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POST-OPERATIVE EFFECTS IN REDUCING ROUX-Y GASTROPLASTY: VITAMIN DEFICIENCY AND OTHER CONSEQUENCES

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Abstract: Obesity has been considered as a chronic disease with a high level of surplus in recent times. Due to this disease, many people are being directed to undergo the procedure of reducing gastroplasty using the bypass in Y-DE-ROUX (RYGB), as it is a metabolic or mixed surgery, where the metabolism becomes faster, helping to lose weight at long term. As a result of this method, patients undergoing this method suffer from vitamin deficiency, since the part of the intestine where the greatest absorption of vitamins occurs is isolated due to the method used. This work aims to bring more consistent and comprehensive information about gastric bypass with the Y-DE-ROUX bypass method and about the vitamin deficiencies that this technique causes, from information about obesity to the consequences of the post-surgical period. This way, we carry out a narrative review in order to respond to the proposed objective, being carried out analysis, critical evaluation and integration of the published literature on the subject, using websites, articles and magazines, so that the objective is achieved, making a maximum survey of information. necessary for people, both lay people and health professionals, to understand the described subject.
Keywords: Gastric bypass, obesity; reduction gastroplasty; vitamin deficiencies.

INTRODUCTION

Obesity is classified as a chronic disease and can be caused by social, genetic, multifactorial and psychological factors, as described by the World Health Organization (WHO). For this reason, patients must be followed up by a multidisciplinary team.

Before obese patients are selected for bariatric surgery (BC), they need to undergo some treatments with specialists, such as nutritionists, psychologists and pharmacologists. If the patient tries these treatments for 5 years and is not successful, he can perform BC, as long as he meets the medical requirements (CONSELHO FEDERAL DE MEDICINA, 2005).

RYGB reduction gastroplasty has been one of the safest techniques, as it is a mixed surgery, which restricts the size of the gastric cavity, reducing the amount of food ingested; as the intestine also undergoes this superficial reduction, nutrient absorption (disabsorption) deficiency occurs, also altering its metabolism (ZILBERSTEIN, 2019).

After surgery, it is necessary to supplement micronutrients through food and multivitamins, so that the levels of body stocks are desirable. It is important to note that some nutrients must be mixed for maximum absorption. Patients who undergo Roux-en-Y gastric Baypass suffer from greater vitamin B12 and iron deficiency. A clinical-nutritional follow-up is necessary, both pre and postoperatively, aiming at the success in the treatment of nutritional replacement, causing weight loss with health (BALDEZ, 2020).

A marked deficiency that can occur after surgery is that of vitamin B1 (thiamine), which causes very prolonged vomiting and some serious neurological disorders - in some cases, irreversible. For this reason, it is treated with vitamin B complex supplementation, and the oral use of 20-30 mg of thiamine a day, which can be extended in more severe cases, to 50-100 mg a day, for intravenous or intramuscular use (ARAGÃO, 2013).

Vitamin B12 deficiency triggers the deficiency of the B vitamins, with vitamin B9 (folic acid) also being affected. Storage can be exhausted within a few months post-surgery if the patient is not supplementing, either by multivitamins or by ingestion of foods rich in folic acid (dark green vegetables, fruits, cereals) (BRESSAN, 2011).

Vitamin B12 deficiency can cause megaloblastic anemia, as this vitamin is responsible for the conversion of methylmalonic acid to siccinyl-coenzyme A and the conversion of homocysteine to methionine. With this dysfunction, there is an increase in methylmalonic acid and homocysteine, signaling that something is wrong with the absorption of vitamin B12 (ROCHA, 2012).

With the reduction of the stomach, it becomes difficult to absorb calcium carbonate, due to the need for a more acidic environment. For this reason, calcium and vitamin D supplementation is necessary, with the objective of bone resorption (ARAGÃO, 2013).

Iron is an essential nutrient for humans, essential for all living cells and is involved in several metabolic processes, being a component of the Krebs cycle, participating in oxygen transport and blood formation, energy production, immune function, cell growth, DNA and neurotransmitter synthesis (YANOFF, 2007).

