Wernicke's Encephalopathy After Longterm Feeding with Parenteral Nutrition

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Wernicke's encephalopathy occurs due to thiamine (vitamin B1) deficiency which is characterized by oculomotor dysfunction, confusion and ataxia. Although it is most common with alcoholism, can also be seen due to hyperemesis caused by chemotherapy, Crohn's disease, gastrointestinal system surgery, AIDS, bariatric surgery and longterm feeding with parenteral nutrition. In this case, a 51-year-old woman who was treated with longterm total parenteral nutrition due to hyperemesis and had the diagnosis of Wernicke's encephalopathy after admission to the intensive care unit is presented.

Key Words: Wernicke encephalopathy, total parenteral nutrition, thiamine deficiency

Introduction

Wernicke's encephalopathy (WE) is a neuropsychiatric syndrome caused by thiamine (vitamin B1) deficiency. The classical triad of WE includes oculomotor dysfunction, confusion and ataxia. Although it is most frequently seen due to chronic malnutrition associated with long term alcohol use, it may occur as an acute disorder in conditions including long term starvation such as cancer and hunger strike, hyperemesis gravidarum and gastrointestinal system (GIS) surgery, mainly bariatric surgery (1-3). It may also develop iatrogenically due to insufficient multivitamin support in patients receiving total parenteral nutrition (TPN) (4).

Thiamine, which is a water-soluble vitamin, is required to maintain glucose metabolism in central nervous system, myelin continuity, and for the synthesis of acetylcholine, gamma-aminobutyric acid and glutamate. A healthy adult should receive 0.5 mg thiamine for each 1000 kcal diet intake in order to maintain thiamine associated functions. Daily intake of thiamine should be increased in children, critical patients treated in the intensive care unit, and in pregnant and lactating women (5).

Laboratory tests are not conclusive for disease diagnosis, and WE can be diagnosed if medical history, physical examination and magnetic resonance imaging (MRG) findings are evaluated together.

In this report, a 51 years old female patient who received long term TPN support due to hyperemesis, and was diagnosed as WE after she was transferred to the intensive care unit because of worsening general condition and somnolence, is presented.

Case Presentation

A female patient at the age of 51 years, whose written informed consent was obtained for publication of her case, with no known history of alcohol dependence, had received a diagnosis of stomach cancer one and a half years ago. The patient, who had received radiotherapy and four cycles of chemotherapy because of stomach cancer, also had had gastrectomy and splenectomy. As the patient could not tolerate oral intake because of hyperemesis, she has been receiving TPN support for six and a half months. The patient had gait and balance disorders two months ago; and these problems were suggested to be due to hyponatremia established in another medical centre. Oral intake of the patient, whose complaints resolved in 1-2 days, got worse in the last two months due to nausea and vomiting. The patient, who had been able to take care of herself until the last week, was hospitalized because of diplopia, gait and balance disorders.

Her neurologic examination revealed somnolence, extremely limited cooperation, uncoordinated eye movements, non-compliance to cerebellar tests and normal motor function. As there was no acute pathology in the emergency computed tomography of the brain, diffusion weighted cranial magnetic resonance imaging (MRI) was requested. In the diffusion weighted MRI, signal changes, iso/hypointense in T1A series and slightly hyperintense in T2A series, that showed no diffusion restriction in the diffusion weighted images and involving pulvinar and medial dorsal nucleus, extending to the inferior colliculus and periaqueductal grey matter at the medial aspects of both thalami was determined and MRI results were recommended to be evaluated together with the clinical and laboratory findings of the patients in terms of metabolic processes (Figures 1, 2). As the patient showed impaired consciousness during her stay in ward, she was admitted to the intensive care unit.

Eye examination of the patient, who was considered to have WE according to her medical history, physical examination and MRI findings, revealed normal anterior segments, orthophoria, bilateral peripapillary haemorrhages and a pale optic disc; there was no nystagmus.

The patient, who was diagnosed as having WE according to clinical and MRI findings, was decided to be given high dose thiamine; 200 mg three times a day in the first two days, and 200 mg once daily in the following five days, by intravenous infusion in 30 minutes. In order to deliver the targeted dose with beheptal ampoules, which involves 25 mg of thiamine and other vitamins, available in the hospital, eight ampoules three times a day in the first two days and only eight ampoules in the following five days were decided to be given. The patient's general condition improved at the second day of treatment, and her somnolence subsequently resolved. Her speech was relatively more clear and understandable compared to her previous state. However, although not continu-

ously, she was disoriented to time, environment and past life. After a one-week intravenous high dose thiamine treatment was completed, intravenous thiamine treatment at a dose of 100 mg day⁻¹ was continued, as she could not get oral or enteral nutrition. The patient with a better general condition was transferred to the ward in order to be treated for her concomitant diseases.

