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## Atypical Presentation of Vitamin B12 Deficiency

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**Abstract:** Vitamin B12 deficiency (B12D) has wide variety of neurological and non-neurological signs and symptoms. We describe a 61-year-old man who was admitted to Emergency Department (ED) with trouble to walk independently, suffering from weakness and a long history of dyspepsia that had worsened in the last four weeks. He had mild impairment of cognitive functions; motor strength was normal and his patellar and achilles reflexes were absent, also the plantar reflexes were abolished. All blood tests were normal except hemoglobin concentration which showed mild anemia. At further studies regarding trouble walking of this patient, he was candidated for lumbar disk surgery based on mild disk bulging seen at L3-L4 level in the lumbar spine MRI. Further examinations before the surgery due to approach to anemia showed severely decreased serum vitamin B12 level. The patient's symptoms improved after treating with intramuscular cobalamin. Being a very commonly seen disorder in the general population, B12 deficiency should be born in mind as a probable diagnosis in patients with peripheral neuropathy and no clear underlying cause presenting to the ED. Therefore, simple screening with a CBC might decrease the neurologic complications, morbidity and inappropriate workups through early diagnosis and treatment.

**Key words:** Vitamin B12 Deficiency, cobalamin, emergency department, dyspepsia

### INTRODUCTION

Vitamin B12 could be found in diverse types of animal proteins and it enters enterohepatic circulation after intestinal absorption. Having a body half-life of more than 1,300 days, vitamin B12 is recommended for a daily intake of 2 to 5 µg (Goebels and Soyka, 2000). Malnutrition, as a cause of deficiency, is seen more common in association with cases of chronic alcoholism, extreme vegetarianism and other forms of insufficient dietary supply, rather than pure malnutrition (Goebels and Soyka, 2000). Intestinal absorption of vitamin B12 is altered at different stages including the liberation of protein-bound vitamin B12 from proteins by gastric acid and its transfer to intrinsic factor produced by gastric parietal cells (Goebels and Soyka, 2000).

Vitamin B12 deficiency (B12D) leads to various hematological, psychiatric, ophthalmic and neurological symptoms and signs (Healton *et al.*, 1991). The full-blown clinical picture of vitamin B12D consists of macrocytic

anemia, atrophic glossitis and peripheral and central neurological complications (Toh *et al.*, 1997). These last conditions include peripheral neuropathy and optic atrophy, as well as lesions in the posterior and lateral columns of the Spinal Cord (SCD) and in the brain (Toh *et al.*, 1997). The neurological dysfunction may be the earliest and often the only manifestation of vitamin B12D (Bradley *et al.*, 2008). Nerve Conduction Velocity (NCV) and Somatosensory Evoked Potentials (SSEP) could reveal the electrophysiological signs of demyelination (Goebels and Soyka, 2000).

### CASE DESCRIPTION

This case is about a 61-year-old retired man who was admitted to Emergency Department of Imam Reza Hospital, Tabriz, Iran (Soleimanpour *et al.*, 2011) suffering from weakness and difficulty to walk for the past 6 months. Patient's symptoms had worsened in the last four weeks and he hasn't been able to walk independently anymore. He mentioned long history of dyspepsia and

became confined to his home because of gait disturbance. He denied any history of diabetes mellitus and alcohol beverage use. Within the past ten years he was prescribed atenolol and triamterene-H for hypertension and omeprazol for dyspepsia. This patient is not a vegetarian, his family history was negative for any hereditary or metabolic disorders and he complained of limbs paresthesia.

On physical examination, his blood pressure was 120/70 mmHg and he had a pulse rate of 62 min<sup>-1</sup>, a respiratory rate of 14 min<sup>-1</sup> and oral temperature of 37.1°C. Neurological examination was as following: He had mild impairment of cognitive functions, Motor strength was 5/5, muscle tone was normal in all extremities, although his pinprick and thermal senses were intact, senses of

vibration and joint position were abnormal. Patient's patellar and achilles reflexes were absent, along with abolished planter reflexes; Romberg sign was negative and cerebellar tests (finger to nose, heel to shin and rebound) were normal. Since this patient was unable to walk, tandem gait was not tested.

His hemoglobin was 9.1 g dL<sup>-1</sup> and all other blood and thyroid function tests were normal. Patient's brain MRI (Fig. 1) showed a generalized cerebral atrophy and his brain MRV illustrated thinning of left lateral sinus with signal void at sigmoid sinus in favor of thrombosis. At lumbar spine MRI (Fig. 2), he had mild disk bulging at L3-L4 level with anterior indentation of thecal sac. Patient's cervical MRI (Fig. 3) demonstrated moderate spondyloarthrosis and disk osteophyte

