Case Report

Communicating Hydrocephalus as a Complication of Eosinophilic Meningoencephalitis

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The authors reported an adult patient with communicating hydrocephalus in eosinophilic meningoencephalitis. He presented with localized peritonitis and then developed eosinophilic meningoencephalitis. Angiostrongylus cantonensis *was the causative agent. This was confirmed by the positive serology test. His consciousness did not recover after supportive treatment. The MRI of the brain showed diffuse enlargement of the ventricular system two weeks after the diagnosis was made. The parameters for hydrocephalus were measured and were compatible with the Gyldensted's criteria.*

Keywords: *Communicating hydrocephalus, Eosinophilic meningitis, MRI, Angiostrongylus cantonensis*

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Eosinophilic MeningoEncephalitis (EME) is a rare manifestation of *Angiostrongylus cantonensis*. It has a high mortality rate and there is no definite and effective treatment[1]. The diagnosis is made clinically with the confirmation by a serology test. Magnetic Resonance Imaging (MRI) in EME may show the abnormal hypersignal on T2 weighted image at the periventricular region and small hemorrhagic tract. With high signal intensity over the globus pallidus and cerebral peduncle, EME may also show on T1-weighted image[2]. Finally, it may show as multiple round or oval enhancing nodules after administration of gadolinium chelate (Gd-DTPA)[3]. Hydrocephalus had been reported in children with radiculomyelitis or meningitis[4,5]. The authors reported a case of eosinophilic meningoencephalitis with hydrocephalus in an adult patient.

Case Report

A 78 year-old hypertensive man presented with localized peritonitis at the left lower quadrant. An exploratory laparotomy was done and the finding was a dilated colon without mass. Sigmoidectomy and colorectal anastomosis were performed. One week after abdominal surgery, he gradually became comatose without any localizing signs. There was neither metabolic derangement nor neurological deficit. He did not have any history of brain disease or previous eosinophilic meningitis. Lumbar puncture was done to exclude intracranial infection. The opening pressure was 140 mmH_2O. The Cerebro Spinal Fluid (CSF) white blood cell count was 690 cells/mm^3 (PMN 2%, lymphocytes 47%, eosinophils 48%, monocytes 3%), protein 130 mg/dl, glucose 38 mg/dl (plasma glucose 151 mg/dl) or 25% of plasma glucose. CSF Gram stain, Acid fast bacilli, and India ink wet preparation were negative. No bacteria or fungi grew in the CSF culture. Specific antibody detection using the Western blot analysis was used to confirm a presumptive diagnosis of *A. cantonensis* infestation. The reaction of serum IgG antibodies to the 29 kDa antigenic polypeptide of *A. cantonensis* provided a positive, relatively specific immunodiagnosis[6], while the serum antibody to 24 kDa antigenic polypeptide of *Gnathostoma spinigerum* was negative. He was diagnosed as eosinophilic meningoencephalitis. The pathological study of sigmoid colon also showed

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focal eosinophilic accumulation in mucosal through serosal layer. Eosinophilia (1,940 cells/mm^3) was also shown at the beginning of presentation. Anti-HIV was done with non reactive result.

At a two weeks follow up, he was still comatose. Lumbar puncture was repeated. The CSF opening pressure was 250 mmH_2O with the white blood cell count 1,630 cells/mm^3 (PMN 3%, lymphocytes 57%, eosinophils 38%, monocytes 2%), protein 283 mg/dl, glucose 130 mg/dl (plasma glucose 180 mg/dl) or 72% of plasma glucose levels. MRI of the brain revealed all ventricles enlarged with the periventricular hypersignal on T2-weighted images (Fig. 1-3). The maximum width of the left anterior horn (LAH, black bar, Fig. 2) was 20 mms, the maximum width of the right anterior horn (RAH, gray bar, Fig. 2) was 20 mms, the maximum left septum-caudate distance (LSC, black arrow, figure 2) was 20 mms, and the maximum right septum-caudate distance (RSC, gray arrow, Fig. 2) was 19 mms. He received supportive treatment and died two months later because of aspirated pneumonia.

