Fluoroacetamide Toxic Leukodystrophy Treated by Butylphthalide: A Case Report with a Review of the Literature

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Abstract

Fluoroacetamide is a high effective rodenticide with broad spectrum. A series of toxic symptoms emerge such as nausea, vomiting with bloody vomitus, epigastric burning, dizziness, headache, fatigue, face muscle twitching, dysphoria, expiratory dyspnea, hypotension, recurrent epigastric burning, general paroxysmal and tonic convolution. Fluoroacetamide toxic leukodystrophy was rarely reported. Here, we report a case of fluoroacetamide toxic leukodystrophy treated by Butylphthalide and review the literature.

A 22-year-old woman presented with a history of rodenticide toxic for about three days. Physical examination and brain MRI of the patient revealed leukodystrophy. After treated with Butylphthalide injection 50mg.d−1, energy mixture and multiplex vitamin for 7 days, symptoms such as staring, speaking, and limb twitching disappeared. Brain MRI was approximately normal in a week and completely normal following up 3 months later. We review the previously published cases of fluoroacetamide poisoning, and discuss the principal diagnosis and treatments of fluoroacetamide poisoning.

Keywords: Fluoroacetamide toxic; Leukodystrophy; Butylphthalide

Introduction

Fluoroacetamide is a high effective rodenticide with broad spectrum. A series of toxic symptoms including dizziness, headache, face muscle twitching, tonic convulsion emerge et al emerge when it happens [1,2]. Fluoroacetamide toxic leukodystrophy was rarely reported [2]. In this report, we present a case of fluoroacetamide toxic leukodystrophy and describe its treatment. We discuss the mechanism, diagnosis, and management of this disease.

Case Report

A 22-year-old woman was admitted to Department of Neurology, Navy General Hospital for paroxysmal convulsion of the limbs for 5 days. On April 9th 2012, she was in low spirits. After taking rodenticide (type and quality information was not available) for 2 hours, she had the clinical manifestation of dyspnea and precordial distress. She was sent to local hospital and felt better after gastric lavage. She refused to stay in the hospital after the treatment. In the evening of April 10th 2012, she started experiencing expiratory dyspnea, eyes gazing to the right, with dull looks, and occasionally limb twitching with no obvious inducements. Her consciousness was clear during the attack, with no foam in the mouth as well as disorder of urination and defecation. The symptoms lasted for about 2 hours before she was admitted into the local hospital. The symptom was improved after treatment of gastric mucosa protective agents, multivitamin, etc (the list of specific drugs is not available). In April 10th 2012 brain CT did not show obvious abnormalities (Figures 1 and 2). In April 11th, 2012, the symptoms relapsed and were not immediately relieved after diazepam injection until 2 hours later. At 7:00 of April 12th, 2012, the symptoms relapsed again and intermittently happened till 1am. Brain MRI showed long T1 and T2 signals of bilateral centrum semiovale, callosum and white matter around rear corner of di-lateral ventricle, as well as hyperintense signal in diffusion-weighted imaging (DWI) (Figures 3-8). She was then transferred to another hospital for neurotrophic treatment (the information for actual treatments was not available). For further diagnosis and treatment, she came to our hospital and was admitted to department of neurology because of her diagnosis results: “leukoencephalopathy and drug poisoning”.

Figures 1 and 2: In April 10th 2012brain CT scan did not show obvious abnormalities.

Results of nervous system examination: She had a clear consciousness and was able to speak fluently. Cranial nerve
examination was normal. Muscular tension of the limbs was reduced with upper limbs level 5 while lower limbs level 4. Right palmoquantum reflex was positive. Left upper-limb tendon reflex was normal while right upper-limb and lower limb tendon reflex disappeared. Left palmoquantum reflex and sucking reflex were negative. Left Babinski syndrome and Chaddock syndrome was ± right Babinski and Chaddock syndrome was negative. The results of blood routine tests, biochemistry and Electroencephalogram (EEG) were all normal. Fluoroacetamide was detected from rodenticides container. After treated with Butylphthalide injection 50mg.d⁻¹ energy mixture and multiplex vitamin for 7 days, symptoms such as staring, speaking, limb twitching disappeared. Brain MRI in April 22th, 2012 was approximately normal Figures 9-12. Follow up 3 months later showed completely normal.

**Discussion**

Fluoroacetamide is a high effective rodenticide with broad spectrum. After entering the human body, amido is removed to become monofluoroacetate. Fluoroacetic acid combines with intracellular mitochondria coenzyme A into fluoroacetyl coenzyme A [1-3]. Combined with oxaloacetic acid, they condense to form fluoro citrate which can inhibit aconitase to break citric acid oxidation of tricarboxylic acid cycle and impair energy generating process [4]. A series of toxic symptoms emerge such as nausea, vomiting (with bloody vomitus) epigastric burning, dizziness, headache, fatigue, face muscle twitching, dysphoria, expiratory dyspnea, hypotension, recurrent epigastric burning, general paroxysmal and tonic convulsion [5]. That with the main symptoms of repeatedly recurrent spasm leading to respiratory failure and death is called nerve-type, while that with the main symptoms of hypotension, hematocyanosis, heart failure and arrhythmia is called heart-type [1,2].

Fluoroacetamide toxic leukodystrophy was rarely reported [2]. In 1982, Roy A et al. reported acute poisoning due to fluoroacetate and fluoroacetamide [6]. In 1983, two cases were reported of severe acute fluoroacetamide poisoning in man, with successful treatment of the life-threatening cardiac arrhythmias by the administration of calcium chloride [7]. Raticide fluoroacetamide was forbidden by the world since 1984 [8]. However, because it is needed and easy-making, raticide fluoroacetamide could still be obtained in China. In 2008, Lei LF reported one case of raticide fluoroacetamide poisoning [2].

In our case, after the patient was poisoned by rodenticide, even toxin was eliminated rapidly, there was rodenticide detected from vessel. Her clinical manifestation and brain images showed the feature of nerve-type fluoroacetamide poisoning.

Although brain CT showed normal images the day after poisoning, after contrasting with brain MRI low CT signal in bilateral centrum semiiovale and extensive white matter of corpus callosum was observed. Brain MRI showed hyperintense signal in DWI while lesions of control T2 and fluid attenuated inversion recovery (FLAIR) were relatively limited. Meanwhile, there was less change of high signal, indicating that the injury of brain white matter was transient intracellular edema instead of interstitial necrosis [9,10]. Based on this information, we concluded that fluoroacetamide was partially combined with brain tissue, causing obstacles of mitochondrion functions and further lead to symmetry injury of brain tissue.

The patient had history of fluoroacetamide poisoning. Brain CT showed diffuse brain injury. Fluoroacetamide mainly disrupt tricarboxylic acid cycle in mitochondria. Therefore, combined with energy mixture and multivitamin, Butylphthalide was also used to
Data from both biological experiments and clinical studies showed that Butylphthalide is an effective mitochondrial protectant through effectively improving mitochondrial membrane fluidity increasing mitochondrial ATPase activity of nerve cell, making mitochondrial membrane stable as well as increasing the activity of mitochondrion Complex IV [13-16]. Based on these studies, we hypothesized that Butylphthalide is useful for the treatment of fluoroacetamide poisoning. After the treatment, the symptoms and signs were relieved. Prognosis was improved.

Therefore, our study showed that Butylphthalide can be used for fluoroacetamide poisoning, organophosphorus pesticide poisoning et al in future cases.

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References