**Bacillus cereus** Brain Abscesses Occurring in a Severely Neutropenic Patient: Successful Treatment with Antimicrobial Agents, Granulocyte Colony-Stimulating Factor and Surgical Drainage

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**Abstract**

Multiple brain and liver abscesses developed immediately after *Bacillus cereus* bacteremia in a neutropenic patient with acute lymphoblastic leukemia. After even 8 weeks of antimicrobial chemotherapy together with administration of granulocyte colony-stimulating factor, every infectious process disappeared but the patient’s headache has still persisted. Because the wall of one brain abscess became thin and was in danger of rupturing into the ventricle, surgical drainage was performed, resulting in disappearance of headache and resolution of brain abscess. The present case indicates that a combined medical and surgical approach is mandatory to treat patients with brain abscesses.

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**Key words:** acute lymphoblastic leukemia, irinotecan (CPT-11), diarrhea, bacteremia, liver abscesses

**Introduction**

*Bacillus cereus* is a gram-positive, aerobic spore-forming rod which exists ubiquitously in our environment, and *B. cereus* can cause some opportunistic infections such as bacteremia, pneumonia, ophthalmitis, osteomyelitis, soft tissue infections and meningitis in immunocompromised hosts (1–3). *B. cereus* brain abscess, however, is very rare and, to date, only a few cases have been reported (4, 5). Recently we encountered such brain abscesses following *B. cereus* bacteremia in a patient with acute lymphoblastic leukemia (ALL). To cure the brain abscesses completely, it was necessary to perform surgical drainage in addition to antimicrobial chemotherapy and administration of granulocyte colony-stimulating factor (G-CSF).

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Bacillus cereus Brain Abscess

Isolation of *B. cereus* from the blood

Fever

MEPM  

MINO  

VCM  

CP  

LVFX

G-CSF

Neutrophils

T.B.

CRP (mg/dl)

1999 Mar. Apr. May

CPT-11 + ADM

Isolation of *B. cereus* from the blood

Headache

Drainage of brain abscess


Discussion

Recently *B. cereus* is becoming recognized as a pathogen of serious systemic infections (7). In the present case, the causative organism of the brain abscesses has not been proven directly. However an immediate occurrence of the abscesses in the brain as well as the liver after *B. cereus* bacteremia and the fact that the pathogen of the brain abscess was eradicated by the antimicrobial agents, which were active against the *B. cereus* isolated from the blood *in vitro*, leads to a rational supposition that these abscesses were also caused by *B. cereus*.

The reason why the present case suffered from the systemic infection due to an uncommon pathogen, *B. cereus*, is unknown, but the severe neutropenia and diarrhea following cancer chemotherapy possibly played an important role in the development of systemic *B. cereus* infections. Probably the *B. cereus* entered the bloodstream from the gut because the patient had received CPT-11, which frequently injures the intestine and induces severe diarrhea (8).

To cure the brain abscesses completely, we used a combined medical and surgical approach. One reported case (3-year-old boy) of multiple *B. cereus* brain abscesses was successfully treated with antimicrobial agents (CP, VCM, gentamicin) alone without drainage and the authors stressed that *B. cereus* brain abscesses can be cured by an appropriate antimicrobial chemotherapy (5). In an *in vitro* susceptibility study by Weber et al (9), *B. cereus* strains were susceptible to IPM, VCM, CP, gentamicin, and ciprofloxacin but resistant to penicillins and...
Figure 2. MRI of the brain. A) Initial brain abscesses (March 19, 1999). Arrows indicate multiple abscesses. B) The wall of one abscess became thin (April 28). C) The wall of the abscess became thick after drainage (May 19). D) The brain abscess was almost absorbed (June 28).

cephalosporins. Their results are compatible with ours except for IPM. In addition to antimicrobial chemotherapy, recovery of neutrophils accelerated by G-CSF (Fig. 1) must have contributed to the resolution of systemic *B. cereus* infections. In general, aggressive surgical drainage is recommended when the brain abscesses, regardless of the causative organisms, are larger than 2.5 cm in diameter, in combination with 6 to 8 weeks of antimicrobial chemotherapy (10). In the present case, the
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Figure 3. Enhanced CT scan shows multiple liver abscesses.

antimicrobial chemotherapy yielded the resolution of infectious process but could not relieve the patient from headache, which disappeared soon after the surgical drainage of a cystic lesion of the brain (Fig. 2B). The present case’s direct cause of death was cerebral hemorrhage. Because an autopsy was not done, it is obscure whether the scar of brain abscesses predisposed the patient to the development of cerebral hemorrhage.

The present case indicates that the choice of early treatment of brain abscesses is appropriate and intensive antimicrobial chemotherapy but timely surgical procedures should be considered whenever indicated. Therefore, physicians must treat patients with brain abscesses in close cooperation with neurosurgeons.

References