Discussion

Normally, after CSF secretion by the choroids plexus and reabsorption by the arachnoid villi, the one-way valve, remains in balance. Meningitis may result in a rapid rise in intracranial pressure due to alterations either in production or absorption of CSF. Communicating hydrocephalus can be found as a complication in chronic meningitis (tuberculous meningitis, or cryptococcal meningitis) and indicates advances of the disease[7,8].

Eosinophilic meningitis had also been reported to cause hydrocephalus communicating[3,4] and non-communicating type[9] in children. The present case demonstrated the communicating hydrocephalus as a complication of eosinophilic meningoencephalitis caused by *A. cantonensis* in an adult, confirmed with serologic test. There was also a report of ventriculomegaly in eosinophilic meningitis patients[10].

The measurement, which was used to confirm the enlargement of ventricle, is the method proposed by Gyldensted[11]. There are three values; fifth, 50^{th} (median), and 95^{th} percentile of linear parameter from the brains of 100 normal adults measured by fine matrix computed tomography. This is also divided according to sex. On coronal view, the LAH and RAH are the maximum width of the left and right anterior horns, measured in millimeters. The LSC and RSC are maximum left and right septum-caudate distance, measured at a 45^{o} angle with the septum pellucidum from the head of the

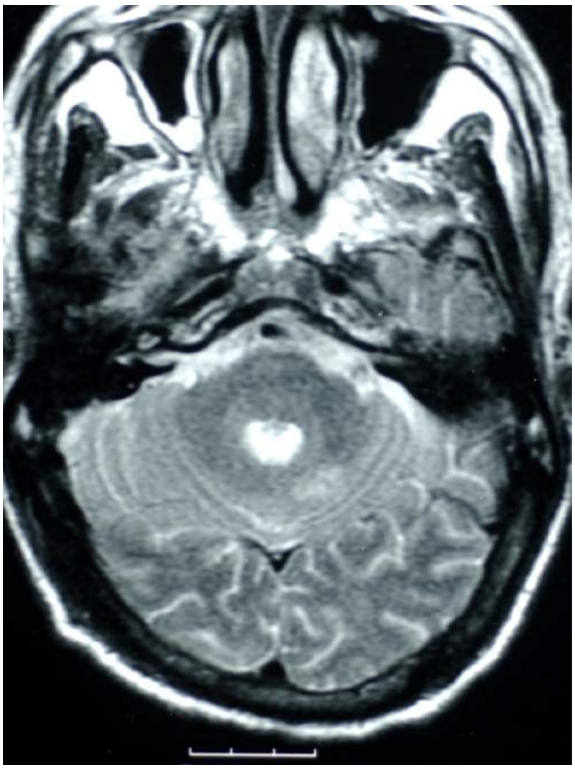

Fig. 1A Axial T2-weighted MR image reveals enlargement of the fourth ventricle

Fig. 1B Axial T2-weighted MR image reveals enlargement of lateral ventricles with periventricular hypersignal

