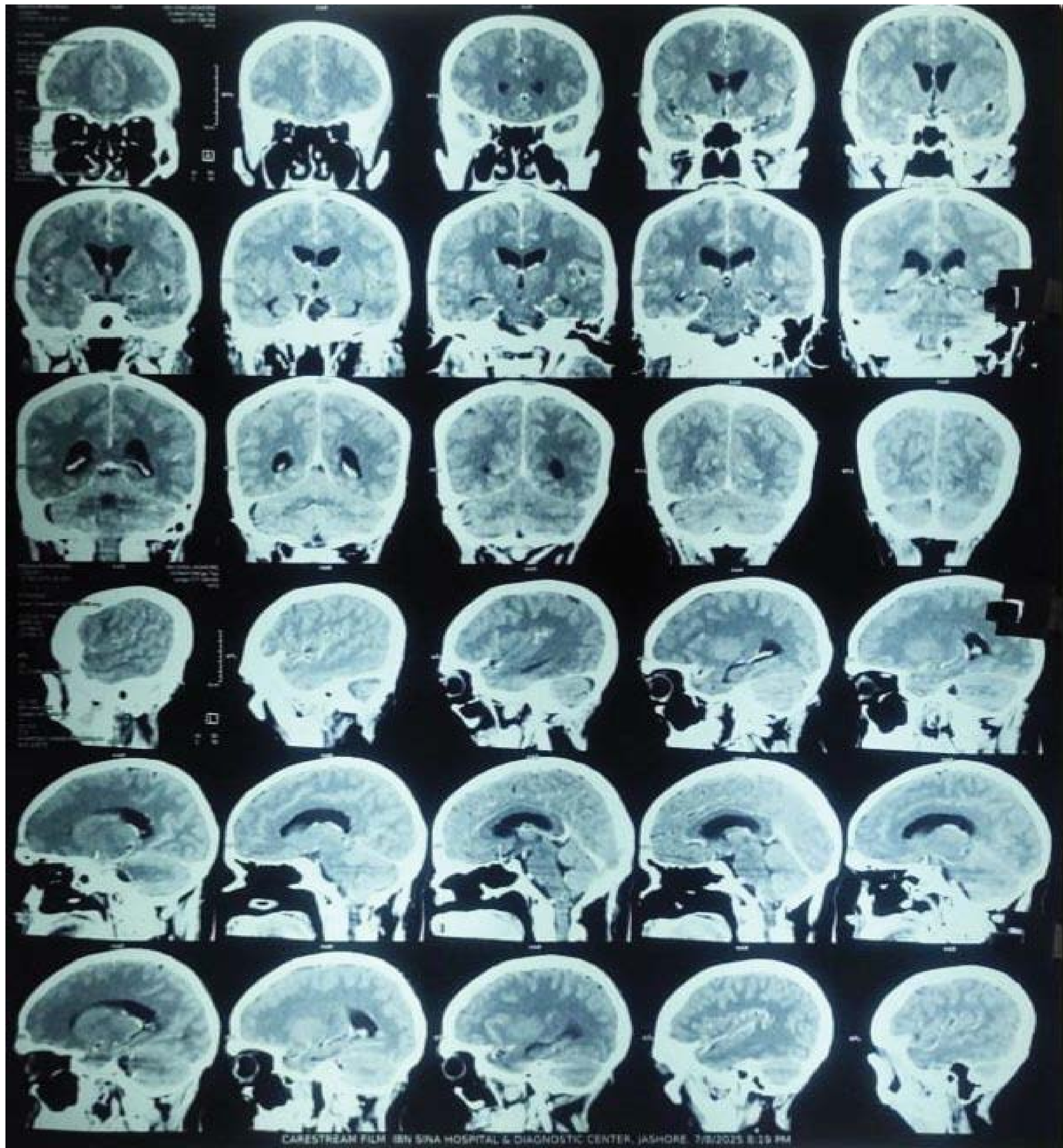

Figure 2: Image showing CT-Scan of brain which revealed status post-craniotomy in right half of the occipital and right temporal bones. No focal brain lesion was detected.

Discussion

By definition, a healthcare-associated infection is one that develops within three months of exposure to a healthcare setting, invasive medical procedure, hospitalization, or surgical intervention. [5] In this context, the temporal relationship between our patient's neurosurgical procedure and subsequent onset of meningitis strongly supports a healthcare-associated etiology.