Discussion

Thiamine is a water soluble vitamin obtained from the diet and can be stored in the body. It is a cofactor for enzymes that take place in pyruvate oxidation (6). Wernicke's encephalopathy, is the clinical type of thiamine deficiency; cardiovascular system failure (wet beriberi), nervous system involvement as polyneuropathy (dry beriberi) and lactic acidosis (gastrointestinal beriberi) may develop concomitantly (7, 8).

WE, characterized by oculomotor dysfunction, ataxia and mental status changes, is a syndrome with a substantial mortality and morbidity. Although it is mostly seen in cases with malnutrition associated with alcoholism, it can develop in conditions including chemotherapy associated hyperemesis, Crohn's disease, surgical interventions of the gastrointestinal system, AIDS, bariatric surgery, pregnancy hyperemesis and long term parenteral nutrition (5). Clinically, the triad of ocular involvement, ataxia and mental confusion can only be seen in 10-20% of the cases (9-11). In some patients, none of these conditions are present (11%). The most commonly seen symptoms are confusion and other mental changes (82%); ataxia (23%), oculomotor dysfunctions (29%) and polyneuropathy (11%) may also be seen. Time from symptom onset to diagnosis is directly correlated with the degree of mental confusion (12, 13).

The presence of cranial MRI findings is supportive in verifying the diagnosis. In the early stages of the disease, T2 and FLAIR images of MRI reveal increased signal intensity

Figure 1. MRI image 1

Figure 2. MRI image 2

in midline structures at the periphery of the third ventricle such as periaqueductal grey matter, bilateral medial thalamus, mammillary bodies, and hypothalamus, and occasionally in the cerebellum (14, 15).

The case presented herein, was a patient who had undergone total gastrectomy due to stomach cancer and had to receive long term TPN support due to hyperemesis. The patient, who had ataxia and mental status changes from the classical triad of Wernicke's encephalopathy, only had papillary haemorrhages in the ophthalmological examination. As previously mentioned, the percentage of patients demonstrating all the three components of the classical triad is quite low. Additionally, some cases with papillary oedema or retinal bleeding was reported in the literature (12, 13). The MRI findings of the patient, who was suggested to have WE clinically, were supportive of the diagnosis of WE.

As reported in the literature, clinical findings of WE not related to alcohol consumption is not specific and there is generally delay in diagnosis (16, 17). Twelve of the 36 autopsy cases with no diagnosis and defined reason for death after coma were reported to have unidentified WE (16). It was observed that gait and balance disorder had initiated two months ago in our case and she had only received treatment for hyponatremia and WE had not been considered.

A healthy human body can store approximately 30-50 mg of thiamine. If 1-2 mg of daily thiamine requirement is considered, a patient who cannot receive enteral nutrition may be suggested to consume all thiamine reserves within 3-4 weeks (15). High dose intravenous thiamine treatment is recommended in patients with severe clinical picture and delayed diagnosis. The recommended dose is 200 mg thrice a day in the first two days, 200 mg once daily in the following five days, given as infusion within 30 minutes (18). As our patient had been receiving TPN treatment for a long time and as she had developed gait and balance disorders two months ago, one-week high dose intravenous thiamine treatment at the recommended dose was given to the patient, considering that she was a delayed case of WE. The patient's mental state improved from the second day of treatment, but orientation disorder continued after one week. We decided to switch to oral maintenance thiamine treatment, considering that we got response to treatment; however, thiamine treatment was continued intravenously at a dose of 100 mg day⁻¹, as the patient could not receive oral or enteral nutrition.

Conclusion

In case of neurological complications in patients who require long term TPN support after surgery, WE should necessarily be considered in the differential diagnosis, and it should be kept in mind that classical triad is rarely seen and medical history and physical examination should be supported by MRI findings to reach a diagnosis in the early stages of diseases in suspected cases. In patients with long term parenteral nu-

trition requirement, thiamine should be routinely added to parenteral nutrition mixtures. It should not be forgotten that early diagnosis and rapid initiation of thiamine treatment decrease the mortality and morbidity of WE that may show a fatal course with severe sequels.

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