Acute Encephalopathy Preceding *Shigella* Infection

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Key words: acute encephalopathy, *Shigella*, children, diarrhea, stool culture

IMAJ 2001;3:384–385

The term encephalopathy describes a generalized disorder of cerebral function. The causes of acute encephalopathies in children are infectious, toxic and ischemic. Acute encephalopathy due to shigellosis is a well-known condition that usually presents with the classical symptoms of fever, toxicity, predominant intestinal signs, or metabolic derangement accompanied by brain edema. We report a patient who presented in an acute encephalopathic state caused by shigellosis, which was only later manifest by mild intestinal signs and fever.

Patient Description

A 3 year old girl with an unremarkable previous medical history was admitted for evaluation of persistent somnolence during the preceding 2 days. She had no other symptoms, and diarrhea, fever, head trauma and use of possibly culpable medication were ruled out. No one in her immediate surroundings was ill.

Upon arrival at the pediatric emergency department she was in an obviously somnolent state with diffuse symetric hypotonia. She responded poorly to commands. Deep tendon reflexes were normal, pyramidal signs were negative, and there was no nuchal rigidity. The rest of the physical examination was normal. She was diagnosed as having acute encephalopathy and further evaluation was undertaken accordingly.

The laboratory data were as follows: leukocytes $2.1x10^6$/ml with 78% neutrophils, and normal arterial blood gas, serum glucose, electrolytes, blood urea nitrogen, serum creatinine, and liver function tests. The levels of ammonia, blood pH and C-reactive protein were also normal and a toxic screening of urine was negative. Computed tomography of the brain was normal, while electroencephalogram demonstrated a mild asymmetry of the background activity, with greater amplitude at the occipital region on the right both during the sleep and awake recording. A lumbar puncture was performed and showed a high opening pressure (45 cm H_2O). Analysis of the cerebrospinal fluid was within normal limits (glucose 58 mg/dl, protein 10 mg/dl, no leukocytes and one erythrocyte).

Treatment with ceftriaxone, acyclovir and dexametasone was initiated until negative results were achieved for cerebrospinal fluid culture, blood culture, and herpes antigen. Other serological tests for cytomegalovirus, enterovirus, influenza A and B, *Mycoplasma*, *Bartonella henselae*, and Epstein-Barr virus were negative. One day after admission she had an episode of fever accompanied by mucus diarrhea, and stool cultures were taken. On the following day her mental status was vastly improved: she was alert, the neurological examination was normal, the fever had resolved and there were no other symptoms. *Shigella sonnei* was cultured from her stool. Having ruled out any other cause that could explain her condition, we reached a diagnosis of acute encephalopathy due to *Shigella sonnei* infection.

Comment

Acute encephalopathy is a life-threatening condition that necessitates a careful evaluation to determine its cause. We report a child with confirmed *Shigella sonnei* infection whose altered consciousness preceded mild intestinal symptoms and fever. After isolation of *Shigella sonnei* from her stool, we attributed this finding to her abnormal neurological state. Intoxication and other potential infectious agents were ruled out.

Shigellosis is a common infectious disease, especially in underdeveloped countries. Its clinical manifestations vary, and include watery or loose stool, crampy-like abdominal pain, high temperature, and toxic appearance. Dysentery results from colonic invasion and injury, and the diarrhea becomes bloody and mucoid [1]. Complications of shigellosis include intestinal as well as systemic symptoms [2]. Definitive diagnosis is established by isolating the organisms from stool specimens or rectal swab [3].

Neurological findings are among the most common extra-intestinal manifestations of shigellosis and can occur in as many as 45% of hospitalized patients [3]. These may accompany or even precede the development of gastrointestinal signs and the condition may be mistaken for a primary neurological illness [4]. Headache, nuchal rigidity, confusion, memory loss, lethargy, hallucinations, or delirium may manifest as acute encephalopathy in shigellosis. The duration of acute encephalopathy due to shigellosis can last from 12 hours to 12 days, and complete recovery with no residual neurological deficit is achieved in almost all patients [5]. Avital et al. [6] reported that neurological manifestations preceded the gastrointestinal symptoms in one-fourth of hospitalized patients with *Shigella* gastroenteritis but in most cases

was accompanied with high fever. Encephalopathy as the only neurological complication was reported in 22% of those patients [6]. It is important to emphasize that the patient we describe here had no fever during her encephalopathic state.

The pathogenesis of the encephalopathy in shigellosis remains unknown. It may be attributed to shiga toxin (although some *Shigella* species usually do not produce the toxin), or to other toxins yet to be classified. Fever or metabolic abnormalities can explain the encephalopathy in some cases.

A particularly lethal toxic encephalopathy of shigellosis known as Ekiri (in Japanese "epidemic dysentery") is reportedly no longer a public health problem [2]. However, Goren et al. [7] reported this as the cause of death in all patients with shigellosis consistent with toxic encephalopathy.

The noteworthy aspect of our report is the clinical presentation of a patient suffering from shigellosis whose predominant neurological symptoms disguised the condition as being a primary central nervous system disease. A neurological symptom preceding the development of gastrointestinal signs in shigellosis is rare, especially when the ensuing gastrointestinal signs are mild and even episodic and no fever is documented. We believe that all the symptoms of this patient were produced by the same etiological agent, *Shigella sonnei*, and by its toxins. We recommend that stool culture be considered in every patient with an otherwise unexplained encephalopathic state, despite the absence of intestinal symptoms or fever.

Acknowledgment. We thank Esther Eshkol for editorial assistance.

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