Low-dose intravenous propofol as a possible therapeutic option for acute confusional migraine

Abstract
Acute confusional migraine (ACM) is a rare form of migraine disorder in which patients present with confusional state along with a migraine headache and for which there is no established treatment. Here, we report a case of a young man with ACM, who showed a marked response to low-dose intravenous propofol administration. He developed a confusional state during the course of his usual migraine headache with the typical visual aura. To achieve adequate sedation to perform the necessary examinations at the emergency department, he was administered intravenous propofol, which unexpectedly improved his confusional state. Although a few case reports on the efficacy of intravenous valproic acid or prochlorperazine exist, this is the first case that suggests a potential effect of low-dose propofol in terminating the acute confusional state of the ACM. The efficacy of propofol may be in part explained by its suppressing effect on widespread cortical spreading depression, which is considered one of the possible underlying mechanisms of ACM.

Acute confusional migraine (ACM) is a rare form of migraine disorder in which patients present with a confusional state along with a migraine headache [1-4] and which is predominantly seen in pediatric patients [5-7]. Thus far, few case reports exist on the treatment of ACM except for intravenous valproic acid [1,8] or intravenous prochlorperazine [9]. Here, we report a case of a patient with strongly suspected ACM who received a propofol infusion, which unexpectedly and markedly alleviated his confusion.

A 24-year-old man had experienced migraine headaches with a typical aura (blinking and narrowed visual field) several times a year since he was a young teenager. He had no family history of headaches and had never taken prophylactic medication for migraine. Since the morning on the day of the episode, he had a moderate headache and nausea along with usual intermittent aura. The symptoms gradually worsened, and approximately 3 hours later, mild consciousness disturbance emerged. His speech was inconsistent and mildly disoriented. He was soon transported to the emergency department (ED) of our hospital because he vomited and collapsed on the ground. On arrival at the hospital, he was in the confusional and mildly agitated state and did not follow our instructions, nor was he able to adequately explain his symptoms.

He appeared to have mild aphasia, but no convulsions or apparent motor deficits were observed. Brain computed tomographic scan and routine blood tests revealed no abnormal findings. As he could not remain calm, approximately 30 to 40 mg (<1 mg/kg) of intravenous propofol was infused to secure adequate sedation to perform a cerebrospinal fluid test and brain magnetic resonance imaging. Results of both tests were normal, except for a slightly narrowed main trunk of the left middle cerebral artery visible in the magnetic resonance imaging (Figure). Within 20 minutes of the propofol administration, the patient's consciousness markedly recovered, but he could not remember most of the details of the confusional episode. He still complained of mild difficulty in word recall and a narrowed visual field, both of which gradually improved. No recurrence was observed until the next day, and he was diagnosed with ACM.

To the best of our knowledge, this is the first report describing the possible efficacy of low-dose intravenous propofol in terminating the confusional state of ACM. Although we could not perform electroencephalogram during the confusional episode, we concluded that our case is compatible with the clinical picture of ACM [2,3].

There are a limited number of earlier reports on ACM treatment, except for a few cases in which intravenous valproic acid [1,8] or prochlorperazine [9] was reported to be effective. Although ACM has been reported as a self-limiting disease that typically resolves within 24 hours or after deep sleep [2,3], leaving the patients with altered mental status until their confusional state resolves naturally can be sometimes challenging. The efficacy and safety of the use of low, nonanesthetic dose (1 mg/kg) of propofol for migraine headache has been reported in some earlier case studies of patients with refractory or intractable migraine headache [10-12]. Therefore, the use of intravenous propofol at the ED can be considered another therapeutic option, especially in some hospitals or countries where intravenous valproate is not available. The requirement to secure necessary sedation to perform examinations for sufficient exclusion of other differential diagnosis, [2,3] would also, in part, justify the use of propofol for ACM patients.

The reason for possible efficacy of propofol for the treatment of ACM is unclear. A complex aura, where cortical spreading depression (CSD) involves a broader range of brain areas, including the cerebral hemisphere and brainstem, is considered one of the possible underlying mechanisms of ACM [2]. Valproic acid is known to reduce cortical excitability [13] and suppress CSD [14] in migraine patients, explaining the pharmacological mechanism of valproic acid as a commonly used migraine prophylaxis. Although the ability of propofol to suppress CSD is controversial at the experimental level [14], the possible efficacy of intravenous propofol in the treatment of ACM may be the result of a CSD-suppressive effect, as in the case of valproic acid.
To conclude, we report a case of a patient with strongly suspected ACM, who showed a marked response to intravenous propofol infusion. The possible efficacy of propofol was indicated, and we would like to suggest propofol as another potential therapeutic option for ACM. Further investigation is required.

References