



## Vitamin B12 Deficiency Presenting with Bilateral Vocal Fold Paralysis

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### Abstract

**Background:** Vitamin B12 deficiency often leads to hematological and neuropsychiatric disorders. Vitamin B12 deficiency usually begins with megaloblastic anemia. Neurological symptoms often occur later.

**Case Report:** We describe a case of 55-years old type 2 diabetic male patient with rare cause of bilateral vocal fold paralysis due to vitamin B 12 deficiency. He was under treatment of insulin, metformin and valsartan for 5 years.

**Conclusion:** Physicians should be kept in mind that long term use of metformin could result vitamin B12 deficiency when assessing the etiology of focal fold paralysis. We tried to discuss the recovering case after vitamin B12 treatment in the context of the literature.

**Keywords:** Vitamin B12 deficiency; Vocal fold paralysis; Metformin

### Introduction

Vitamin B12, also known as cobalamin, is a water-soluble vitamin. Vitamin B12 is an important vitamin which is not synthesized in the body and therefore has to be taken with diet and abundant especially in proteins of animal origin. Vitamin B12 plays an important role in DNA synthesis and in many biochemical reactions and neurological functions [1]. Vitamin B12 deficiency leads to central and peripheral neuropathies. In addition, the cranial nerves are rarely affected, but the optic nerve effected more frequently than the others [2]. The diagnosis of vitamin B12 deficiency traditionally has been based on low serum vitamin B12 levels. Increasing methylmalonic acid and homocysteine levels are a more sensitive measure for early detection of vitamin B12 deficiency. The Schilling test used for previously detection of pernicious anaemia generally has been replaced serological detection of parietal cell and intrinsic factor antibodies [3]. Inadequate intake of food (such as vegetarian diet, malnutrition), impaired cobalamin absorption (such as intrinsic factor deficiency, malabsorption syndromes), cobalamin metabolic disorders and transport disorders lead to vitamin B12 deficiency. Vocal fold paralysis is a condition that otolaryngologists often meet. The etiology of paralysis is very variable, and frequently leads to iatrogenic trauma, tumors and infections. Sometimes the etiologic factor cannot be determined. Here, we present a case of bilateralfold paralysis before developing hematological parameters of megaloblastic anemia. So, it is important to consider vitamin B12 deficiency for preventing permanent neurological damage in these patients.

### Case Presentation

A 55 year old male patient presented to the Otolaryngology polyclinic with hoarseness. Bilateral vocal fold paralysis was detected. Her history included Diabetes Mellitus (DM), diabetic neuropathy, diabetic nephropathy and hypertension. He was using insulin, metformin, gabapentin and valsartan. He does not smoke and does not drink alcohol. The patient was referred to the Nephrology polyclinic for diabetic nephropathy and increase of serum potassium. Laboratory findings were; glucose 160 mg/dL (74-105), blood urea nitrogen 16 mg/dL, serum creatinine 1,2 mg/dL, sodium 141 mEq/L, potassium 6mEq/L, vitamin B12 <50 pg/ml (191-663), folate 10.5 pg/ml (3.1-17.5), hemoglobin 13 gr/dl (13-17), thrombocyte 258.000 mm<sup>3</sup> (150.000-350.000), MCV 92fL (82-95), MCH 30pg (27-32), MCHC 33 g/dl (31-35) and peripheral smear showed hypersegmentation of neutrophils. ferritin

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level was normal. Normal anion-gap metabolic acidosis was detected in the arterial blood gas of the patient. The urine anion gap was found to be positive, and the patient was diagnosed with type 4 renal tubular acidosis. In head and neck tomography for hoarseness, there was nonspecific, moderate asymmetry at the level of the left vocal fold and no restrictive loco regional lesion was detected. Cranial magnetic resonance imaging was evaluated as normal. Electromyography was interpreted as compatible with axonal polyneuropathy. It was thought that there may be a relationship between low vitamin B12 level of the patient and vocal fold paralysis. The patient has started vitamin B12 therapy, first week once a day, later once a week for one month and then once a month intramuscular was performed. Hoarseness of the patient progressively recovered after a month of treatment. The drug (gabapentin) used for diabetic neuropathy was stopped. After 3 months, the patient's neuropathy complaints were repaired and the vocal fold were evaluated as normal.

## Discussion

Vitamin B12 is synthesized by microorganisms in the body. Vitamin B12 is the main source. In addition, it is taken from animal foods (liver, kidney and heart are rich in vitamin B12 content). Sea food contains less vitamin B12, while vegetables have very little. Vitamin B12 can be absorbed in two ways, either passively or actively when taken. Vitamin B12 is absorbed passively when it reaches the ileum and jejunum in supraphysiological quantities. It is absorbed actively by intrinsic factor when taken in physiological quantities [4]. The lack of vitamin B12 has negative effects on the central and peripheral nervous system, gastrointestinal system, cardiovascular system, musculoskeletal system, hematological and immunological systems. Symptoms of neurological (central and peripheral nerve) symptoms are manifested by symmetrical, distal sensory loss. Usually, findings begin at the feet, and then appear in the hands. Deep superficial sensory loss, loss of power in lower extremities, depending on the involvement of the motor and sensory pathways, and ataxia may develop. Pathological reflexes may occur. They also may be accompanied by hallucinations, irritability, apathy and temperament changes. It has been suggested that the mechanism responsible for neurological dysfunction is different from the mechanism of vitamin B12 deficiency leading to hematological probing. B12 vitamin acts as a coenzyme for L-methylmalonyl coenzymes mutase and methionine synthetase. Vitamin B12 deficiency results in the accumulation of methylmalonic acid and homocysteine as a result of enzymatic defect. The amount of this accumulation seems to be proportional to the severity of neurological and psychiatric abnormalities [5-7]. Vitamin B12 deficiency is characterized by hematological abnormalities in about two thirds of patients. Although neurological findings often occur later than hematologic findings, neurological findings rarely occur without hematological findings [8]. There is also a case in the literature describing vocal fold paralysis due to vitamin B12 deficiency. In this case, vocal fold paralysis was present in addition

to hematological findings [9]. Our case showed no hematological test findings of megaloblastic anemia. Since it is effective in reducing insulin resistance and cardiovascular risk, metformin is one of the first drugs selected in type 2 DM treatment. The most common side effects are gastrointestinal effects (diarrhea, metallic taste in the mouth, nausea, and feeling of discomfort in the stomach). Vitamin B12 deficiency due to long-term use of metformin has been defined. However, megaloblastic anaemia due to the lack of vitamin B12 resulting from the use of metformin has rarely been reported. Some evidence of this impaired absorption support that it changes bacterial overgrowth of metformin or intestine microbiota. In the study conducted in Type 2 DM patients, Vitamin B12 deficiency was significantly lower in patients using metformin [10].

## Result

As a result, neurological findings were detected in our patient without hematological symptoms. Vocal fold paralysis, previously described in only one event, was detected as well. Complaints of the patient who started vitamin B12 replacement were completely improved after 3 months. So, physicians should be kept in mind that long term use of metformin could result vitamin B12 deficiency when assessing the etiology of focal fold paralysis.

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