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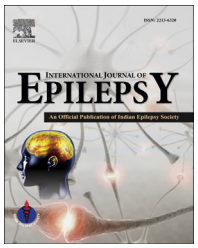

Case Report

Batwing appearance – A neuroradiologic clue to glutaric aciduria-type 1

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ABSTRACT

Glutaric aciduria type 1 (GA-1) is a rare inherited neurometabolic disorder due to enzymatic block in the common degradation pathway for lysine and tryptophan. We report a 16 month girl child who presented with an initial acute encephalopathic crisis followed by static encephalopathy with characteristic neuroimaging findings. Diagnosis was confirmed by demonstrating elevated urinary glutaric acid and 3-hydroxyglutaric acid levels. Early diagnosis and adequate dietetic therapy can prevent most of the neurological symptoms.

1. Introduction

Glutaric aciduria type 1 is a rare inherited autosomal recessive inborn error of metabolism due to a deficiency of the mitochondrial enzyme glutaryl coenzyme A (CoA) dehydrogenase which is involved in the catabolism of L-lysine, L-hydroxylysine and L-tryptophan. It has an estimated prevalence of 1 in 100,000 newborn babies. Elevated levels of glutaric acid and its metabolites in the body tissues are responsible for the protean manifestations like acute encephalopathic crises, dystonia, dyskinesia, macrocephaly and mental retardation. Characteristic neuroimaging findings and specific metabolic investigations help in making an early diagnosis. Treatment is by restriction of glutarigenic amino acids, lysine, tryptophan and hydroxyl lysine, and supplementation with carnitine and riboflavin. This article aims to describe our patient with this progressive neurodegenerative condition.

2. Case report

A 16 month old female child was born by second degree consanguineous parentage to a second gravida mother with an uneventful antenatal period at full term by normal vaginal delivery. Her birth weight was adequate and she had an uneventful neonatal period. She achieved social smile and cooing at 3 months, grasping objects at 4 months, neck holding and hand regard by 5 months and sitting with support by 6 months. She remained asymptomatic till 7 months of age when, in association with a transient viral illness, she developed acute encephalopathic features, recurrent tonic seizures and loss of previously acquired milestones. She was started on oral lorazepam and phenobarbitone. Since then she has not achieved any further milestones and continues to have frequent dystonic spasms of neck and limbs. The neurological examination revealed microcephaly (head circumference-

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41.5 cm), failure to thrive (weight and height less than 5th percentile), bilateral palmar fisting with cortical thumb and intermittent tongue thrusting and dystonic movements of neck in addition to generalized hypertonia. The acute encephalopathic presentation and subsequent neuroregression following a trivial illness during the infancy period as well as the presence of marked extrapyramidal features made us consider the possibility of an underlying neurometabolic disorder like mitochondrial cytopathy or inborn errors of metabolism like glutaric aciduria type 1, biotin responsive basal ganglia disease, organic acidemias and urea cycle defects.

EEG showed paroxysms of slow waves seen synchronously on both sides. Routine hematological and biochemical investigations including thyroid function tests were within normal limits except for mild anemia. CSF analysis was normal and showed normal levels of CSF lactate and pyruvate. Plasma lactate was normal. Computerized Tomography (CT) of the brain showed widening of the sylvian fissures and temporal lobe atrophy with "bat wing sign" as well as bilateral symmetrical basal ganglia hypodensities. Magnetic Resonance Imaging (MRI) of the brain (Fig. 1) confirmed the CT findings with bilateral symmetric T2 weighted hyperintense signals visualized in basal ganglia (Fig. 2) and minimal diffusion restriction (Figs. 3 and 4) in the basal ganglia bilaterally. Tandem mass spectroscopy showed elevated levels of plasma glutarylcarnitine and elevated C5DC/C8 ratio suggestive of glutaric aciduria type 1 which was further confirmed by demonstrating elevated urinary glutaric acid and 3-hydroxyglutaric acid levels. Therapeutic intervention by a low protein diet with restriction of lysine and tryptophan was initiated. High doses of riboflavin and L-carnitine were also supplemented. Antiepileptics were continued for seizure control.