Zinc is absorbed in the duodenum and proximal jejunum. Deficiency of this vitamin is associated with the cause of diarrhea, hair loss, emotional disorders, weight loss, recurrent infections, dermatitis and, in men, hypogonadism (FRANCO, 2013).

Dumping syndrome affects patients who underwent gastroplasty with the Roux-en-Y intestinal bypass method, also considered metabolic surgery. This syndrome occurs due to the rapid passage of foods with large concentrations of fats and/or simple carbohydrates from the stomach to the intestine. Symptoms can be characterized by: nausea, vomiting, flushing, epigastric pain and symptoms of hypoglycemia (LUIZ, 2012).

The postoperative period of BC has both good and bad consequences, because the body does not ingest more food than before, and eliminates a significant amount of adipose tissue from the body, consequently, requiring less of body functions, with good changes in the body. metabolism and body functioning (MORAIS, 2021).

MATERIALS AND METHODS

In order to carry out this narrative review in order to respond to the proposed objective, an analysis, critical evaluation and integration of the published literature on the subject were carried out. In this sense, this review was elaborated from an electronic search, from LILACS, MEDLINE, PubMed, Scielo, URI ERECHIM, PUC online library, Google Scholar databases; due to the recognition in the scientific context of these platforms. The research was carried out by means of a survey of theoretical references in journals, scientific articles, dissertations that gathered and synthesized information about the physiology and evaluation of evidence on the importance of vitamin D and others, in the therapy of some diseases and in the human organism, using 29 references, including articles, magazines and websites.

Inclusion criteria were used: articles published in Portuguese, English and Spanish; online; with availability of access and publications carried out between 2003 and 2021, which had relevant information for the study. Descriptors were used, such as: "vitamin D", "deficiency", "metabolism", "bariatric surgery", Y-DE-ROUX", "importance", in addition, bibliographies with information not relevant to the objective of the work were excluded. and those in which they were incomplete.

DEVELOPMENT

Currently obesity is already considered a chronic disease, of which individuals who have excess amount of adipose tissue are diagnosed. This disease can be caused by social, genetic,

multifactorial and psychological factors. Obesity is considered one of the most serious diseases of public health, causing greater amounts of gastric bypass performed. The World Health Organization states that in Brazil this chronic disease has increased by 72% in the last thirteen years, from 11.8% in 2006 to 20.3% in 2019.

According to the IBGE (2020), the proportion of obese people in the population aged 20 years or older more than doubled in the country between 2003 and 2019, from 12.2% to 26.8%. In this period, female obesity rose from 14.5% to 30.2%, while male obesity rose from 9.6% to 22.8%.

Obesity is associated with chronic low-grade inflammation that is mediated by increased release of pro-inflammatory cytokines from adipose tissue (LOPES, 2019).

PREREQUISITES FOR REDUCTION GASTROPLASTY

Before obese patients are selected for bariatric surgery (BC), they need to undergo some treatments with specialists, such as nutritionists, psychologists and pharmacologists. If the patient tries these treatments for 5 years and is not successful, he can undergo CB, as long as he meets the medical requirements. As requirements we have: patients over 18 years old, who have a BMI between 35 and 40, proving comorbidities such as: hypertension, dyslipidemia, type 2 diabetes, sleep apnea and hormonal dysfunctions. When the BMI is above 40, there is no need to prove comorbidities, since it is already considered severe obesity grade III or morbid obesity (CONSELHO FEDERAL DE MEDICINA, 2005).

Surgery can be performed when the patient has a multidisciplinary team with specialists - psychologist, psychiatrist, endocrinologist, cardiologist, pulmonologist and nutritionist - who will accompany him in the pre and post-surgical period, as it is necessary to minimize possible complications, such as: psychological disorder and metabolic disorders. One of the main professionals needed in the postoperative period is the psychologist, since psychological disorders such as image distortion, depression, anxiety, among others, occur after surgery, due to the fact that an erroneous expectation is created about a process. rapid weight loss and perfection that, in reality, does not happen. In addition to going through a lot of psychological pressure, because of the standards that society imposes (MARIA, 2018).

