

WERNICKE'S ENCEPHALOPATHY, REFEEDING SYNDROME AND WET BERIBERI AFTER LAPAROSCOPIC

SLEEVE GASTRECTOMY: THE IMPORTANCE OF THIAMINE EVALUATION.

Running Title: The importance of thiamine evaluation

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ABSTRACT

We described the case of a young man with morbid obesity who underwent bariatric surgery who experiences different complications. After the discharge the patient starts to complain about nausea, dizziness and visual impairment. After a first access to an emergency department, with a diagnosis of labyrinthopathy, the patient gets worse. He then has been hospitalized and a wernicke's encephalopathy was diagnosed. During the hospitalization other complication of low thiamine appeared such as wet beriberi. The clinical picture was also complicated with the refeeding syndrome. Wernicke's Encephalopathy, wet beriberi and refeeding syndrome are life-threatening conditions that can be prevented and treated. Both physicians and patients must be warned about these potential risks in order to put in act a prompt treatment

Keywords: Wernicke's encephaloipaty, bariatric surgery, sleeve gastrectomy, wet beriberi, refeeding syndrome

TEXT

Morbid obesity has been recognized by the World Health Organization as a systemic disease that, if untreated, can lead to the development of many comorbidities [1]. Despite conservative management is essential for the treatment of this disease, patients are unlikely to achieve their goal only with lifestyle changes. Bariatric surgery is widely used to manage morbid obesity, with sleeve gastrectomy being the most frequent procedure [2-4]. Neurological complications of bariatric surgery are rare and reported in only 1.3% of patients [5-6].

Wernicke's Encephalopathy (WE) is an acute neurological disorder caused by thiamine deficiency. WE is usually described in alcohol abuse but it is also associated with several other conditions such as prolonged fasting, malnutrition, malabsorption and bariatric surgery [7-11]. Thiamine is absorbed in the duodenum and proximal jejunum and, after crossing the blood-brain-barrier (BBB), is converted in thiamine pyrophosphate, the active metabolite. The latter acts in carbohydrate metabolism as a coenzyme [12-13]. The classic triad of symptoms in WE is ophthalmologic dysfunction and nystagmus, ataxia and mental status changes. Cases of WE after bariatric surgery and in particular sleeve gastrectomy are reported in literature [6, 14-25].

We describe the case of a man aged 38 with an uneventful medical history, except for morbid obesity with a body mass index (BMI) of 44.6 (Weight 143 kg, Height: 179 cm). He was a nondrinker. Due to his obesity, he underwent laparoscopic sleeve gastrectomy, after a positive preoperative evaluation performed by physicians specialized in morbid obesity. Two days after surgery the patient was discharged with a specific diet for sleeve gastrectomy patients, including a vitamin and micronutrient supplementation. A few days after discharge, the patient started to complain of nausea and vomiting, resulting in the inability to maintain the prescribed diet. About 45 days after surgery he was admitted to an emergency department complaining of fatigue, postural instability and variable diplopia without evidences of ophthalmoparesis, vertigo and difficulties of food intake due to nausea and vomiting. He was evaluated by an emergency physician and by an otorhinolaryngologist, who discharged him with a diagnosis of labyrinthitis. After two weeks he returned to the same emergency department complaining a worsening of the same symptoms. A CT scan of the brain

