

Case Report

Papilledema and abducens nerve palsy associated with vitamin B12 deficiency

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Received: 14 July 2022

Accepted: 04 August 2022

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ABSTRACT

Papilledema is defined as optic disc swelling that is secondary to elevated intracranial pressure. Vision is usually well preserved with this condition. The optic discs appear blurred in papilledema. Elevation in intracranial pressure is due to variety of reasons of which intracranial hemorrhage is the most common. We present a case in which our patient developed papilledema due to vitamin B12 deficiency. Lateral rectus muscle palsy occurs due to abducens nerve palsy. The lateral rectus muscle is responsible for lateral movement of the eyeball, specifically abduction. Its palsy results in sudden onset of horizontal double vision, which is worse when the patient looks to the affected side. There is also limited outward movement of the affected eye. Abducens nerve palsy can occur due to ischemia injury, stroke, infection, brain tumour, elevated intracranial pressure, or inflammation of the nerve. In our patient the abducens nerve palsy was due to homocysteinemia secondary to dietary vitamin B12 deficiency. Homocysteine is a potent atherosclerotic risk factor and can cause ischemic nerve palsy, as seen in our patient.

Keywords: Child neurology, Abducens nerve, Hyperhomocysteinemia, Vitamin B12 deficiency, Papilledema, Acetazolamide

INTRODUCTION

Papilledema is a clinical presentation of raised intracranial pressure. If left untreated, it can lead to loss of peripheral vision.¹

Isolated abducens nerve palsy is the most common cranial nerve palsy seen in neuro-ophthalmology clinics.² It presents as acute onset diplopia. There are various etiologies such as diabetes mellitus, hypertension, dyslipidemia, carotid artery disease etc.² In this case report we describe our patient who had acute presentation of diplopia and history and examination suggested ischemic etiology.

CASE REPORT

An 11-month-old boy was brought by his mother to the hospital with complaints of increased frequency of stools,

vomiting and fever for the past two days. The child appeared malnourished. Signs of dehydration were present such as sunken eyes, dry mouth and tongue, and irritability. The child was administered intravenous fluid correction for the dehydration. The mother endorsed that child was not started on adequate complementary feeds. She also gave a vague history of fall from bed at night 4-5 days back. His anthropometric measurements were suggestive of acute on chronic malnutrition. He was achieving all the developmental domains timely until 3 months back when the mother noticed regression of milestones. Relevant investigations were ordered. Hemoglobin levels were as low as 7 g% and other cell lines (leukocytes 3500 per cubic mm, thrombocytes 130,000 per μ l) were also on their lower side of normal. His RBC indices suggest an MCV of as high as 107. Vitamin B12 deficiency was strongly suspected and levels of the same as well as homocysteine for supportive evidence were

ordered. Vitamin B12 was very low (150 pg/ml) and homocysteine was elevated (20.1 µmol/l).

The child was empirically started on antibiotic and was maintained on oral fluids and supplements. After a test dose, intramuscular vitamin B12 was also started. MRI brain was planned which was suggestive of cortical atrophy and enlargement of subarachnoid space. This is a usual finding in B12 deficiency. But there was also subacute dural hematoma on right side. One probable explanation for this finding could be the fall the child sustained 4-5 days back. On day 4 of admission, it was noticed that there was a paucity of movements of the eye ball towards temporal side of one first followed by other on the next day, likely bilateral lateral rectus palsy. Neuropediatric opinion was sought. The possibility of pseudotumor cerebri was suspected likely secondary to B12 deficiency and fundoscopic examination was thus advised. Another possibility of hematoma causing the same was also considered. Neurosurgery opinion was thus taken. The neurosurgeon was of the opinion that the hematoma was subtle and was present only on one side, not explaining the anatomical basis of bilateral lateral rectus palsy. The fundoscopic examination suggested papilledema.

Given the above considerations, metabolic cause likely B12 deficiency for bilateral abducens nerve palsy (causing bilateral lateral rectus palsy) was pursued.

The patient was additionally started on acetazolamide 20 mg/kg/day TDS along with vitamin B12. The child showed improvement within a few hours.

DISCUSSION

Vitamin B12 plays an important role in DNA synthesis, protein metabolism, maintaining normal brain function, and erythropoiesis.³ The best sources of vitamin B12 are milk, cheese, eggs, fish, shellfish and poultry.³ The daily recommended requirement of vitamin B12 is 6-9 µg.³ Vitamin B12 plays several vital roles to maintain normal biochemical and physiological processes. It contributes to the formation of methionine, an important part of DNA synthesis in cells that undergo rapid turnover, including those of hematopoietic system. A deficiency of vitamin B12 can lead to megaloblastic erythropoiesis, a form of anemia having large red blood cells. Vitamin B12 also plays a crucial role in limiting the plasma homocysteine, which in large amounts can lead to endothelial cell toxicity.³

In our case the child developed papilledema. Papilledema was due to pseudotumor cerebri causing increased intracranial pressure.⁴ One of the characteristics of vitamin B12 deficiency is pseudotumor cerebri (PTC), which has not been reported frequently in literature.⁴ PTC cases associated with megaloblastic have been reported in the literature.^{4,5} It is unclear by which mechanisms; the anemia leads to intracranial pressure and

papilledema.⁴ Most authors are of the opinion that the papilledema could be attributed to cerebral and optic nerve anoxia, with resultant increased capillary permeability and subsequent cerebral edema followed by increased intracranial pressure.⁶ In our case, acetazolamide lowered the intracranial pressure and helped in resolving the corresponding symptoms.

This child also suffered from bilateral lateral rectus muscle palsy. It was most likely due to ischemia causing abducens nerve palsy. In vitamin B12 deficiency homocysteine levels are known to rise.³ Homocysteine is a potent atherosclerotic risk factor that leads to formation of free radicals and advances smooth muscle growth.⁷ In the eye, hyperhomocysteinemia is a possible risk factor for many diseases including retinal arterial atherosclerosis, macular degeneration and optic atrophy due to retinal microvascular occlusions, cataracts, and glaucoma.⁸ Hyperhomocysteinemia is also reported to cause isolated abducens nerve palsy.² However not many studies have been performed and not much clinical cases have been reported.² This could be attributed to micro vasculopathy induced damage, similar to that found in diabetic patients with abducens nerve palsy.^{2,8} The encouraging fact is that hyperhomocysteinemia is a modifiable risk factor. There is complete resolution of the abducens nerve palsy when homocysteine levels are reduced to the normal range.⁹ In our case too the child showed improvement on giving intramuscular vitamin B12. The data shows more risk in females, compared to males with 60% risk in males and 80% risk in females with an increased odds ratio of 1.4-1.7.¹⁰ The mean age reported for this condition is 25 years (range: 6-52 years).² In infants, vitamin B12 deficiency is mostly due to poor supplementations, maternal vegan diet, and maternal vitamin B12 deficiency.¹¹

CONCLUSION

Infantile vitamin B12 deficiency is common in developing nations due to lack to maternal education on supplements feeds in addition to breastfeed, lack of breastfeeding, and maternal deficiency of vitamin B12. All breastfeeding mothers should be educated on the importance of breastfeeding, supplemental feeds. Vegan mothers should be checked of vitamin B12 levels and should be supplemented with vitamin B 12 if levels are low. By proper nutrition to the infant, malnutrition can be prevented and serious complications can be lessened.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

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Cite this article as: Singh N, Fernandes W, Fernandes BCA. Papilledema and abducens nerve palsy associated with vitamin B12 deficiency. *Int J Adv Med* 2022;9:955-7.