

Ascending Sensory Neuropathy caused by Mild Thiamine Deficiency after Gastric Bypass Surgery

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Abstract Bariatric surgery is the current modality of choice for weight loss in morbid obese patients. Although bariatric surgery is well known to improve obesity related complications, however, patients may be affected by early and late complications. Nutritional deficiency is one of the late complications of bariatric surgery which is more common in patients who are non compliant with dietary recommendations. American Society for Metabolic & Bariatric Surgery stresses the importance of long term regular follow up for dietary adherence assessment and nutritional deficiency screening tests. Thiamine deficiency, though rare, is increasingly seen due to increasing population of patients with gastric bypass surgery. Thiamine deficiency after bariatric surgery usually presents with neurological symptoms, most commonly as Wernicke Encephalopathy or dry Beriberi, and in almost all such cases, thiamine deficiency is very severe. Isolated ascending sensory neuropathy is a very rare presentation, which was seen in out patients with mildly low thiamine levels.

Keywords: *Ascending Sensory Neuropathy, Bariatric Surgery, Thiamine deficiency, Vitamin B1*

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1. Introduction

Vitamin B1, also known as Thiamine, is an important vitamin required for vital body functions and cellular processes. Its deficiency is widely known to cause Wernicke-korsakoff syndrome in alcoholics. In addition, it can also present with peripheral neuropathy, heart failure and infantile beriberi, which is commonly seen in third world countries where maternal malnutrition is common [1]. In advanced countries, it is most often observed in adults with chronic alcoholism, prolonged parenteral nutrition, post gastrectomy, anorexia nervosa, pregnant and lactating women and hyperemesis gravidarum [2]. Thiamine deficiency is a known complication of bariatric surgery presenting commonly as dry beriberi and Wernicke encephalopathy [3]. Pure sensory ascending neuropathy as a presenting complain of mild B1 deficiency has never been reported before. Here we report a case of Thiamine deficiency in an adult presenting with ascending sensory neuropathy after gastric bypass surgery.

2. Case Presentation

A 22-year-old female with the past medical history of pseudotumor cerebri and morbid obesity presented to emergency department with the complaints of ascending numbness involving both extremities. According to the patient, she started having numbness in the back of both legs 2 days ago, which gradually progressed to involve her

entire body below umbilicus. The patient did not have any muscle weakness or focal neurological deficit and was able to walk without assistance. She denied any fever, chills, joint pains or rashes. There was no history of any diarrhea or upper respiratory infection in the last 1 month. She denied any use of alcohol, smoke or illicit drugs. History was significant for pseudotumor cerebri for which she had spinal tap 9 months ago. All the CSF studies were normal at that time. Due to morbid obesity, the patient had Roux-en-Y gastric bypass surgery 4 months ago. Her preoperative work up including but not limited to CBC, metabolic panel, liver functions, vitamin B1, B3, B6, B12 and Copper levels were normal. She was prescribed lifelong multivitamin and micronutrients supplement but she was non-compliant with her dietary recommendations. As per patient, she did not take any multivitamins for the last 3 months. She was admitted to the hospital on the suspicion of Guillain Barre Syndrome.

On neurologic examination, cranial nerves II-XII were intact, reflexes were normal and power was 5/5 in all extremities. Sensory examination revealed loss of fine touch from toes to umbilicus. Sensations were normal above the umbilicus and in both arms. There was loss of position and vibration sense bilaterally but temperature and deep pressure sensations were intact. She was able to walk unassisted with open eyes, but got unsteady with closed eyes [Romberg test was positive]. Finger-to-nose test and heel-to-shin test were normal and Babinski sign was negative.

During the hospital stay, she had extensive neurological work up which included MRI of the brain (Figure 1),

cervical, thoracic and lumbar spine (Figure 2). MRI brain did not show any evidence of multiple sclerosis and MRI of the spines were normal. Vitamin B1, B3, B6, B12, folate, and copper levels were ordered which came back normal except blood thiamine level which was mildly low (66 nmol/L). Additional laboratory tests including Lyme serology, RPR, ANA, HIV and hepatitis panel were all normal. The rest of the investigations including CBC and complete metabolic panel were also within normal limits. She was started on oral multivitamins on the suspicion of vitamin or micronutrient deficiency, but her numbness continued to progress with involvement of bilateral breasts

next day. Differential diagnosis included Guillain Barre Syndrome for which lumbar puncture was done but all CSF studies were normal. EMG and nerve conduction studies were also ordered which came back normal. After excluding these serious neurological conditions, the diagnosis of thiamine deficiency induced ascending sensory neuropathy was made. She was continued on multivitamin. Her symptoms started to improve in a couple of days and she was symptom free in 3 weeks. She did not have any symptoms on follow up and repeat vitamin levels on follow up were normal.

