Hemiconvulsion Hemiplegia Syndrome with Iron Deficiency Anemia in a child with review of literature

Abstract:

Hemiconvulsion hemiplegia epilepsy (HHE) syndrome is a rare complication of prolonged focal seizures in children and usually idiopathic but may be associated with structural, infective, traumatic and degenerative diseases. We present a three yearsmale child with iron deficiency anemia, who had left sided focal status epilepticus clonic type for nearly 12 hours, and later developed left sided hemiparesis. This is the first association of iron deficiency with hemiconvulsion-hemiplegia-syndrome; and illustrates the importance of neuroimaging in each case of status epilepticus. More importantly, the case also raises the possibility that deficiency in Iron could be a contributing factor in cases of hemiconvulsion-hemiplegia-syndrome

Key words: Hemiconvulsion hemiplegia epilepsy (HHE), febrile seizure, status epilepticus, iron deficiency anemia

Introduction

Hemiconvulsion-hemiplegia-epilepsy (HHE) is a rare outcome of prolonged focal status epilepticus that usually occurs in children below 4 years of age.[1] This entity starts with a focal status epilepticus and concurrent febrile illness, which subsequently evolves to ipsilateral hemiparesis of the convulsing side; at follow-up over months to years, two-third of the patients develops epilepsy. Magnetic resonance imaging (MRI) of the brain in the acute stages characteristically shows gross cerebral edema in the contralateral hemisphere, which later turns into atrophy.[2] At present, the underlying etiology of HHE remains poorly understood. Individual reports of possible etiological triggers like vasculopathy, trauma, inflammation, viral infections, mutations of SCN1A and CACNA1A. In situations where no trigger is identified, it is labelled as idiopathic.[3]However it is an established but under diagnosed and potentially preventable sequel of prolonged status epilepticus in children younger than 4 years.Iron deficiency anemia is associated with an increased risk of febrile seizures in children.[4] Here we present a case of 3 years male childof hemiconvulsion hemiplegia syndrome with iron deficiency anemia.

Case report:

A-3-yearsmalechildborn to a nonconsanguinous marriage via normal vaginal delivery and cried immediately after birthcame to the emergency withcomplaint of sudden onset abnormal body movement followed by unconsciousness 7days back and weakness of left side of body for 3 days. Child was apparently alright 7 days back and he developed sudden onset left sided clonic convulsions involving both upper and lower limbs while playing with friends at his home. After few minutes the child had drooping of head and frothing from his mouth followed by unconsciousness. The above episode was associated with one day of fever only. There was no history of trauma, headache, vomiting, cough, cold, blurring of vision, rash, animal bite, any unknown substance ingestion, bluish discoloration of body. There was no past history of any similar episodes, any seizures or previous hospitalization.His developmental milestones were achieved according to the age.

Before arrival in emergency,the child received treatment for meningitis for 4 days and status epilepticus(Intravenous lorazepam, phenytoin, sodium valproate, levetiracetamand continuous midazolam;6µg/kg/minute infusion for 12 hours). After that the seizures got controlled and the child was conscious but was in altered sensorium. The finding of CSF analysis was normal. They took the child to home by own. In home the caretakers noticed that the child could not able to move his left half of body for which they came to us after 3 days.

On examination, the child was conscious, irritable, lying supine in bed. His vitals were stable. Glasgow Coma Scorewas 11/15. There was left sided upper motor neuron type of 7th cranial nerve palsy with left sided hemiplegia. Hehad no loss of sensation and signs of meningeal of irritation.

Comment [O1]: Were these all medicine given at a same time? Or you mean that the medication was gradually increased and added up once the maximum dose of each drug reached.

Comment [O2]: Please make it clear whether discharged or took against medical advice?

Comment [O3]: Modified glass glow coma scale would have been better as child is only 3 years,

His CBC revealed TLC: 6.76x10^3/µl, DLC (N:51, L: 35, E7 ,M6 AND B1%), Hb: 6.8 gm/dL, MCV-72 fl, MCH-16.8 pg, MCHC- 23.3gm/dl, platelets- 156X10^3/µl. Serum Iron, ferritin, TIBCwere11µg/dl,9.9 ng/ml and 499.93 µg/dLrespectively. Serum cyanocobalamin (314 pg/mL) and homocysteine (10µmol/L) was normal. His tuberculin test and CBNAAT for CSF and gastric aspirate came out to be negative. Liver function tests, renal function test, PT, aPTT, INR reports were normal.Urine for organic acid screening came to be normal. His NCCT scan(**Figure 1**)showed wedge shaped hypodensity involving complete right cerebral hemisphere with mass effect andeffaced right ventricle and MRI of brain(**Figure 2**)showed edematousright cerebral cortex, subcortical and deep white matter along with mass effect and dilatation of contralateral lateral ventricle. MR angiography of cerebral vessels were normal(Figure 3)

We treated the child with acetazolamide (50mg/kg/day),oxcarbazepine (10 mg/kg/day) and low dose aspirin (3-5 mg/kg/day). The child's general condition improved gradually. He started recognizing his uncle and aunt. Facialpalsy improved gradually by the time of discharge but weakness of left side of body persisted. The child did not develop any episode of fever or seizure during the period of hospitalization. The child was discharged after 7 days with a diagnosisof hemiplegiahemiconvulsion syndrome with iron deficiency anemia.

