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Vit B12 Deficiency Induced Hyper Homocysteinemia Causing Stroke in Young Adult

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ABSTRACT

Stroke in young adults is less common than stroke elderly people. Stroke in young adults needs an extensive work up both for common as well as uncommon causes. Stroke due to vitamin B12 deficiency causing hyper homocysteinemia is a rare cause. It is important to identify vitamin b12 deficiency as the cause since it is treatable and preventable cause of stroke. Hence, early recognition and treatment of vitamin b12 deficiency can improve the treatment results at a low cost and prevent wasting of health care dollars on expensive to treat diagnosis.

Keywords- Homocysteine, Macrocytes, Stroke, Vitamin B12.

1. INTRODUCTION

Stroke in adults less than 45 years of age account for less than 10 % of total cases of stroke¹. Conventional risk factors for stroke like diabetes mellitus, hypertension, dyslipidemia do not account for strokes in young adults generally. Risk factors for stroke in young are cardio embolic, atherosclerosis, lacunar infarcts, collagen diseases and indeterminate origin.² In India, cardio embolic stroke from cerebral venous thrombosis and valvular heart disease of rheumatic origin are most common³. Stroke due to vitamin B12 deficiency causing hyper homocysteinemia is a rare cause.

2. CASE REPORT

We report a year old man who was admitted to our side with complaint of weakness of left side of body for last 4 days. There was no history of vomiting, seizure or loss of consciousness. There was no past history of diabetes mellitus, hypertension or ischemic heart disease or any substance abuse.

On examination, the patient was alert, conscious and oriented to time place and person. His pulse rate-86/min, blood pressure was 136/80 mmHg and he had mild pallor. On CNS Examination, he had upper motor type of facial palsy of left side of face .Motor system examination revealed power in left upper and lower limb was 3/5 and left plantar reflex was extensor. Sensory and cerebellar system examination was also within normal limits. Examination of all other systems was however within normal limits.

On Investigations, his hemoglobin was 10 g/dl. Mean corpuscular volume (MCV)-115 fl, Mean corpuscular haemoglobin (MCH)-37.5 pg, Mean corpuscular hemoglobin concentration (MCHC)-32.7 g/dl

Peripheral blood smear examination revealed macrocytosis. However, Total leucocyte count and platelet counts were within normal limits.

Random blood sugar, lipid profile, renal function test and serum electrolytes were also within normal range.

CT scan of brain revealed infarct in right parietal region of the brain.

Causes for infarcts in young age like protein C and protein S and anti thrombin³ were within normal range .Anti-nuclear antibody (ANA) and sickling tests were negative.

As the patient had macrocytes on peripheral blood smear, serum Vitamin B12 level was estimated-136pg/ml, so vitamin b12 was low, as a consequence, the patient had increased serum homocysteine level -50 umol/l. However, serum folic acid levels were within normal limits.

Colour Doppler of B/L carotids, electrocardiogram and two dimensional (2D) echocardiography were however normal.

The patient was treated conservatively and cyanocobalamin injections were given following which on motor examination power in left side of body increased to 4/5 and the patient is doing well on subsequently on follow up visits

3. DISCUSSION

It has been seen in reports that Vitamin B₁₂ deficiency strikes 16% of the population.⁴ Others report the prevalence to be as high as 25%.⁵ The Framingham Offspring Study found that nearly 40% of people aged 26 to 83 years had B₁₂ levels in the “low normal” range—a level at which many begin experiencing neurological symptoms

Vitamin B12 is a water-soluble vitamin and deficiency of this vitamin is seen more commonly in pure vegetarians as meat, fish, egg is rich sources of Vitamin B12. It is crucial for DNA synthesis, methylation, folate metabolism, erythropoiesis, neurodevelopment, and nervous system function.

Deficiency of vitamin B12 causes both hematological as well as central nervous system manifestations. Hypersegmented neutrophils, macrocytes on peripheral blood smear, pancytopenia, and megaloblastic anemia are the important hematological manifestations. Neurological manifestations can be-demyelinating nervous system disease, dementia, psychiatric illness,

Vitamin B₁₂ functions as a cofactor for methionine synthase and L- methyl malonyl-CoA mutase. Vitamin B₁₂ and Homocysteine levels are inversely related as deficiency of vitamin b12 prevents conversion of homocysteine to methionine leading to increase in serum homocysteine levels. Deficiency of Vitamin B12 is responsible for 28% of hyperhomocysteinemia whereas folic acid deficiency is seen in 2% cases of hyperhomocysteinemia⁶. Patients with increased homocysteine levels are hence at a risk of cerebrovascular, cardiovascular complications. This is because homocysteine is a highly reactive amino acid and potentiates oxidation of VLDL and is hence toxic to vascular endothelium causing both arterial and venous thrombosis. High homocysteine increases plaque on the carotid artery, and the likelihood of stroke is high when homocysteine is elevated. Vitamin B12 supplements are able to reduce plasma homocysteine concentrations by 7%⁷

According to study by Quinlivan et al⁸ vitamin B12 levels may determine homocysteine levels and risk for cerebrovascular disease. Similar results have been seen in 1 large intervention trial for secondary prevention, the HOPE 2 study, where patients assigned to active treatment with folic acid, vitamin B12, and vitamin B6 were at a lower risk of recurrent stroke (RR0.75, 95% CI, 0.59 to 0.97) compared with the placebo group⁹

Stroke in young adults needs thorough investigations for looking into both common –uncommon etiologies. It is also important to identify risk factors both genetic and acquired for prevention of stroke. Since stroke due to Vitamin B12 deficiency is a rare but treatable cause of stroke, it is very important to diagnose it. Hence, by identifying such preventable and treatable causes we can bring down costs and decrease emotional burden on family.

4. CONCLUSION

Vitamin b12 deficiency is problematic because low B₁₂ causes an array of neurologic and psychiatric manifestations as was seen in our case. Cerebrovascular accident due to vitamin b12 deficiency is a major problem. It is important to identify vitamin b12 as the cause since it is treatable and preventable cause of stroke. Vitamin B₁₂ deficiency has been severely underplayed in health care and largely ignored in favor of more recognized and more expensive-to-treat diagnoses. Hence, early recognition and treatment of vitamin b12 deficiency can improve the treatment results at a low cost and prevent wasting of health care dollars on expensive to treat diagnosis.

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