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Short Communication

An Adult Case of *Chryseobacterium meningosepticum* Meningitis

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SUMMARY: *Chryseobacterium meningosepticum* is an uncommon pathogen causing adult bacterial meningitis. Herein, we report the case history of one 21-year-old woman with this uncommon central nervous system infection. A diagnosis of adult *C. meningosepticum* meningitis can only be confirmed by a positive cerebrospinal fluid (CSF) culture. The patient had insulin-dependent diabetes mellitus as the underlying condition associated with this infection. The clinical presentations were fever, headache, disturbance of consciousness, and seizure. CSF analysis revealed a purulent inflammatory reaction. After a 21-day course of intravenous cefepime (6 g/day) treatment, this patient was discharged in a state of complete recovery.

Clinically, *Chryseobacterium meningosepticum* is not a common pathogen causing infection in healthy individuals outside of the hospital setting, but it has been detected in respiratory equipment, medical disinfectants, and other solutions. Therefore, *C. meningosepticum* can be a causative pathogen of nosocomial infections including adult meningitis, especially in those with debilitating medical and neurosurgical problems (1,2). However, *C. meningosepticum* remains a rare pathogen in cases of adult bacterial meningitis (3,4). In this study, we report the case history of one adult patient with *C. meningosepticum* meningitis, and provide a review of the English-language literature.

On October 4, 2000, a 21-year-old woman was sent to our emergency unit because of fever, headache, progressive disturbance of consciousness, and generalized convulsions beginning the day before. Apart from insulin-dependent diabetes mellitus (IDDM), the patient's past history was unremarkable. Her body temperature was 38.6°C upon admission, and she had positive signs of meningeal irritation. Laboratory examination showed a white blood cell (WBC) count of 270×10^9/L (90% neutrophils), and the following test results: BUN, 9.64 mmol Urea/L; Cr, 53.41 micromol/L; glucose, 30.58 mmol/L; blood osmolarity, 326 mOsmol/kg; positive for ketone bodies; and normal liver enzyme levels. Cerebrospinal fluid (CSF) study revealed the following results: WBC, 6.276×10^9/L, glucose, 5.1 mmol/L; lactate, 13.9 mmol/L; total protein, 0.5 g/L; and a negative Gram stain. Arterial blood gas analysis revealed the following: pH = 7.037, $PaCO_2$ = 31.7, and PaO_2 = 71.2. The CSF and blood cultures were obtained and the CSF culture grew *C. meningosepticum*. In our hospital, the following methods were used in order to identify *C. meningosepticum*. The *Chryseobacterium* spp. was incubated on eosin-methylene blue agar. Additional conventional biochemical tests, including oxidase, motility, indole, esculin, DNAase, and urea reaction tests, separated the members of this group of organisms. The API20 NE system (bioMérieux Vitex, Hazelwood, Miss., USA), a standardized micromethod combining eight conventional tests and 12 assimilation tests for the identification of non-fastidious Gram-negative rods not belonging to the *Enterobacteriaceae*, was also used to further determine the *Chryseobacterium* spp. Antibiotic susceptibility was tested by the Kirby-Bauer disc diffusion method (Becton Dickinson, BBL, Cockeysville, Md., USA, Mueller-Hinton II agars). A macrodilution broth susceptibility test and an E test (AB BIODISK, Solna, Sweden) were carried out in order to determine antimicrobial susceptibility. The results of the antibiotic susceptibility test and the E test are listed in Table 1. The isolated strain was resistant to amikacin and gentamicin, but was sensitive to cefepime, ceftriaxone, ceftazidime, cefotaxime, ceftizoxime, moxalactam, imipenem/cilastatin, and meropenem. This patient received a 21-day course of intravenous (i.v.) cefepime (6 g/day) treatment, and she was discharged in a state of complete recovery.

Table 1. Antibiogram

Antibiotics	Macrodilution broth susceptibility test		E test
	MIC (μg/ml)	MBC (μg/ml)	MIC (μg/ml)[1]
Cefepime	1	8	0.094
Ceftriaxone	2	16	(–)
Ceftazidime	4	16	2
Cefotaxime	0.5	2	(–)
Ceftizoxime	0.06	0.25	(–)
Imipenem	0.25	0.5	0.5
Aztreonam	>8	32	(–)
Meropenem	0.25	2	0.5
Moxalactam	2	4	(–)
Flomoxef	1	1	(–)
Vancomycin	1	2	(–)
Erythromycin	0.25	1	(–)
Rifampicin	0.25	0.5	(–)
Amikacin	32	(–)	(–)
Gentamicin	32	(–)	(–)

MIC, Minimum inhibitory concentration; MBC, Minimum bactericidal concentration; (–), not done.
[1]: MICs at which 90% of the isolates were inhibited.

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In addition to our case, there have 10 other reported adult cases with *C. meningosepticum* meningitis in the English-language literature (1,6-13). Nine of these other 10 reported cases had debilitating underlying conditions including hematological diseases, neoplasms, immunosuppressive state, head injury, and diabetes mellitus. The common manifestations of these other 10 reported cases were fever and disturbances of consciousness, followed by seizure, hydrocephalus, and stroke. The following CSF data from these 10 other reported cases were obtained: glucose, 0.71 to 5.1 mmol/L; total protein, 0.5 to 1.27 mmol/L; and WBC count, 0.006 to 26.85 $\times 10^9$/L. The initial CSF cultures and Gram stains were sterile in five of these 10 other reported cases. These 10 other reported patients received different combinations of antibiotic therapy including i.v. chloromycetin, i.v. sulfadiazine, i.v erythromycin, i.v. dihydrostreptomycin, i.v. chloramphenicol, i.v. tetracycline, i.v. cefoperazole, i.v. piperacillin, intrathecal neomycin, intramuscular gentamicin and ampicillin, and oral novobiocin and rifampicin. Five of these 10 reported patients died during the course of treatment.

As this study revealed, the clinical and laboratory manifestations of adult *C. meningosepticum* are not unique and are similar to those of adult bacterial meningitis caused by other bacterial pathogens. Therefore, the clinical diagnosis of this rare central nervous system (CNS) infection can only be confirmed by positive CSF culture, especially in patients with a debilitating underlying condition. In some cases, repeated CSF cultures are needed for the identification of *C. meningosepticum*.

The minimum inhibitory concentration (MIC) breakpoints for the antibiotic resistance and susceptibility of *C. meningosepticum* have not been clearly established by the National Committee for Clinical Laboratory Standards. As previous reports (5-13) have shown, various combinations of antibiotics had been used in the treatment of this uncommon adult CNS infection. Our patient was completely cured with a course of i.v. cefepime. Among the reported cases of adult *C. meningosepticum*, 45% (5/11) died in the course of treatment. This high mortality rate may be influenced by both the CNS infection and the debilitating underlying condition. In the literature, there is no recommended antibiotic for use in the initial treatment of adult *C. meningosepticum* meningitis; therefore, further large-group analysis is needed to determine the critical therapeutic of antibiotics.

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