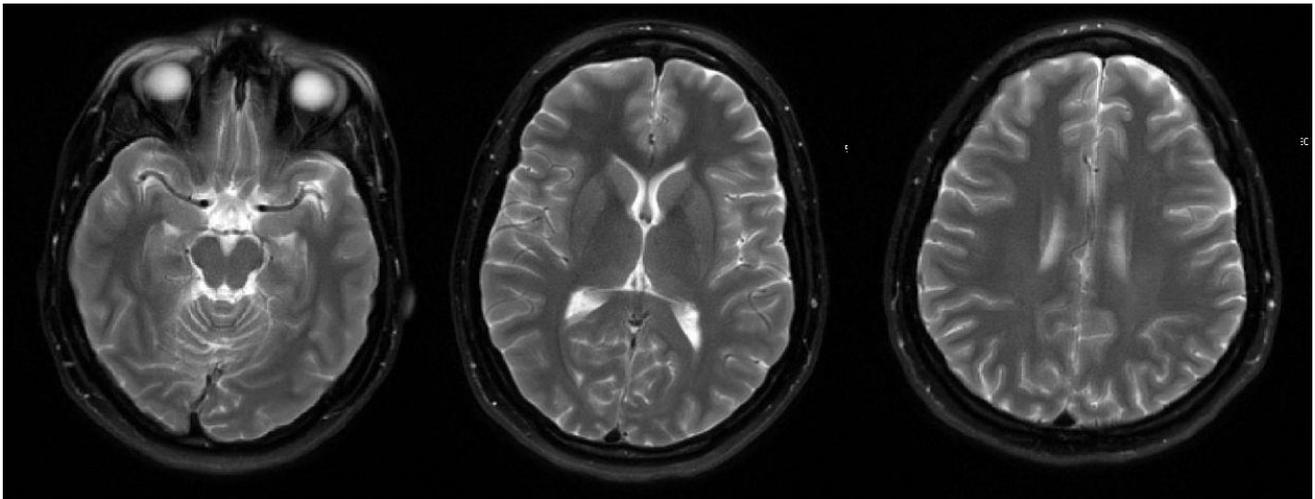


Figure 1. MRI Brain shows normal findings

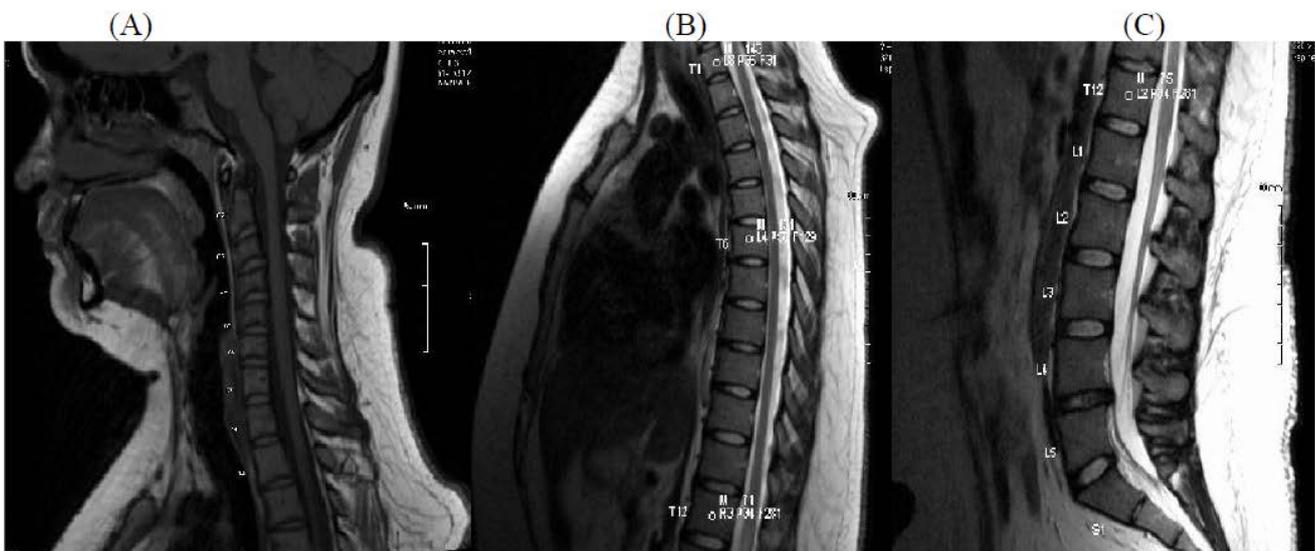


Figure 2. MRI of Cervical (A), Thoracic (B) and Lumbar Spine (C) shows normal anatomy