Chryseobacterium indologenes, formerly classified under the Flavobacterium genus, is a non-motile, oxidase-positive, indole-positive, non-glucose-fermenting Gram-negative bacillus belonging to CDC group IIb. [6] Despite its low prevalence, C. indologenes has increasingly been recognized as an emerging healthcare-associated pathogen due to its ability to form biofilms and produce proteolytic enzymes, which contribute to its virulence and persistence in hospital environments, including ventilator circuits, humidifier systems, indwelling devices, and inadequately sterilized equipment. [7] In addition, most reported C. indologenes infections involve catheter-associated bloodstream infections and hospital-acquired pneumonia, while only a limited number of studies have identified it as a causative pathogen in meningitis. [8-9]

Neurosurgical patients, particularly those undergoing posterior fossa or CPA procedures, remain vulnerable to postoperative infections since surgical manipulation near dural sinuses and CSF pathways may predispose to occult CSF leaks. [10] In our case, the organism's isolation from CSF

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strongly suggests a nosocomial introduction, emphasizing the need for meticulous infection-control practices, strict sterilization protocols and routine monitoring of operating theater and ICU equipment where water-associated organisms may persist. [11]

A major clinical challenge related to C. indologenes infections is its intrinsic multidrug resistance. Prior literature consistently reports resistance to β-lactams, carbapenems, and aminoglycosides, frequently leaving only a narrow range of active agents—most commonly minocycline or fluoroquinolones. [12] This was reflected in our case, where the isolate demonstrated susceptibility solely to minocycline, highlighting the importance of early culture-guided therapy rather than reliance on typical empiric regimens. Despite this limited antibiotic susceptibility profile, our patient exhibited significant clinical improvement within the first few administered doses, illustrating that prompt initiation of an effective agent can lead to favorable outcomes even in the context of a highly resistant pathogen.

In this case, tigecycline was used as part of a combination antimicrobial regimen, with dose optimization aimed at maximizing systemic exposure in the setting of a multidrug-resistant organism. Evidence suggests that, higher-dose tigecycline improves pharmacokinetic target attainment in severe infections, particularly when used alongside other active agents. [13] Given its limited cerebrospinal fluid penetration, tigecycline is best considered an adjunct rather than a standalone therapy in CNS infections; therefore, the favorable outcome observed in our patient likely reflects the synergistic, susceptibility-guided combination therapy rather than the impact of a single agent. This approach aligns with existing literature supporting combination therapy for complex hospital-acquired infections caused by resistant Gram-negative organisms. [14-15]

The simultaneous isolation of Staphylococcus hominis from blood culture likely contributed to the elevated inflammatory markers and initial leukocytosis; nonetheless, its role appeared secondary. The patient's clinical status, CSF profile, and drastic response to minocycline-based therapy pointed strongly toward C. indologenes as the primary driver of his meningitic presentation. However, recognizing such co-existing pathogens is essential, as they can subtly influence laboratory parameters without being the absolute cause of disease.

Moreover, in concordance with previous reports, diabetes mellitus served as an additional predisposing factor, as metabolic dysregulation may impair immune response and facilitate opportunistic infections. [16] However, our patient's recovery was commendable, with complete normalization of CSF parameters and clinical stability following targeted therapy. This aligns with evidence that early identification and directed antimicrobial treatment significantly improve the prognosis of C. indologenes infections, whereas delayed or inappropriate therapy is associated with increased morbidity and mortality. [7, 17]

This case also highlights the importance of vigilant postoperative surveillance in neurosurgical patients. While the patient's neurological recovery post-craniotomy was initially uneventful, the delayed emergence of fever and meningeal symptoms three months later illustrates how postoperative meningitis can manifest outside the immediate perioperative period.

Based on our findings, this organism should be acknowledged as a possible contributor to hospital-acquired infections, especially in patients with chronic illnesses or immunocompromised states, those with indwelling devices, or individuals recovering from recent acute illness or major surgery. This highlights the need for more defined recommendations regarding its clinical management. Moreover, given its association with hospital equipment and water sources, this case reinforces the need for stringent infection control practices in operating rooms, sterilization units, and intensive care settings, including regular monitoring of water supply systems, disinfection protocols, and equipment maintenance.

Conclusion

This case highlights an uncommon presentation of Chryseobacterium indologenes meningitis in a postoperative neurosurgical patient, stressing the importance of considering atypical, multidrug-resistant organisms when clinical response to standard therapy is inadequate. Early recognition, prompt microbiological identification, and susceptibility-guided antimicrobial selection were the pivotal points in achieving favorable outcomes. The case also emphasizes the need for strict infection-control practices, particularly in settings where invasive procedures and indwelling devices increase vulnerability to rare hospital-acquired pathogens.

Declaration of conflicting interests

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