

# Vitamin B12 Deficiency Induced Optic Neuropathy

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## Summary

*Vitamin B12 has several vital roles in the body. Optic neuropathy secondary to vitamin B12 deficiency occurs in less than 1% of B12 deficient patients. Our case is a young patient presenting with progressive painless bilateral decrease of vision with optic disc congestion and central scotomas on both visual fields. After ruling out other possible causes of optic neuropathy, the patient was treated with injectable vitamin B12 on the basis of blood investigations. The patient experienced significant visual recovery.*

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**Keywords:** Optic neuropathy, Vitamin B12 deficiency

## Case Description

A 20 year old medical student presented to our hospital with complaint of bilateral progressive painless decrease in vision since 1 month even after the best spectacle correction.

The patient had been examined at other centres previously and was suspected to have CSCR and cortical blindness. But these were ruled out after OCT macula and MRI reports came out to be normal.

The patient had history of skipping meals during hostel stay with multiple episodes of blackout at that time. He occasionally had alcohol too. No history of any ocular trauma or past ocular disease was present. No significant history of any other systemic illness was present. Family history was unremarkable.

On examination, the patient's aided visual acuities were 6/18 OD and 6/36 OS at distance. The pupils were round and sluggishly reactive to light, without an afferent pupillary defect. Extraocular muscle movements were full without restriction. On doing the cover test, he was found to be orthophoric at distance. The subjective refraction did not improve the best-corrected visual acuities. He was able to read 12 and 2 plates on color vision testing with Ishihara plates OD and OS respectively.

Anterior segment evaluation was unremarkable. Intraocular pressures as measured by Goldmann's tonometry were 16 mmHg OD and 17 mmHg OS.

Dilated fundus examination showed generalised congested optic disc (L>R). Optic disc cups were normal. The maculae had a positive foveal light reflex in both eyes. The rest of the posterior segment was unremarkable OU.

The patient was initially suspected of having optic neuritis and therefore, treated with iv methylprednisolone for 3 days followed by oral prednisolone, oral neurobionforte, oral MCA and reviewed after 1 week with no improvement in both eyes.

SITA Standard 30-2 Humphrey Visual Field (HVF) revealed central scotomas OD and OS; The mean deviations were -5.37 dB OD and -8.49dB OS. Optical coherence tomography (OCT) macular testing was normal. FFA done to rule out any macular pathology also revealed normal study.

A normal MRI report ruled out any compressive or infiltrative optic nerve lesion that can occur from any intraorbital mass. So, the patient was now sent for VEP which supported optic neuropathy.

Various toxic, nutritional, genetic and autoimmune pathologies were investigated to find out the cause of optic neuropathy.

Genetic screening for LHON was done as it is a common cause in young men in the age bracket of 15-30 years. This was found to be negative.

Blood investigations showed serum Vit B12 in the lower range – 256pg/ml with peripheral blood smear showing megaloblasts.

The patient was started on intramuscular cyanocobalamin 1 mg/mL once weekly. The patient's vision and colour vision started improving.

The patient was then diagnosed with bilateral optic neuropathy due to vitamin B12 deficiency and the treatment was continued on weekly basis for four weeks and monthly thereafter to be followed by folic acid 1 mg daily po.

## Discussion

Vit B12 has many vital roles. It plays a key role in DNA synthesis, maintaining normal brain function, protein metabolism and erythropoiesis. It is mainly obtained from consuming animal products including meat, milk, eggs, and fish and thus lacks in vegan diet.

Vit B12 also acts as a cofactor in formation of succinylCoA, an integral part of Krebs cycle. This impaired oxidative metabolism causes a depletion of ATP. This depletion of ATP damages these sensitive papillomacular bundle fibers which have high metabolic demand, resulting in the bitemporal optic nerve atrophy and cecentral and central scotoma seen in B12 deficiency optic neuropathy.

Progressive, painless, bilateral loss of vision and temporal optic atrophy with central or cecentral scotomas are signs and symptoms seen in few optic neuropathies like compressive or infiltrative optic neuropathy, Leber's hereditary optic neuropathy, toxic and nutritional optic neuropathy and are required to be investigated.

Vit B12 is treated with injectable Vit B12 1mg weekly. Incomplete treatment of vitamin B12 deficiency with oral B12 supplementation coupled with oral folic acid can aggravate neurological impairment secondary to vitamin B12 deficiency if the B12 deficiency is not corrected first.

Thus, though Vit B12 deficiency is a rare cause of optic neuropathy, it should be considered for early diagnosis and good visual recovery.

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