

## Severe neurological complication following adjustable gastric banding

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**SUMMARY: Severe neurological complication following adjustable gastric banding.**

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*Aim. In the last years with the increase of bariatric surgery, first of all as a result of new indications, a rise in the incidence of nutrient-related complications has been observed. Currently little is known about the impact of post-bariatric malnutrition and neurological complications. Wernicke's encephalopathy is a severe neurological syndrome which occurs as a result of thiamine deficiency. Wernicke-Korsakoff syndrome must be considered a serious neurological complication of bariatric surgery with significant morbidity and mortality, with rapidly progressing neurological symptoms, and must be treated immediately.*

*Case report. We report the case of a 35 years-old male patient, affected by morbid obesity, anxious-depressive syndrome and alcohol use*

*disorder, who after adjustable gastric banding implanted in another hospital developed a severe malnutrition and neurological syndrome.*

*The patient showed poor adherence to the follow-up and to the dietary indications and after all, we needed to place a PEG for enteral nutrition in order to resolve the malnutrition condition and the neurological syndrome.*

*Our experience emphasizes that preoperative selection and assessment of a patient's nutritional status according to guidelines, is required to identify potential problems, and that bariatric surgeons or physicians caring for patient who have undergone bariatric surgery should be familiar with the constellation of nutritional and neurological disorder that may occur after surgery.*

*Conclusion. We want to remark the importance of preoperative selection of the patients, the follow-up and the cooperation between patient and physician in order to obtain the best result and avoid severe complications.*

KEY WORDS: Obesity - Adjustable Gastric Banding - Wernicke-Korsakoff syndrome.

### Introduction

Morbid obesity is widely diffused and influences morbidity, mortality, and quality of life of the affected individuals. Surgery could be a method of treating morbid obesity, but should be the final resort. A conservative management with diet and lifestyle modification, group psychological support and medical therapy have to be pursued first and only after these treatment have failed it's possible to resort to the surgical treatment. Therefore, surgery offers the best chance of effective long-term reduction in BMI for many morbidity obese patients. The incidence of bariatric surgery is increased a lot in the last years, first of all as a result of new indication in-

cluding diabetes mellitus, idiopathic intracranial hypertension (1, 2). The selection of the patients is very important and international guidelines describe contraindications specific for bariatric surgery (3).

However, bariatric surgery is not without complications: on one hand there are complication due to the surgical procedure, such as bleeding or infection, on the other hand complications related to nutritional deficiency (4). Nutritional deficiencies are a consequence of alteration in the structure of the gastrointestinal tract, but they may also occur due to reduce food intake, inadequate diet, vomits or prolonged parenteral feeding. Malnutrition after bariatric surgery is related to protein and vitamins deficiency. Wernicke's syndrome is an acute neurological disorder due to deficiency in vitamin B1 and it has been already described by many authors as the most common neurological complication after bariatric surgery (5-7).

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## Case report

A 35-years-old male patient, 169 cm high, weighing 108 Kg (BMI 37.81), affected by morbid obesity. The patient medical record included anxious-depressive syndrome, alcoholism, arterial Hypertension, type II diabetes mellitus and dyslipidemia.

In 2006, the patient underwent gastric banding in a different center from our Unit. Ten days after surgery, an early and forced calibration of the gastric banding was performed. The intervention resulted in 35 kg weight lost in the first three months after surgery. After this first period, the patient weight decreased slowly.

The patient showed poor adherence to follow-up from the beginning, so the patient's condition could not be monitored regularly.

Two years after surgery, he was admitted to a neurological department because of the appearance of an ideomotor slowdown, dysarthria, tremors and strength deficit in the lower limbs, postural and ambulation instability, episodes of accidental falls. The patient performed blood tests, CT brain and MRI brain scan, which were negative. A diagnosis of "Korsakoff's syndrome and exotoxic polyneuritis in chronic alcohol abuse" was formulated.

In March 2009 the patient was visited for a clinical re-evaluation. EGD diagnosed a "water-melon (petechial) gastropathy of the fundus and at the site of the banding". Therefore we performed a partial desufflation of the banding from 8.5 to 3 cc. He never showed up at follow-up again.

In June 2013, the patient was re-admitted because of severe dysphagia with episodes of ab ingestis pneumonia. He was, therefore, subjected to complete desufflation of the gastric banding. The esophagogastrroduodenal transit with water-soluble contrast showed an incoordination in the swallowing with bronchial aspiration and normal esophagogastric transit (Figure 1). Blood tests showed malnutrition with Vitamin B12 deficiency and hyperhomocysteinemia. CT brain and MRI brain scan were negative. Electromyography (EMG) diagnosed a sensory-predominant polyneuropathy. Because of the malnutrition condition, a PEG was placed for enteral nutrition.

In the period between June and December 2013, there was a rapid improvement in both neurological and psychiatric symptoms and dysphagia. The patient resumed oral spontaneous nutrition. In Jan-



Figure 1 - Incoordination of swallowing with bronchial aspiration of contrast medium. Normal esophagus-gastric transit.

uary 2015, both PEG (Figure 2) and gastric banding were removed. The patient has not returned to our observation.

## Discussion

Nutrient deficiencies are common after bariatric surgery. With the increase in bariatric surgery in recent years, a rise in the incidence of nutrient-related complications has been observed (3).

Currently little is known about the impact of the post-bariatric course of macro or micronutrient deficiencies, especially the B-group vitamin and related neurological complications.



Figure 2 - Laparoscopic view of PEG site.

Vitamin B12 is primarily absorbed in the terminal ileum, aided by intrinsic factor secreted from the antrum of the stomach (3). Deficiencies in vitamin B12 are more widely associated with malabsorptive operations (7-9).

