LETTERS TO THE EDITOR

To the Editor

Improvement of Cognitive Impairment Following Delayed CO Encephalopathy

Delayed encephalopathy after carbon monoxide (CO) intoxication is clinically characterized by deterioration and relapse of cognitive ability and behavioral movement[1]. Hyperbaric oxygen treatment for CO intoxication has been reported to decrease the incidence of delayed neuropsychiatric sequelae, but there is no specific treatment for these symptoms[1,2]. We report a patient with delayed encephalopathy after CO intoxication whose cognitive function improved substantially after donepezil treatment.

Case Report

A 16-year-old male was admitted to emergency room of the nearest general hospital, his chief complaint being of stupor consciousness. He was immediately treated with hyperbaric oxygen therapy under the diagnosis of acute CO intoxication, a diagnosis which was based on a complete history and an examination of his blood carboxyhemoglobin levels (17%). Two days later, he had completely recovered and was discharged after the 8th day. He was admitted to our hospital on the 25th day after acute insult because of gait disturbance and cognitive impairment. On admission, he was confused, and his cognitive functions were impaired. A neuropsychological test was performed on the day of his admission; mini-mental state examination (MMSE) score was 8 and clinical dementia rate (CDR) was 2 (sum of box: 11). He also exhibited a short step gait with decreased arm swing and increased muscle tone and choreic movement in right extremity. Electroencephalography demonstrated diffuse mixed slowing waves in both hemispheres. The brain magnetic resonance image revealed high signal intensities from the bilateral periventricular white matter and deep white matter in T2-weighted and diffusion-weighted images, a finding which is suggestive of late developing cytotoxic edema (Figure). Risperdal was prescribed, and after three days, the involuntary movement of the right extremities ceased. In response to cognitive decline, we selected donepezil hydrochloride (5mg/day), a drug thought to prevent the

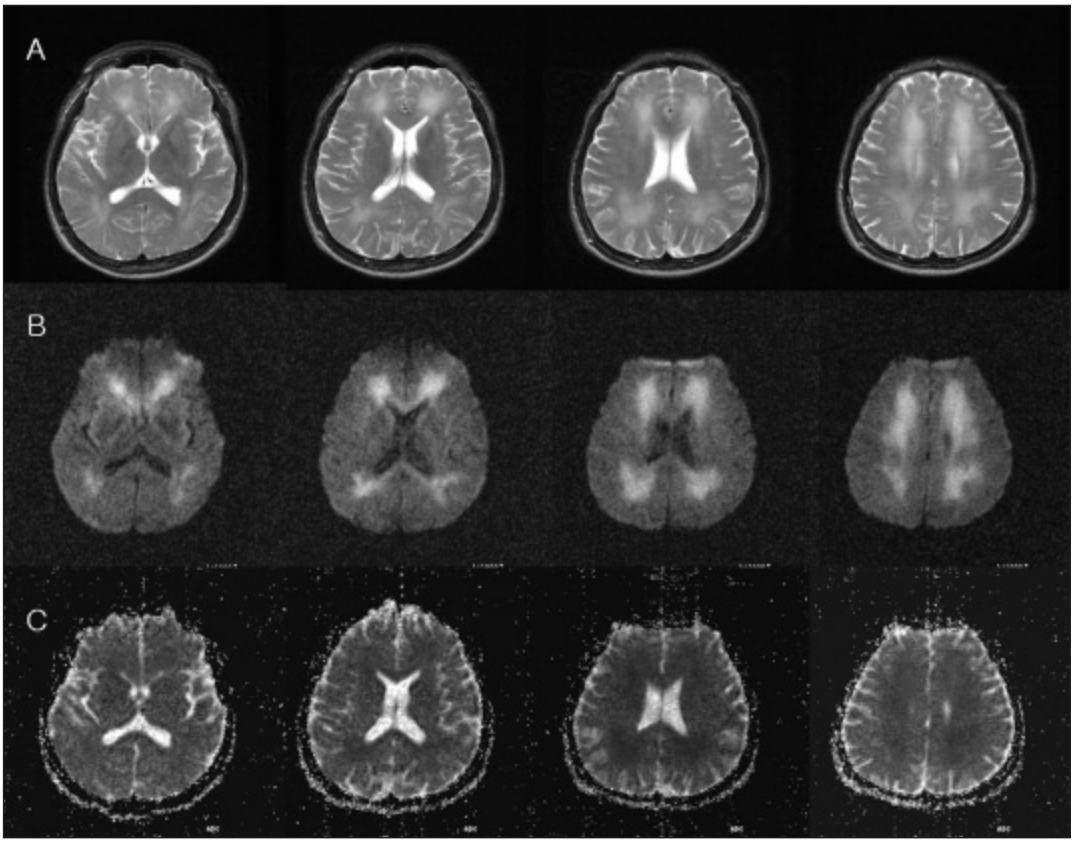

Figure: *Brain magnetic resonance images demonstrate high signal intensities from bilateral periventricular white matter and deep white matter in T2-weighted (A) and diffusion-weighted images (B) and low signal intensities from comparable area in apparent diffusion coefficient maps (C).*