BYPASS REDUCTION GASTRO-PLASTY IN Y-DE-ROUX

This method was developed in 1960 with a focus on weight loss, which consisted of partially removing the stomach due to ulcers. A few decades passed and this technique was perfected using a part of the intestine, thus becoming called Roux-en-Y Gastric Bypass (RYGB). To reduce postoperative complications in severely obese patients, the laparoscopic method was developed. In laparoscopy, 5 to 6 incisions are made. A small gastric pouch is created that, when the patient ingests food, distends it, bringing the feeling of satiety. Weight loss after the standard 75cm ROUX-Y-Bypass (RYGB) is 65 to 70% of excess body weight and approximately 35% of BMI. In this technique, surgical mortality is 0.5% when performed by competent professionals. 5% of morbidities are: pulmonary embolism, hemorrhages and infections. Long-term complications that may occur are Dumping syndrome, ulcer, staple rupture, stomach stenosis and internal hernias (NOVAIS, 2007).

RYGB reduction gastroplasty has been one of the safest techniques, as it is a mixed surgery, which restricts the size of the gastric cavity, reducing the amount of food ingested; as the intestine also undergoes this superficial

reduction, nutrient absorption (disabsorption) deficiency occurs, also altering its metabolism (ZILBERSTEIN, 2019).

VITAMIN DEFICIENCY

Patients who undergo this surgery lose weight due to reduced diet and poor absorption of nutrients; 25% are proteins and 72% fat that will undergo malabsorption (AZEVEDO, 2011). Nutrients that depend on dietary fat to be absorbed, such as fat-soluble vitamins and zinc, are the most affected in absorption due to Bypass. According to SBCSaúde (2021), nutritional deficiencies can be avoided if a multidisciplinary team regularly assists the patient. Malnutrition is usually reversed with nutrient supplementation as it is promptly diagnosed. The regulation of biological functions of the body that regulate weight depend on vitamins and minerals. The importance of this micronutrient absorption is weight loss control, which will regulate appetite, hunger, nutrient absorption, metabolic rate and more.

After surgery, it is necessary to supplement micronutrients through food and multivitamins, so that the levels of body stocks are desirable. It is important to note that some nutrients must be mixed for maximum absorption. Patients who undergo Roux-en-Y gastric Baypass suffer from greater vitamin B12 and iron deficiency. A clinical-nutritional follow-up is necessary, both pre and postoperatively, aiming at the success in the treatment of nutritional replacement, causing weight loss with health (BALDEZ, 2020).

Vitamins and minerals are essential for adjusting body weight by regulating appetite, hunger, nutrient absorption and thyroid functions. With a view to long-term follow-up of patients, nutrient replacement will have to be made through food along with multivitamins to have a more effective result. Non-supplementation can put surgery at risk due to micronutrient deficiency. This follow-up must be done over the long term. Supplementation must be done at least five days a week to be successful, but about 33% of patients do not, and 7.7% stop using supplementation after two years of surgery (BORDALO, 2011).

VITAMIN B1

A marked deficiency that can occur after surgery is that of vitamin B1 (thiamine), which causes very prolonged vomiting and some serious neurological disorders - in some cases, irreversible. For this reason, it is treated with vitamin B complex supplementation, and the oral use of 20-30 mg of thiamine a day, which can be extended in more severe cases, to 50-100 mg a day, for intravenous or intramuscular use (ARAGÃO, 2013).

The Wernicke-Korsakoff syndrome is a kind of amnesia, it presents itself with the deficiency of vitamins of the B complex, manifested through ophthalmoplegia, which is the paralysis of the external straight muscles of the conjugated gaze, ataxia, mental and consciousness disorders (BORDALO, 2011).

VITAMIN B9

Vitamin B12 deficiency triggers the deficiency of the B vitamins, with vitamin B9 (folic acid) also being affected. Storage can be exhausted in a few months post-surgery if the patient is not supplementing, either by multivitamins or by ingestion of foods rich in folic acid (dark green vegetables, fruits, cereals). In about 6% to 65% of patients, a decrease in this vitamin was observed, which may lead to microcytic anemia, leukopenia, thrombocytopenia and megaloblastic marrow, because the absorption of vitamin B9 takes place in the duodenum, as mentioned above, this portion of the intestine does not It has more possibility of absorption, making

it necessary to treat it with 1000 ug/d of folic acid for a period of two years, with this it will be necessary to check the levels of vitamins, maintaining the supplementation (BRESSAN, 2011).