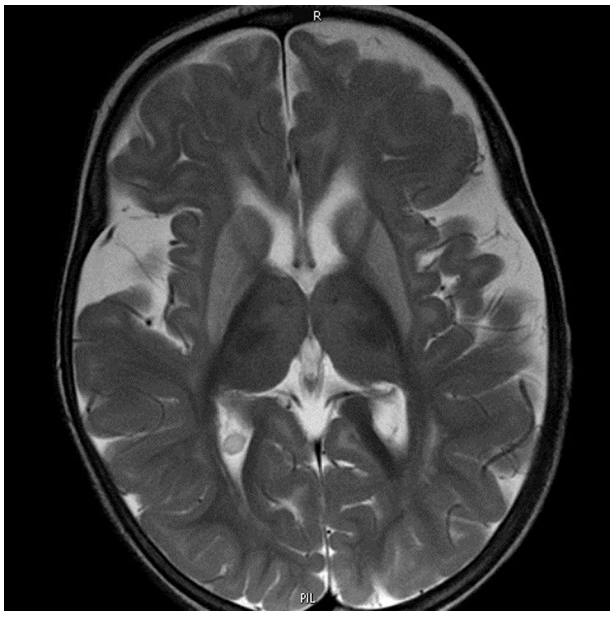

Fig. 2 – T2 axial view of MRI of brain showing bilateral symmetric hyperintense signals in the basal ganglia.

3. Discussion

Glutaric aciduria type 1 was first reported in 1975 by Goodman et al.[1] It is a rare disorder of lysine and tryptophan metabolism

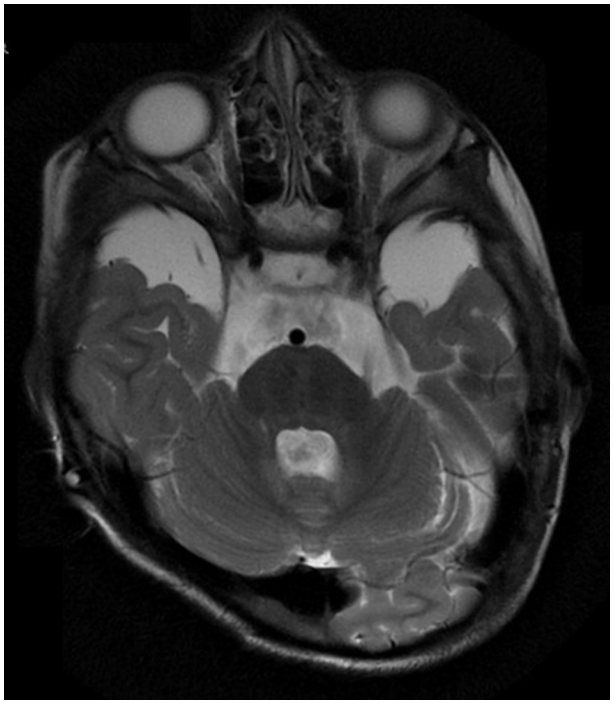

Fig. 1 – T2 axial view of MRI of the brain showing enlarged pretemporal subarachnoid spaces.

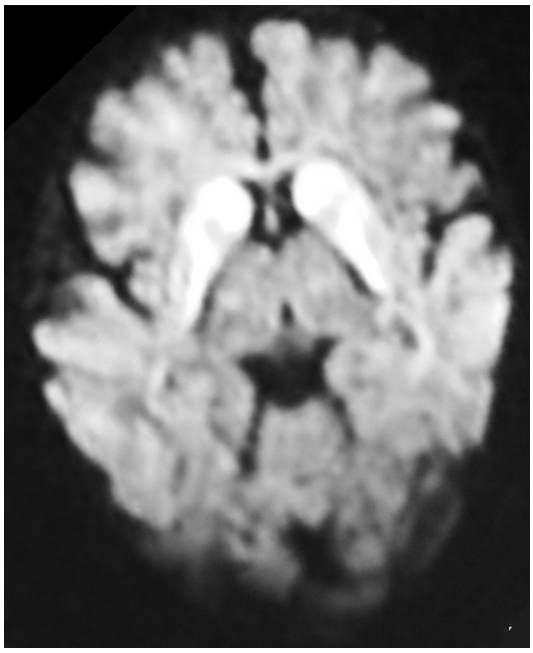

Fig. 3 – Diffusion weighed MR imaging showing bilateral symmetric bright signals in the regions of caudate and putamen.