Discussion-Hemiconvulsion-Hemiplegia/Hemiconvulsion-Hemiplegia-Epilepsy (HH/HHE) syndrome was first reported by Gastaut and colleagues in 1957. Pathophysiology of this syndrome still remains poorly understood and the long-term cognitive outcomes are still unclear.[1]Several etiologies for the initial seizures in HHE syndrome have been proposed and include viral infections, meningitis, subdural effusion, protein S deficiency, cyanocobalamin deficiency, L2 hydroxyglutaric aciduria and mutations SCN1A and CACNA1A. [5,6,7]

Here we present the first case of acute onset hemi convulsion and hemiplegia with iron deficiency anemia (IDA) in achild. Many literatures have confirmed it that iron deficiency has a strong correlation with febrile seizures and pediatric stroke.[5][8]Iron deficiency anemia hold a 10 fold increased risk of acute stoke in welltoddlers.[9] In developing country like Indiaup to half of preschool population are affected by iron deficiency anemia. Studies reported frequency of iron deficiency in patients with febrile seizuresis around 63% in India.[10]Iron is required forhemoglobin synthesis as well as for enzymes participating in neurochemical reactions.Various hypotheses about iron deficiency and iron deficiency anemia in inducing seizures are decrease of GABA inhibitory neurotransmitter, change in neuron metabolism,reduction of enzymes such as monoamine and aldehyde oxidases and impairment in oxygenation and energy metabolism of the brain. [11]. Studies also revealed that low iron status as well as ferritin concentration may be a significant risk factor for the development of febrile seizures. [12]

Conclusion- We present a case report of 3 years male child with iron deficiency anemia and hemiconvulsion hemiplegia syndrome. As iron deficiencyanemia is already an established risk factor of febrile seizure and stroke in children, we like to highlight the importance and

association of it and also emphasize that iron deficiency anemia should be promptly treated in children.

References-

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Legends for figure:

Figure1. NCCT brain showing wedge shaped hypodensity involving complete right cerebral hemisphere with mass effect andeffaced right ventricle.

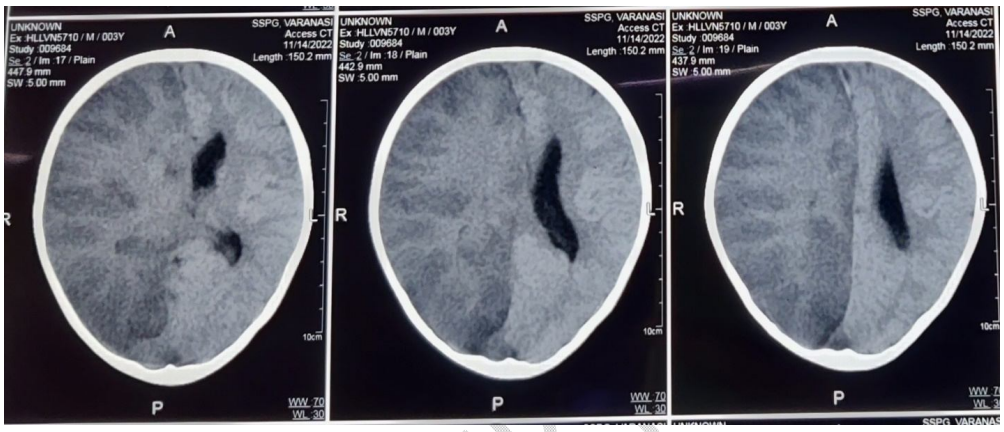

Figure2.MRI Brain showing edematousright cerebral cortex, subcortical and deep white matter along with mass effect and dilatation of contralateral lateral ventricle

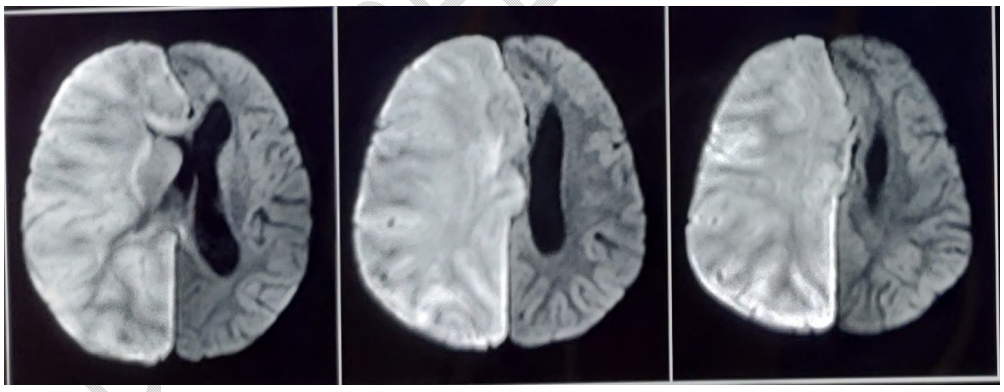

Figure3. MR angiography showing no significant abnormality.