Subdural Empyema Caused by Hematogenous Dissemination from an Abscess in Thigh to a Preexisting Chronic Subdural Hematoma
—Case Report—

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Abstract

A 63-year-old male with a preexisting chronic subdural hematoma presented with progressive confusion and left hemiparesis as well as high fever. Subdural empyema was strongly suspected. At surgery, the empyema was encapsulated by definite inner and outer membranes. Cultures isolated from the subdural fluid and from an abscess of his left thigh yielded methicillin-resistant Staphylococcus aureus. A pulsed-field gel electrophoresis showed these two strains were genetically identical. Hematogenous infection of a preexisting subdural hematoma is an extremely rare cause of subdural empyema.

Key words: subdural empyema, chronic subdural hematoma, hematogenous dissemination, deoxyribonucleic acid fingerprinting

Introduction

Subdural empyema is an unusual condition which is commonly associated with paranasal sinusitis, intracranial surgery, or open head injury in adults or with meningitis in children. Hematogenous spread from an infected focus elsewhere in the body is a rare cause, and hematogenous dissemination to a preexisting chronic subdural hematoma (CSDH) is an extremely rare cause of subdural empyema, with only a few reported cases. However, no neuroradiological documentation of CSDH was obtained before the diagnosis of subdural empyema was confirmed, therefore the causative relationship is only speculative. We report a case of subdural empyema caused by hematogenous infection of preexisting CSDH from an abscess of the thigh.

Case Report

This 63-year-old male was admitted on foot to another hospital for the control of his diabetes mellitus in February 1997. He had a long history of diabetes mellitus, alcoholic cirrhosis, and gastroduodenal ulcer. Repeated minor head injury was strongly suspected from his background. On admission, he was inactive but showed no neurological deficit. After admission he gradually became disoriented and developed incontinence of urine and feces. Computed tomography (CT) revealed a thin CSDH on the right side of his brain (Fig. 1 left). He was afebrile,

Fig. 1 left: Computed tomography (CT) scan on February 20 showing a thin chronic subdural hematoma (CSDH). right: CT scan after admission showing an enlarged CSDH with minimal midline shift to the contralateral side.
and the white blood cell (WBC) count was 4240/mm³ and C-reactive protein level was 0.2 mg/dl (within normal limits). Serum electrolytes were within normal limits. Mild hepatic dysfunction was present, but plasma ammonia level was 46 µg/dl (within normal limits) and hepatic failure was negated. A large decubitus ulcer was present in the region of left trochanter major. A week later he became lethargic and developed left hemiparesis and a conjugate deviation to the left. He was transferred to our institution for further evaluation and treatment.

On admission to our hospital on February 28, 1997, his temperature was 39.1°C and his neck was soft. A large abscess was observed in the left thigh under the decubitus ulcer. Neurological examination found he had a Glasgow Coma Scale score of 10 (E3, V2, M5), and demonstrated minimal weakness of the left upper and lower extremities. Laboratory data included a WBC count of 7290/mm³, C-reactive protein level of 12.0 mg/dl, and blood glucose level of 446 mg/dl. The cerebrospinal fluid contained 87 leukocytes/mm³/3 fields, with 78% lymphocytes and 15% mononuclear leukocytes, 78 mg/dl protein, and 97 mg/dl glucose. Culture of the abscess of the thigh yielded >10⁵ cfu of methicillin-resistant Staphylococcus aureus (MRSA). Immediately after admission he developed focal seizures in his left upper extremity and left face. CT without contrast medium demonstrated an enlarged subdural hematoma with minimal midline shift (Fig. 1 right). On the basis of his clinical course and physical and laboratory findings, the diagnosis of subdural empyema was strongly suggested.

Burr hole irrigation was performed, and about 130 ml of brownish, turbid, and viscous fluid was aspirated from the subdural space. The empyema was encapsulated by definite outer and inner membranes very similar to those of CSDH. The fluid contained 4904 leukocytes/mm³/3 fields, with 99% neutrophils, 270 mg/dl protein, and 77 mg/dl glucose. Intravenous administration of 3 g/day of cefpirome sulfate was commenced immediately after surgery. Culture of the subdural fluid identified MRSA, so 200 mg/day of arbekacin sulfate was added. Postoperative CT showed no reaccumulation of subdural fluid, and his epileptic seizures were effectively controlled with phenytoin. However, despite the aggressive antibiotic therapy, the patient developed sepsis from the abscess in his thigh, followed by disseminated intravascular coagulation, and he died 19 days after surgery. Autopsy was proposed but rejected by his family.

Typing of the MRSA strains, which were isolated from the abscess of his thigh and the subdural empyema, was performed using pulsed-field gel electrophoresis. The deoxyribonucleic acid (DNA) fingerprints obtained by this technique were identical (Fig. 2), which strongly suggests that the empyema was caused by hematogenous dissemination from the abscess of the thigh.

Discussion

In the present case, the diagnosis of CSDH was confirmed by CT before the patient developed any physical or laboratory findings of subdural empyema. The speculation that hematogenous infection of the hematoma resulted in the empyema is supported by several findings. First, there was no evidence of any common predisposing factor for subdural empyema such as paranasal sinusitis, open head injury, or prior neurosurgical procedure. Second, definite inner and outer membranes were observed at surgery. Since the potential subdural space is relatively free,
pus tends to spread widely over the surface of the brain.\textsuperscript{1,5,6,23} Although a neomembrane is formed in reaction to the infection, it does not effectively limit the spread of pus.\textsuperscript{22} The presence of definite inner and outer membranes encapsulating the empyema cavity and thus limiting the spread of pus strongly suggests the presence of CSDH. Third, DNA fingerprinting revealed that the MRSA strains isolated from the abscess and subdural fluid were identical. The patient’s long history of uncontrolled diabetes mellitus predisposes both formation of decubitus ulcer and its underlying abscess, and bacteremia. The growth of CSDH is associated with episodic microhemorrhages into the hematoma cavity.\textsuperscript{9} In the presence of bacteremia, the microhemorrhages will act as the seeding process of the microorganism into the hematoma cavity.

The choice of surgical procedure remains controversial, but recent reports advocate drainage through burr holes as the first treatment.\textsuperscript{17,23} In a small portion of cases, reaccumulation of pus may eventually necessitate a craniotomy for adequate drainage. Early diagnosis by either CT or magnetic resonance imaging, and postoperative administration of appropriate antibiotics, have reduced the mortality rate below 10%.\textsuperscript{13} In the present case, drainage through a burr hole was successful because reaccumulation of pus did not occur. Unfortunately, however, the original focus of infection, which could not be effectively controlled despite the antibiotic therapy, led to fatal sepsis.

Our case is extremely rare because the hematogenous dissemination of abscess into a preexisting CSDH caused subdural empyema, which was documented by CT before the diagnosis of subdural empyema.

### References


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