Thiamine is absorbed in the proximal portion of the duodenum, although preferentially in the most acidic environment (10). The thiamine deficiency is often resulting from a decreased acid production, restriction of food intake and frequent vomiting (11).

Thiamine pyrophosphate is an important enzyme co-factor in the Krebs's cycle. Biochemical deficiency can be demonstrated within a few weeks of cessation of thiamine intake because of tissue storage of vitamin B1 is minimal.

Prolonged and severe, thiamine deficiency results in brain cell death. Possible mechanisms involved include compromised cerebral energy metabolism and focal accumulation of lactate, both of which could result from decreased activities of alpha KGDH. Vitamin B<sub>1</sub> deficiency alters mitochondrial function, impairs oxidative metabolism, and causes selective neuronal death by diminishing vitamin B<sub>1</sub>-dependent enzymes (12).

In addition, it is proposed that brain cell death in severe thiamine deficiency may result from excessive release of excitotoxic amino acids (13).

Vitamin B1 deficiency results in peripheral neuropathy, ophthalmoplegia and nystagmus, ataxia and may lead to permanent impairment of recent memory. In 1881 Wernicke was the first to describe the clinical manifestations of what would later be recognized as an acute reaction to thiamine deficiency (14). Wernicke's encephalopathy is characterised by dietary deficiency, oculomotor abnormality, cere-

bellar dysfunction, such as ataxia, and confusion or mild memory impairment, while Korsakoff's syndrome consists of disorientation, confabulation, and limited insight. These conditions were first described separately, however, their similar neuropathology led to the conclusion that they represent the acute and chronic phases of the same thiamine-deficiency syndrome (15). This condition is typically described in the setting of alcohol abuse and it is due to insufficient dietary intake of vitamin B1 over a long period.

The mechanism by which bariatric surgery lead to vitamin B1 deficiency is almost certainly persistent vomiting, rapid weight loss and inadequate vitamin repletion. Cases of bariatric surgery-related Wernicke's encephalopathy often involve non-specific neurological symptoms and are primarily diagnosed clinically with no definitive neuroimaging abnormalities (14).

Bariatric surgery can be classified as a restrictive procedure, such as Sleeve Gastrectomy or adjustable gastric banding, or as a malabsorptive procedure, such as Roux-en-Y gastric bypass. Even if nutritional deficiencies are a common consequence of malabsorptive procedure, the risk of malnutrition and related neurological complications must not be underestimated after restrictive procedures. Wernicke's encephalopathy has been described in obese surgically-treated patients with malabsorptive procedures but also in patients who have undergone gastric restrictive surgery including adjustable gastric banding (16).

The time between stopping thiamine absorption and the clinical signs onset is usually a few weeks, but in some cases it may take several months or even

a few years (7, 8).

The diagnosis of Wernicke's encephalopathy remains essentially clinical; clinical symptoms and signs can be very vague, but mostly related to prolonged post-operative vomiting and a rapid altered mental status. The sensitivity and specificity of blood and urinary tests in symptomatic patients are limited and the measurement of serum thiamine is not a part of routine laboratory analysis.

Radiological examination by MRI is the diagnostic tool of choice but it has a sensitivity of 53% and MRI findings are not diagnostic in all cases.

Routine thiamine screening is not recommended after bariatric surgery but should be considered for patients who use alcohol, receive parenteral nutrition, or experience rapid weight loss, intractable vomiting, neuropathy and encephalopathy,

Wernicke's encephalopathy is an acute neurological complication to which bariatric surgeons and clinicians have to be sensitized in the early stage of bariatric surgery and that must be suspected at the first neurological sign and in case of persistent vomiting in order to urgently start intravenous treatment to avoid serious sequelae (17). Only quick diagnosis and prompt treatment with intravenous or intramuscular thiamine administration could avoid a fatal outcome.

## Conclusion

The gastric banding is a valid procedure to control morbid obesity. However, this case-report confirms that it must represent the last therapeutic choice.

The pre-operative assessment in patients scheduled to undergo surgery is very important for therapeutic success. Psychiatric disability is an important factor that negatively affects the patient's response to control protocols for clinical monitoring. In fact, a poor compliance can be observed in patients with psychiatric history, as happened for the case described, even if there is a favorable opinion from the psychiatrist.

The gastric banding requires a close follow-up also to ensure proper calibration. In the case-report the patient was subjected to an early and forced calibration, because of his basic conditions. Missed follow-up, because of poor compliance, is a factor of possible therapeutic failure. Inadequate bandaging calibration can be responsible for eating disorders.

Vitamin deficiencies with associated hyperhomocysteinemia often result from malnutrition, poor diet and alcoholism. Chronic alcoholism, however, can be responsible for the Wernicke's Syndrome by itself. It may be a confounding factor compared to the formulated diagnosis. In the case report, Wernicke's Syndrome occurred only after the gastric banding.

Wernicke's encephalopathy is an acute neuropsychiatric condition caused by an insufficient supply of thiamine (Vitamin B1) to the brain. Wernicke's encephalopathy can result from dietary deficiency alone and this form is usually successfully treated (18).

In our experience, a rapid improvement was observed with the help of the PEG. However, conditions of poor compliance and difficulty in ensuring adequate follow-up may necessitate to remove the gastric band.

Since increasing numbers of people are undergoing bariatric surgery, surgeons who treat morbid obesity must select patients according to International Guidelines and must follow the metabolic and nutritional status of the patient after surgery.

Persistent vomiting after gastric restrictive operations should be considered alarming and be treated appropriately immediately.

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