was performed and resulted normal. The neurological evaluation showed: patient alert, labile attention, easy distractibility, confabulant, disoriented in time and space, nystagmus in all directions, non-evaluable deambulation for ataxia. The remaining neurological status was normal. The patient was hospitalized in the neurology ward with a suspected metabolic encephalopathy (e.g. Wernicke's Encephalopathy). Blood tests yielded the following results: normal level of vitamin B12, vitamin B6: 1.4 ug/L (NV 3.6-18); vitamin B1: 20 ug/L (NV 28-85), folate: 2.2 ng/ML (NV 3.10-17), normal level of iron, copper, vitamin A and vitamin E, normal phosphorus and potassium as well as other electrolytes. The recorded body weight was 110.3 kg with a BMI of 34.4, showing a reduction in body weight of 33 kg (23% of weight loss) in about two months. At the admission, a prophylactic thiamine supplementation IV was started at the dosage of 500 mg thrice a day for the first two days, followed by IM 500 mg once a day for five days, both in combination with magnesium and other vitamins of the B-group. A NMR of the brain (Fig. 1) showed the typical alteration of Wernicke's Encephalopathy [26]. Electromyography and nerve conduction studies were normal. A follow-up MRI was performed ten days later and showed a clear improvement (Fig. 2). The evaluation of the sleeve gastrectomy and surgical procedure showed no abnormalities. The clinical picture rapidly improved after thiamine supplementation with a complete restoration after 7 days. At day 2 after thiamine supplementation the patient started an oral diet under the supervision of a nutritionist. The patient never complained again of nausea or other gastrointestinal problems. On the third day after starting the oral diet, control blood tests revealed normal glycemia and a rapid decrease in phosphorus (1.8 mg/dL NV 2.7 – 4.5) and potassium levels (3.19 mmol/L NV 3.50-5.0) configuring a refeeding syndrome [27-28]. A supplementation of phosphorus and potassium (first IV and oral, then only oral) resulted in the restoration of the correct electrolyte levels. An ECG was performed, due to fatigue and dyspnea for light efforts, coupled with a slight edema of the limbs, revealing a fall in the ejection fraction (EF, 45%). An ACE inhibitor was started (ramipril at the dosage of 2.5 mg/d) and the patient underwent a 24-hour ECG monitoring that didn't show major arrhythmias. A cardiac MRI for tissue characterization of the myocardium could not be performed because of the steric limitations of the MR gantry (the patient was overweight and a cardiac MRI requires the use of a thoracic coil). These findings suggested the presence of wet beriberi [29]. The patient was discharged to a rehabilitation center

and, after one month, had a follow-up ECG that showed a recovery of the ejection fraction to 54%. The patient no longer complained of fatigue and dyspnea and there was no evidence of limb edema.

Today, bariatric surgery represents the election procedure to achieve a considerable weight loss, coupled with a significant improvement in obesity-related comorbidities, but it can lead to a certain number of potentially life-threatening complications [14]. The purpose of this paper is to highlight some clinical aspects that could be considered as red flags in an obese patient who undergoes bariatric surgery:

- unrelenting vomiting could trigger vitamin depletion, in particular B1 that has a low retention [20-21].
- rapid weight loss after surgery must be considered a risk factor [6-15,16]. Literature reports that a rapid weight loss (30-40 kg) in three months after sleeve gastrectomy should be considered a risk factor [6]. Recurrent vomiting and excessive weight loss are perhaps the main causes for depletion of the vitamin reserve [21].
- obese patients are often malnourished. Obesity surgery can also cause malnutrition.

Bariatric surgery patients also find a healthy diet difficult to follow, both for the problems discussed above and because of their past lifestyle, potentially leading to a refeeding syndrome [28,32]. We would like to stress the importance of a close analysis of the medical history, to identify these complications as soon as possible. The European Federation of Neurological Societies (EFNS) [30] developed guidelines for the diagnosis, management and prevention of Wernicke's Encephalopathy, which must include 2 signs out of 4 of the following: 1) dietary deficiencies, 2) visual impairment, 3) cerebellar dysfunction and 4) either an altered mental status or mild memory loss [24]. When arrived, our patient fulfilled 3 criteria out of 4.

At the best of our knowledge this is the first case report that describes such a complicated clinical picture, featuring a multiple organ deficit, due to thiamine deficiency and a refeeding syndrome.

Morbid obesity is an increasingly serious health problem, due to unhealthy lifestyles. Bariatric surgery is consequently increasing and its potential complications are becoming evident. Although the number of case reports in literature is growing, it is unlikely that many practitioners have ever seen such patients [19].

Prevention is the best strategy, thus patients have to be instructed on following a healthy diet and warned on the risks related to excessive vomiting and a too rapid weight loss [18].

In conclusion we recommend to carefully monitor vomiting, percentage of weight loss and nutritional status before and after bariatric surgery. Considering the mortality and morbidity that can be caused by thiamine deficiency, we suggest to include it in the tests, especially if symptoms such as vomiting should appear. We would like to stress that, in malnourished patients, low levels of other micronutrients and electrolytes can further complicate the clinical picture. Wernicke's Encephalopathy, wet beriberi and refeeding syndrome are life-threatening conditions that can be prevented and treated. Both physicians and patients must be warned about these potential risks in order to put in act a prompt treatment [20,31].

None of the Authors have conflict of interest to declare.

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Fig1: MRI FLAIR. Hiperintensity of the mammillary bodies, periacqueductal grey matter and the thalami, typical MRI signal of Wernicke's Encephalopathy.

Fig2: MRI Flair Images showing an improvement of the neuroradiological findings.