3. Discussion

Although Bariatric surgery is known to have multiple benefits in patients with multiple comorbid conditions including reduced or eliminated need for insulin and antihypertensive medications, reduction in lipid disturbances, improvement in degenerative joint disease, resolution of signs and symptoms of idiopathic intracranial hypertension and Obstructive sleep apnea [4]. There are some well known complications of bariatric surgery including immediate post surgical complications,

metabolic derangements, unexplained abdominal pain, small bowel obstruction, anastomotic stenosis, multiple micronutrient and vitamin deficiencies, loss of bone density, cholelithiasis and nephrolithiasis [5]. Because of the complexity of the procedures and associated complications, longterm follow up is needed including lifelong nutritional supplementation. Poor compliance to nutritional recommendations after Bariatric surgery increases the risk of post surgical complications. Obesity, itself is a known risk factor for malnutrition and 20–30% of obese patients have been shown to have micronutrient deficiencies before surgery, thus putting them at risk of

further deterioration of nutritional status after bypass. [6]. These predisposing factors combined with post surgical malabsorption can lead to peripheral neuropathy, though an immunologic mechanism has also been demonstrated in some cases of polyneuropathies of acute and subacute onset after bariatric surgery as shown by inflammatory infiltrate on nerve biopsies [6].

Post bariatric management involves multidisciplinary approach involving surgeon, nutritionist and primary care doctor. All patients should be screened for nutrients deficiency both before and after the surgery at regular intervals. These laboratory tests including vitamin B1, B3, B12 and copper levels should be done at 3 months, 6 months and then annually thereafter if initial levels were normal [7]. Thiamine deficiency can occur early after bariatric surgery due to low storage reservoir of Vitamin B1 in body. As thiamine is absorbed from duodenum and proximal jejunum, its deficiency is more common in Roux-en-Y gastric bypass and Biliopancreatic diversion/duodenal switch. Thiamine deficiency following bariatric surgery most commonly presents as Wernicke encephalopathy (WE), a neurologic condition causing encephalopathy, oculomotor dysfunction, and gait ataxia [8]. Patients may also present with dry beriberi characterized by symmetrical motor and sensory peripheral neuropathy [8]. Such patients usually complain of burning sensation in extremities associated with weakness and falls. These neurological complications are usually seen with severe thiamine deficiency and are reversible with thiamine therapy. IV thiamine followed by oral maintenance therapy is the treatment of choice in such serious cases.

Our patient presented with ascending sensory neuropathy. The differentials included any B complex Vitamin deficiency, Guillain Barre Syndrome, multiple sclerosis and copper deficiency. Patient had MRI brain and spines that ruled out multiple sclerosis. She had Lumbar puncture and EMG/Nerve conduction studies, which were normal, thus ruling out Guillain Barre Syndrome. Further tests were ordered to diagnose the cause of sensory neuropathy which came back normal. The only abnormal lab was mildly low thiamine level. Rest of the vitamin and major micronutrient levels were normal. After ruling out other common causes of neuropathy, a diagnosis of ascending sensory neuropathy secondary to thiamine deficiency was made. She was already started on multivitamins on day of admission, which was continued. IV thiamine was not used as symptoms were not severe and she did not have Wernicke encephalopathy or dry beriberi. To our surprise, her symptoms started to improve with complete resolutions in 3 weeks. She was symptom free on regular follow up.

4. Conclusion

1. The most common manifestation of Thiamine deficiency after bariatric surgery is Wernicke encephalopathy, though rare presentations of Vitamin B1

deficiency are increasingly seen due to rising population of patients with bariatric surgery.

2. Ascending sensory neuropathy is a rare presentation of thiamine deficiency, which can be seen in early stages of mild deficiency. This finding may herald more severe manifestations like dry beriberi or wernicke encephalopathy. Patient with such mild symptoms can be treated with oral multivitamin instead of high doses of IV thiamine given for other serious manifestations of severe thiamine deficiency.

3. Nutrition deficiency is a common complication of bariatric surgery that can be prevented with adequate dietary counseling of patients and regular follow up. Adherence to dietary recommendations should be assessed at each and every visit.

4. Gastric bypass surgery can be considered safe only if adequate long term follow up is provided.

Consent

Consent from patient was taken.

Conflicts of Interest

Authors declare no conflicts of interest.

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