Thrombotic stroke secondary to hyperhomocysteinemia: A rare presentation in the pediatric age group

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Abstract

Cerebrovascular disease in childhood is relatively rare. Hyperhomocysteinemia is an important risk factor for vascular diseases including stroke. A 10-year-old child presented with headache, non-projectile vomiting, and weakness in the right half of the body for 2 days. The neurologic examination revealed right-sided hemiparesis and the diagnostic workup showed a small focal acute infarct in the MRI brain and increased homocysteine levels.

Keywords: Cerebrovascular disease, Hemiparesis, Hyperhomocysteinemia, Stroke,

Introduction:

Cerebrovascular disease in children is relatively rare. The incidence of hemorrhagic and ischemic strokes together is 2.7 cases per 100,000 population per year[1]. Despite extensive evaluation, an etiologic factor or associated conditions remain undetermined in 20% to 50% of all stroke patients[2,3].

Patients with classic homocystinuria, a rare inborn error due to cystathionine b-synthase deficiency, suffer from venous thrombosis and premature cardiovascular disease at a very young age[4].

Over the last 2 decades, it has become evident that moderate hyperhomocysteinemia is an independent risk factor for arteriosclerosis, stroke[5,6], and venous thrombosis[7].

Herein, we report a case of thrombotic stroke secondary to hyperhomocysteinemia in a 10-year-old child.

Case report:

A 10-year-old female child, born out of a second-degree consanguineous marriage brought with complaints of headache, sudden onset and progressive in nature, severe in intensity, more on the left side associated with vomiting.

The mother noticed slurring of speech, abnormal eye movements, weakness of the right half of the body difficulty in holding and grasping objects with a history of dragging the right foot while walking, and difficulty in holding slippers. The child also had a history of coughing while drinking water.

History of Bell's palsy at 4 years of age which recovered completely with the birth history being an uneventful and developmentally normal child.

At presentation, the child was hemodynamically stable, with end gaze nystagmus of the right eye, bilateral pupils reacting to light, decreased tone, and decreased power with MRC grading 2/5 with grade 1 reflexes on the right upper and lower extremity (Ashworth scale)[8].

MRI brain imaging revealed a large T1 iso to a hypointense area with a T2 hyperintense area, and a small focal acute infarct is present involving the left side of the pons likely vasculitis (figure 1).

Secondary causes for vasculitis were ruled out and blood investigations showed increased levels of homocysteine **(27.5um/l).**

Intravenous vitamin B_{12} 2.5 micrograms was given for 7 days, then started on oral pyridoxine, folic acid, and aspirin. The child began to improve on the 5th day of treatment with improvement in speech, swallowing reflex, and circumduction gait. The child was discharged on oral vitamin B_{12}, folic acid supplements, and physiotherapy.

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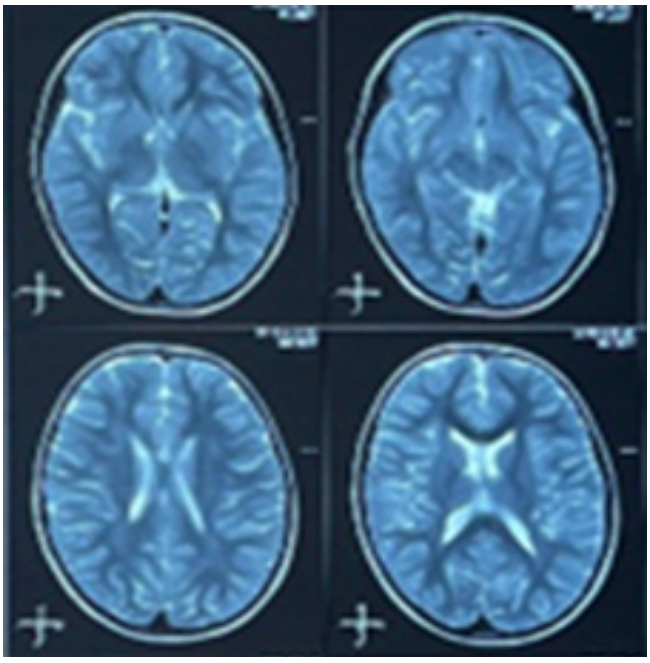

Figure 1: large T1 iso to a hypointense area with a T2 hyperintense area, A Small focal acute infarct is present involving the left side of the pons likely vasculitis

Discussion:

Elevated levels of homocysteine (>15 µmol/L) are considered a major risk factor for non-hemorrhagic stroke[2]. Homocysteine gets eliminated from the body through folate metabolism and vitamin B12 metabolism finally converting into adenosine which gets cleared from the body. Thus, a deficiency of folate or vitamin B12 can lead to an increased level of homocysteine[3]. The etiologies of hyperhomocysteinemia are multifactorial. Non-genetic cause includes dietary deficiency whereas genetic determinants include enzyme defects such as classical homocystinuria due to deficiency of cystathionine beta-synthase. It can also occur due to a defect in methylcobalamin formation leading to megaloblastic anemia. This case highlights the fact that when a young patient presents with an incident of stroke event along with other supportive systemic findings with or without a family history, homocysteinemia should form a major differential diagnosis to evaluate and further timely management strategies[4-6]. Young patients presenting with vertigo with associated neurological signs should be suspected of cerebellar stroke along with other causes of stroke such as thrombotic disorders like protein C deficiency and factor V Leiden mutations should be ruled out. Therefore, a young patient with symptoms like vertigo or syncope should undergo a complete neurological assessment both clinically as well as by neuroimaging. They should also be evaluated for metabolic causes as they can also present with stroke-like representation[4].

The American Heart and Stroke Association advises treating patients with a stroke and hyperhomocysteinemia (>10 µmol/L) daily with 0.4 mg of folic acid, 2.4 µg vitamin B12, and 1.7 mg of vitamin B6 because of the low cost and safety of the therapy[7]. The normalization of the plasma homocysteine concentrations happens within 2 to 6 weeks after the start of the therapy[9].

Conclusion:

Any child with stroke-like features should be evaluated for thrombotic disorders like protein C deficiency and hyperhomocysteinemia in addition to any metabolic derangements. There are strong clues in favor of a causal relationship between athero-thrombotic diseases and hyperhomocysteinemia. Homocysteine levels can be effectively lowered by combining folic acid, vitamin B12, and vitamin B6.

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