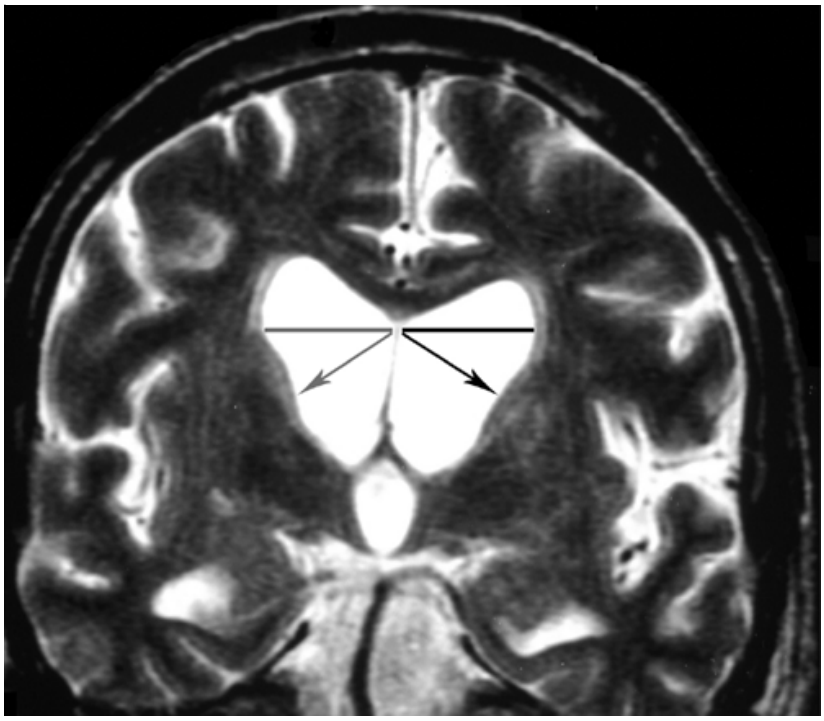

Fig. 2 Coronal T2-weighted MR image shows enlargement of third and frontal horns of lateral ventricles. The black bar, gray bar, black arrow, and gray arrow indicate LAH, RAH, LSC, and RSC, respectively
Note: LAH; maximum width of left anterior horn, RAH: maximum width of right anterior horn, LSC: maximum left septum-caudate distance, and RSC: maximum right septum-caudate distance

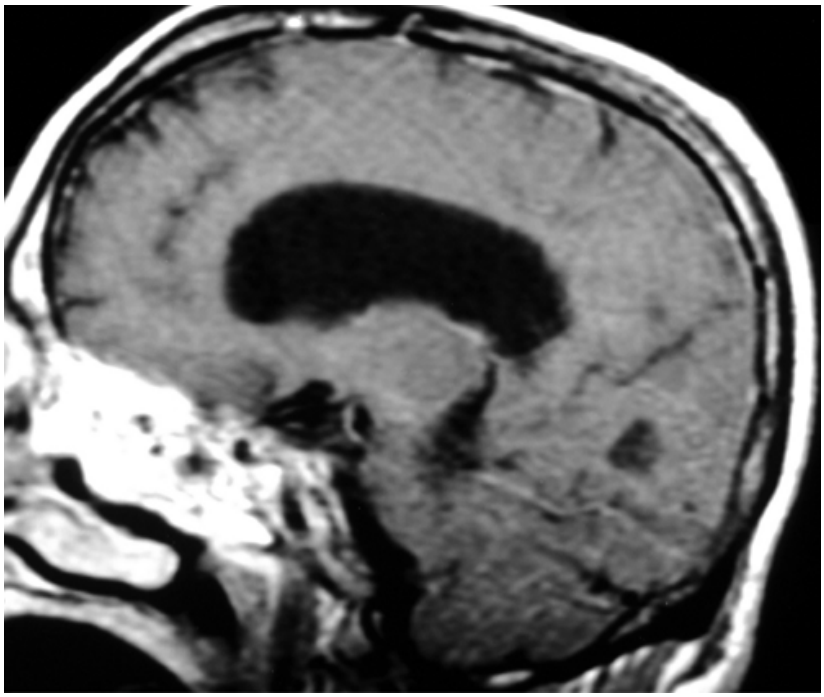

Fig. 3 Sagittal T2-weighted MR image demonstrates the huge dilatation of the body part of the lateral ventricle

caudate nucleus. The 95th percentile of LAH, RAH, LSC, and RSC in men are 19.8, 18.2, 13.2, and 11.6 millimeters, respectively. All of these parameters in this patient were higher than standard values. Even though the authors measured using the MRI, not computed tomography, the landmark (caudate nucleus) was accurately used.

The neurological disorders, caused by *A. cantonensis*, have two main forms: eosinophilic meningitis and eosinophilic meningoencephalitis. Hydrocephalus in not a common complication associated with angiostrongyliasis. It has never been reported in meningitic form and rarely found in meningoencephalitic form[12]. Blockade of the CSF pathway and impairment of CSF absorption are the two main mechanisms. Because of the small number of cases, there are no clinical trials to define risk factors of hydrocephalus. The presence of hydrocephalus may associate with a long duration and severity of disease. Furthermore, it may indicate the existence of worms in cerebral tissue that leads to higher mortality.