VITAMIN B12

As the production of gastric juice is reduced, the conversion of pepsinogen into pepsin, necessary to release the vitamin B12 that is present in protein foods, does not occur. Intrinsic factor is produced in the stomach through parietal cells. When the production of the intrinsic factor produced - which occurs with the reduction of the gastric compartment - is insufficient, vitamin B12 is not absorbed in the distal ileum, causing pernicious anemia. Often after BS, vitamin B12 deficiency is reported, ranging from 12-75%. Low vitamin B12 in the body can only be noticed after 6 months of CB, it is common for levels to drop after 1 year or more, it occurs when there is no longer stored in the liver. There are reports that up to 10 years after surgery, this deficiency will still occur (BORDALO, 2011).

Vitamin B12 deficiency can cause megaloblastic anemia, as this vitamin is responsible for the conversion of methylmalonic acid to siccinyl-coenzyme A and the conversion of homocysteine to methionine. With this dysfunction, there is an increase in methylmalonic acid and homocysteine, signaling that something is wrong with the absorption of vitamin B12 (ROCHA, 2012).

Anemia develops in about 37% of patients within twenty months after surgery, where the most affected are women. Microcytic anemia develops in 18% of patients, normocytic anemia in 12%, and macrocytic anemia in 7%. This deficiency was presented after six months of surgery (AMARAL, 2010).

According to ROCHA (2012), the Wernicke Korsakoff Syndrome (SWK) is common, which causes a form of amnesia, an acute confusion, soon after the postoperative period or with the ingestion of alcohol after 13 years of BS.

CALCIUM VITAMIN

With the reduction of the stomach, it becomes difficult to absorb calcium carbonate, due to the need for a more acidic environment. For this reason, calcium and vitamin D supplementation is necessary, with the objective of bone resorption (ARAGÃO, 2013).

According to Bordalo (2012), calcium citrate intake is indicated because it is more bioavailable than calcium carbonate, at a dosage of 500mg per day, together with 125 IU of vitamin D3-cholecalciferol for better absorption. With this, a reduction in parathyroid hormone (PHT) is obtained, which regulates calcium homeostasis, replacing it with 400 to 800 IU of vitamin D associated with 1200 mg of calcium carbonate.

When there is a deficiency in the preoperative period, supplementation of a dose of 5,000 IU of vitamin D (cholecalciferol) in oral use must be started, once a week, for a period of eight weeks. In the case of the postoperative period, a dosage of 2,000 IU of vitamin D per week is used, and the preoperative dosage can be maintained. In severe cases, a dosage of 50,000 to 100,000 IU per day will be used (TOREZAN, 2013).

IRON

RYGB results in the reduction of parietal cells and gastric juice secretion, due to the reduction of the stomach body and exclusion of sites where there is greater absorption, such as the duodenum and proximal jejunum, interrupting the conversion of ferric iron to iron. ferrous. It is necessary to follow up with the nutritionist and endocrinologist to carry

out recurring tests (blood count and ferritin) to guide the professional in the decision of what will be the best supplementation, which can be done through sulfate, fumarate or iron glucanate, orally. For patients who are unsuccessful with oral treatments, they will have to use the parenteral route to treat the deficiency. Noting that iron cannot be administered together with calcium due to interaction (MORAIS, 2015). Patients who undergo CB experience more difficulty in eating red meat, where the highest iron content is found and, consequently, have iron deficiency anemia (TRAINA, 2010).

Iron is an essential nutrient for humans, essential for all living cells and is involved in several metabolic processes, being a component of the Krebs cycle, participating in oxygen transport and blood formation, energy production, immune function, cell growth, DNA and neurotransmitter synthesis (YANOFF, 2007).