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breakdown of acetylcholine, a neurotransmitter in the brain that is important in memory function. On the 18th hospital day, follow-up MMSE and CDR score showed 9 and 2 (sum of box: 11), respectively. Ultimately, the patient discharged on 20th hospital day without improvement of cognition. On 15th day after discharge, the dose of donepezil hydrochloride was increased 10mg/day. About three months later, the patient's cognitive impairment gradually recovered, and the MMSE and CDR score reached 26 and 0.5 (sum of box: 3.5), respectively. But neurological examination showed the persistence of moderate impairment of gait function.

Discussion

The initial acute CO intoxication was followed by a persistent vegetative state[3]. However, in the majority, there was a period of more or less full recovery, followed by an abrupt relapse. During the initial recovery, intellectual and neurological function often was normal, and there was no hint that potentially fatal sequelae were subsequently to occur[3]. After recovery period of usually two to three weeks, the neurological and psychiatric symptoms of delayed encephalopathy may occur, but the exact mechanism of this phenomenon is unclear[2]. Since cerebral cortex, basal ganglia, and hippocampus are very sensitive to hypoxia, the cerebral hypoxia caused by CO intoxication can only account for lesion sites by CO intoxication[2]. However, Gilmer et al reported in their animal study that hyperbaric oxygen treatment is not effective in preventing neurological sequelae and no benefit of hyperbaric oxygen over normobaric oxygen following severe CO neurotoxicity[4].

Nevertheless, Wang et al reported effectiveness of acetylcholinesterase inhibitor for cognitive impairment in delayed encephalopathy, which was unique report about successful management for cognitive symptoms in delayed encephalopathy, to our knowledge[2]. We also experienced that administration of donepezil hydrochloride appeared to be effective in our patient. However, benefit of donepezil hydrochloride for cognitive impairment could be not explained because pathogenesis of delayed encephalopathy was unclear. Recent studies have suggested that donepezil has neuroprotective effects through up-regulation of the anti-apoptotic protein Bcl-2, stimulation of nicotinic acetylcholine receptors, and activation of the phosphoinositide- 3-kinase /Akt pathway and inhibition of glycogen synthase kinase-3, and inhibition of acetylcholinesterase in the cortex and hippocampus of the brain, although the protective mechanisms of donepezil have not yet been clearly identified[5]. Therefore, further studies are necessary to clarify pathogenesis and management of cognitive impairment due to delayed encephalopathy.

In-Uk Song, Hyun-Ji Cho, Young-Do Kim, Sung-Woo Chung
Department of Neurology,
The Catholic University of Korea
Bupyeong -gu, Incheon
E-mail: limbic@catholic.ac.kr

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To the Editor

Re: Stereopsis in Drug Naïve Parkinson's Disease Patients. Can J Neurol Sci. 2011; 38:299-302.

I read with interest this report describing impaired stereopsis among drug-naïve parkinson's disease (PD) patients[1]. The authors found an 87.5% prevalence of abnormal stereopsis (as measured by the Titmus stereoacuity test) in PD patients compared to a 10% prevalence among age-matched controls. This difference was both large and statistically significant, and the authors further observed that those PD patients who had abnormal stereopsis had significantly more advanced disease, as measured by the UPDRS (motor) score and Hoehn and Yahr stage, than those PD patients with normal stereopsis. The authors theorize that impaired stereopsis in PD patients may result from dysfunction in the visual association cortex responsible for the binocular representation of 3D surfaces, possibly as a result of dopamine depletion in extrastriate cortical pathways.

I believe there may be a simpler explanation for the authors' findings of impaired stereopsis in PD: convergence insufficiency (CI) .

Convergence insufficiency refers to the impaired ability of the two eyes to adduct simultaneously to center each fovea on a near target. Decreased convergence amplitudes and a distant near point of convergence are the hallmarks of CI[2,3]. Insufficient convergence of the eyes, with consequent decentration of one