References

1. Chotmongkol V, Sawanyawisuth K. Clinical manifestations and outcome of patients with severe eosinophilic meningoencephalitis presumably caused by *Angiostrongylus cantonensis*. Southeast Asian J Trop Med Public Health 2002; 33: 231-4.
2. Kanpittaya J, Jitpimolmard S, Tiamkao S, Mairiang E. MR findings of eosinophilic meningoencephalitis attributed to *Angiostrongylus cantonensis*. Am J Neuroradiol 2000; 21: 1090-4.
3. Jin E, Ma D, Liang Y, Ji A, Gan S. MRI findings of eosinophilic myelomeningoencephalitis due to Angiostrongylus cantonensis. Clin Radiol 2005; 60: 242-50.
4. Graber D, Jaffar MC, Attali T, Poisson J, Renouil M, Alessandri JL, et al. Angiostrongylus in the infant at Reunion and Mayotte. Apropos of 3 cases of eosinophilic meningitis including 1 fatal radiculomyeloencephalitis with hydrocephalus. Bull Soc Pathol Exot 1997; 90: 331-2.
5. Enzenauer RW, Yamaoka RM. Eosinophilic meningitis and hydrocephalus in an infant. Arch Neurol 1982; 39: 380-1.
6. Maleewong W, Sombatsawat P, Intapan PM, Wongkham C, Chotmongkol V. Immunoblot evaluation of the specificity of the 29-kDa antigen from young adult female worms *Angiostrongylus cantonensis* for immunodiagnosis of human angiostrongyliasis**.** Asian Pac J Allergy Immunol 2001; 19: 267-73.
7. Ozates M, Kemaloglu S, Gurkan F, Ozkan U, Hosoglu S, Simsek MM. CT of the brain in tuberculous meningitis. A review of 289 patients. Acta Radiol 2000; 41: 13-7.
8. Park MK, Hospenthal DR, Bennett JE. Treatment of hydrocephalus secondary to cryptococcal meningitis by use of shunting. Clin Infect Dis 1999; 28: 629-33.
9. Francois P, Martin G, Goullier A, Plasse M, Beaudoing A. Neuromeningeal hypodermyiasis complicated by hydrocephaly. Value of nuclear magnetic resonance imaging. Presse Med 1987; 16: 1231-3.
10. Tsai HC, Liu YC, Kunin CM, Lai PH, Lee SS, Chen YS, et al. Eosinophilic meningitis caused by Angiostrongylus cantonensis associated with eating raw snails: correlation of brain magnetic resonance imaging scans with clinical findings. Am J Trop Med Hyg 2003; 68: 281-5.
11. Gyldensted C. Measurements of the normal ventricular system and hemispheric sulci of 100 adults with computed tomography. Neuroradiology 1977; 14: 183-92.
12. Jin E, Ma D, Liang Y, Ji A, Gan S. MRI findings of eosinophilic myelomeningoencephalitis due to Angiostrongylus cantonensis. Clin Radiol 2005; 60: 242-50.

ภาวะโพรงสมองคั่งน้ำชนิดไม่อุดตันที่เป็นภาวะแทรกซ้อนจากโรคเยื่อหุ้มสมองและสมองอักเสบชนิดอีโอสิโนฟิล

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รายงานผู้ป่วยภาวะโพรงสมองคั่งน้ำชนิดไม่อุดตันที่พบในผู้ป่วยผู้ใหญ่ที่เป็นโรคเยื่อหุ้มสมองร่วมกับสมองอักเสบชนิดอีโอสิโนฟิลจากพยาธิ Angiostrongylus cantonensis ซึ่งวินิจฉัยโรคด้วยการตรวจด้วยน้ำเหลืองให้ผลบวกต่อพยาธินี้ ภายหลังจากการรักษาผู้ป่วยอยู่ในภาวะไม่รู้สึกตัว การตรวจภาพสมองโดยแม่เหล็กไฟฟ้าภายหลัง จากการวินิจฉัยแล้วสองสัปดาห์พบการขยายตัวของระบบโพรงสมอง และจากการวัดค่าต่าง ๆ โดยเกณฑ์ของ Gyldensted พบว่าเข้าได้กับภาวะโพรงสมองคั่งน้ำชนิดไม่อุดตัน