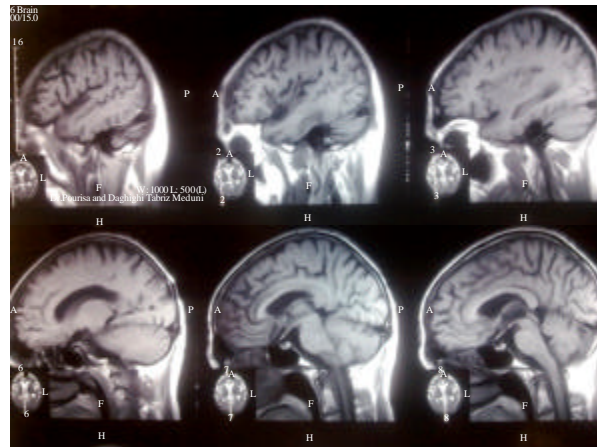


Fig. 1: Patient's brain MRI



Fig. 2: Patient's lumbar spine MRI



Fig. 3: Patient's cervical MRI

complex projection at C3-C4 and C5-C6 levels. Electroneurodiagnosis showed bilateral absent sural and ulnar Sensory Action Potentials with prolonged H-reflexes and mild-to-moderate chronic L4-L5-S1 radiculopathy.

As a result this patient ended up being a candidate for lumbar disk surgery but since the patient's symptoms were not correlated with radiologic findings, we concentrated more on mild megaloblastic anemia which showed serum vitamin B12 level low at 70.9 (normal range 191-663 pg mL<sup>-1</sup>). Serum concentration of folate and homocysteine was 20 ng mL<sup>-1</sup> (normal range 4.6-18.7, ng mL<sup>-1</sup>) and 125 mole L<sup>-1</sup> (normal range 5-15 μM L<sup>-1</sup>), respectively. Testing antibodies to gastric parietal cell and intrinsic factor, measuring serum methylmalonic acid concentration and Schilling test were not available in our country. We decided to gastroscopy the patient which was refused by him.

He was treated with intramuscular cobalamin (1 mg) once a day for seven days, once a week for 1 month, followed by monthly injections (Bradley, 2008). After 4 weeks his symptoms improved and he was able to walk alone although there were still remained mild sensory deficit. After two months, his hemoglobin slightly rose and reached above 12 g dL<sup>-1</sup>, vitamin B12 level reached 1529 pg mL<sup>-1</sup> (normal range 191-663 pg mL<sup>-1</sup>) and serum homocysteine concentration decreased to 13 mole L<sup>-1</sup>.

## DISCUSSION

Vitamin B12 deficiency can result in macrocytic anemia (Toosi *et al.*, 2008). In addition to the comprehensively-defined hematological changes of vitamin B12 deficiency, a variety of neurological

impairments have been explained (Goebels and Soyka, 2000). Neurologic abnormalities of B12 deficiency include sensory deficits, loss of deep tendon reflexes, movement disorders and neuropsychiatric changes (Toosi *et al.*, 2008). Accounting for more than 70% of the neurological symptoms, paresthesia is considered as the most common primary complaint in neurological patients (Goebels and Soyka, 2000). Our patient suffered from weakness, trouble walking, ataxia, impairment of cognitive functions and limbs paresthesia. These manifestations could be attributed to B12 deficiency (Singh and Benbadis, 2010). B12D may result from several factors: Intrinsic factor deficiency (Pernicious Anemia), deficient vitamin B12 intake (because of strict vegetarianism, alcoholism or following dietary fads), disorders of terminal ileum, competition for cobalamin (blind loop syndrome or with fish tapeworm), abnormalities related to protein digestion related to achlorhydria (abnormalities include atrophic gastritis, pancreatic deficiency, proton pump inhibitor use and Zollinger-Ellison syndrome), medications (colchicine, neomycin and p-aminosalicylic acid), increased vitamin B12 requirement (hyperthyroidism and alpha thalassemia), in AIDS and N<sub>2</sub>O exposure (Toosi *et al.*, 2008; Singh and Benbadis, 2010).

Lack of intrinsic factor, mostly assessed by the Schilling test, is known as the most common cause of impaired vitamin B12 absorption. Insufficient amount of gastric acid, another cause of vitamin B12 malabsorption frequently seen in the elderly, is characterized by inability to proteolyze vitamin B12 from other nutritional proteins in which Schilling test would be normal. This hypo or achlorhydria, found in more than 30% of patients above 60 years of age, is mostly observed in atrophic gastritis

caused by the reduction of fundus glands and parietal cell mass (Goebels and Soyka, 2000). Our patient was not a vegetarian. He did not smoke nor drink alcohol, the family history was negative for any hereditary or metabolic disorders and he had no signs or symptoms of malnutrition. We concluded that his vitamin B12 deficiency may be of Pernicious Anemia (PA) or achlorhydria due to Proton Pump Inhibitor (PPI). Because testing for antibodies to gastric parietal cell and intrinsic factor, were not available in our hospital we can not exclude PA as a causal factor.

### CONCLUSION

Being rather a common disorder especially in the elderly population, vitamin B12 deficiency is of primary presenting complaints i.e., neurologic manifestations, most significantly peripheral neuropathy. Early diagnosis is vital as numerous undesirable complications including cognitive decline and progressive, irreversible neurologic abnormalities are probable (Svenson, 2007).

We believe that this patient developed symptoms and signs of vitamin B12D due to PA or chronic use of antiacid for treatment of dyspepsia. Early diagnosis of vitamin B12D can limit morbidity and inappropriate workups and should be considered in ED.

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