The ideal supplement is to administer 1 to 2 tablets per day – Iron (ferrous fumarate) > 18 mg, together with vitamin C, which increases the acidity of the gastrointestinal tract by facilitating the conversion of ferric iron to the ferrous form, as a method of absorption. However, there are several types of iron supplementation such as: dietary iron, with 33% of ferrous fumarate; iron sulfate, with 20% iron, and ferronyl, with 98% iron. Not only iron deficiency, but also copper deficiency can cause anemia. Therefore, supplementation with 900ug/d of copper is necessary, preventing or treating anemia. Many patients experience nausea and vomiting after eating red meat, and this is a source of iron bound to the basolateral membrane of the duodenum and, after surgery, a good part of patients become intolerant, causing iron deficiency anemia (STEENACKERS, 2018).

ZINC

Zinc is absorbed in the duodenum and proximal jejunum. Deficiency of this vitamin is associated with the cause of diarrhea, hair loss, emotional disorders, weight loss, recurrent infections, dermatitis and, in men, hypogonadism (FRANCO, 2013). According to Davis (2007), it must be used to prevent the use of multivitamins with an additional dose of 6.5 mcg/day of zinc.

DUMPING SYNDROME

Dumping syndrome affects patients who underwent gastroplasty with the Roux-en-Y intestinal bypass method, also considered metabolic surgery. This syndrome occurs due to the rapid passage of foods with large concentrations of fats and/or simple carbohydrates from the stomach to the intestine. Symptoms can be characterized by: nausea, vomiting, flushing, epigastric pain and symptoms of hypoglycemia (LUIZ, 2012). They can be late and early; early dumping occurs from 30 to 60 minutes after the meal and late dumping from 1 to 3 hours after the meal. The only method for the patient not to suffer the effects of this syndrome is to rest (if he is going through such an event) and definitively remove from the diet the foods that contribute to dumping.

Late symptoms relate to increased insulin, then hypoglycemia, where it alters hormones like glucagon. But these side effects are considered beneficial as they help in weight loss where food intake is restricted. As an initial therapy, patients have small meals throughout the day, reaching up to six meals a day, avoiding the intake of sugars due to their rapid absorption, and it is not recommended to drink water after two hours of eating.

POST-SURGICAL CONSEQUENCES

The postoperative period of BC has both good and bad consequences, because the

body does not ingest more food than before, and eliminates a significant amount of adipose tissue from the body, consequently, requiring less of body functions, with good changes in the body. metabolism and body functioning (MORAIS, 2021). Improving the respiratory system, considerably reducing asthma attacks and sleep apnea; in the cardiovascular system there is a decrease in systolic and diastolic pressure, making the patient less likely to have hypertension and infarction, also altering cholesterol, reducing the "bad" (total, triglycerides, uric acid) and increasing the "good" (HDL); endocrine alterations, as in diabetic and non-diabetic patients, having a decrease in blood glucose levels. As bad consequences we have the gastrointestinal alterations, which are: gastrojejunostomy stenosis, gastrogastric fistulas, gastric ulcer, small intestinal obstruction, dumping syndrome, diarrhea and vomiting; desorption, resulting in a deficiency of vitamin B12, iron, D, calcium and zinc. Psychiatric changes also occur with weight loss; which can generate image distortion, binge eating, increased anxiety and depression, for not meeting all expectations (ILIAS, 2007).

CONCLUSION

This informative descriptive literature review aimed to raise, expand and complement the knowledge about the postoperative effects of ROUX-Y gastric bypass surgery, concluding that obesity is a chronic disease, considered a worldwide epidemic, causing morbidly obese patients to require reduction gastroplasty. In the present study, specifically on the Y-DE-ROUX method, which results in vitamin deficiencies, supplementation is necessary. Dumping syndrome, which occurs due to the direct passage of macromolecules of fats and/or complex carbohydrates, which are not properly digested, causes the patient to have undesirable signs and symptoms. However, BC brings a reduction in body fat and a decrease in glycemic indices and cholesterol, bringing other benefits.

As for the pharmacist, as he has a greater domain of knowledge about pharmacology (pharmacokinetics and pharmacodynamics), he must follow the patient in a clinical way, having all the information, results of previous exams and pathologies. Always helping with information, solving doubts and monitoring so that, if necessary, refer and direct the patient to a specialist doctor, or if there is a possibility, change the dosages of vitamins and minerals, or even changing them.

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