



Cirurgia bariátrica e metabólica, diferentes técnicas cirúrgicas e suas implicações

Bariatric and metabolic surgery, different surgical techniques and their implications

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ABSTRACT

Introduction: The global increase in obesity has led to an increasing prevalence of this health condition, associated with several clinical conditions. Management of obesity may include changes in lifestyle, use of medications, or surgical intervention such as bariatric surgery. Among

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the surgical techniques most used in this context, the gastric bypass procedure stands out, which is recognized for its efficacy in reducing weight and improving associated comorbidities.

Methodology: A literature review was conducted in the PubMed database, covering articles published from 2010 to 2022. The research used key terms such as "gastric bypass", "obesity", "comorbidities" and "effects". **Results and Discussion:** The analyses carried out in the studies showed that the gastric bypass procedure is an effective strategy in the approach to obesity, promoting a significant weight reduction and contributing to the improvement of coexisting conditions such as diabetes, hypertension, dyslipidemia and sleep apnea. In addition, gastric bypass has favorable effects on quality of life and decreased mortality rates. Although its efficacy is remarkable, the indication of gastric bypass requires careful evaluation, taking into account the severity of obesity and the presence of coexisting conditions. Patient awareness of the risks and benefits of this procedure is imperative, as well as the need for follow-up by a multidisciplinary team after surgery. **Conclusion:** The gastric bypass procedure emerges as a safe and effective option in the treatment of obesity, exerting a positive impact on weight reduction, improvement of coexisting conditions and quality of life of patients. However, the importance of careful selection for the indication of this technique, as well as continuous supervision by a multidisciplinary team after surgery, is emphasized.

Keywords: Gastric bypass, Obesity, Comorbidities, Effects.

INTRODUCTION

Acute mesenteric ischemia is characterized by a sudden cessation of blood flow, and it is known that this vessel is the main responsible for the vascularization of the small intestine, thus resulting in a rapid abdominal emergence. This obstruction to blood flow can trigger complications, such as necrosis or intestinal infarction, in addition to presenting a significant risk of death to the patient. For a more in-depth understanding of the pathological mechanisms, it is necessary to perform a brief review of the anatomical structures that make up the mesenteric circulation. The main vessels include the Celiac Trunk, the Superior and Inferior Mesenteric Arteries (SMA), as well as collateral vessels that originate from this vascular system and ensure adequate perfusion of the entire small intestine. The celiac trunk (CT) plays a crucial role in the irrigation of the gastrointestinal tract (GIT), encompassing the esophagus and duodenum, while the superior and inferior mesenteric lead to the rest of the distal segments. Drainage occurs through the superior and inferior mesenteric veins, which join the splenic vein to form the portal vein. Occlusion can result from occlusive or non-occlusive means, abruptly interrupting blood flow in any of these vascular structures. The existing pathophysiological mechanisms are arterial embolism or thrombosis, venous thrombosis and non-occlusive origin (BARROS, 2018); (BALA, 2022). In general, the most common etiology of this condition is an embolic occlusion of the superior mesenteric (SMA). In these cases, approximately 1/3 of the patients have a previous history of an embolic event, which may also occur in association with other arterial



embolisms, and it is common for the embolus to result from an atherosclerotic disease of the superior arteries, such as the aorta. However, they can also have their origin in the dysfunction of other structures, such as the atrium or left ventricle. In general, the preferred site of emboli are the regions of vascular narrowing, often located 3-10 cm distal to the origin of the SMA, thus sparing the proximal jejunum and colon. More than 20% of cases are associated with concomitant emboli in other arterial beds, such as the spleen and kidney (BALA, 2022). With regard to arterial thrombosis, there is usually an association with coronary artery disease, a pathology that affects about 20% of the elderly population. The main mechanism of flow obstruction is arterial stenosis, which progressively reduces arterial lumen. Clinically, ischemia is recognized when it reaches about 70% of the vessel diameter. In cases like these, an acute presentation can be experienced if the plaque ruptures abruptly or due to severe dehydration. Venous thrombosis is the least common cause of this condition, and reduced irrigation occurs with decreased venous return, resulting in a visceral wall edema. This compromises perfusion and leads to reduced flow in multiple affected segments. Thrombotic phenomena result from systemic disorders such as prothrombotic states, direct injury to the vessel wall, and venous stasis, known as Virchow's Triad. However, up to 49% of cases may have an idiopathic etiology. Finally, there are also other causes, such as non-occlusive arterial and venous thrombosis, which result from a vasoconstriction of the splanchnic arteries due to stenosis of some adjacent structure. Other common causes are hypovolemia, severe heart failure, sepsis, prolonged use of vasoconstrictors, extensive surgeries, or hypotension caused by prolonged dialysis (BARROS, 2018); (MARTINI, 2022).

Currently, Acute Mesenteric Ischemia has an incidence of 10 per 100,000 people per year. In addition, there is an exponential increase with aging, a fact that arouses concern, since, in the current Brazilian scenario, there is an inversion of the age pyramid with growth in the elderly population. The main problem is the high mortality resulting from this condition, recorded in about 50% of cases of the disease (ANIKKA, 2022). The main problem is that it is a silent condition, depending on its etiology, so that the clinic may become evident only in advanced cases. Its presentation varies, depending on the cause. In acute mesenteric ischemia (IMA), symptoms usually appear abruptly and at a stage that requires early surgical intervention for the affected intestinal region, resulting in a high rate of morbidity and mortality. Due to the low prevalence and nonspecific clinical picture, this condition is difficult to diagnose. This is often delayed, resulting in a delay in the implementation of treatment, which leads to an unfavorable prognosis (BARROS, 2018); (BALA, 2022).



Therefore, in order to ensure a more positive outlook for the patient, as well as an appropriate approach to their pathological condition, the objective of this study is to review the main clinical characteristics of IMA, along with its diagnostic criteria and the recommended intervention to be implemented.

METHODOLOGY

This is a narrative review of the literature, carried out through the determination of the following key terms by the MESH (Medical Subject Headings) platform. The following key terms were obtained, which were combined by the Boolean operator AND: "Mesenteric Ischemia", "Diagnosis", "Therapeutics", "Surgical Procedures, Operative". The search was conducted on the PUBMED search platform, which indexes the MEDLINE (Online System for Search and Analysis of Medical Literature) database. Initially, 196 studies were identified, of which 68 articles were available in full. After this step, the inclusion criterion of original articles published between 2010 and 2023 was added, resulting in the selection of 20 articles.

After the application of the filters, the articles were submitted to a selection process carried out independently by two authors, in a blind manner. Initially, the analysis included the title and abstract of the articles, and in this process, 5 articles were excluded because they did not meet the main objective of the study. Subsequently, the complete reading of the remaining 15 articles was conducted, resulting in the selection of 12 to compose this review.

DISCUSSION AND CONCLUSION

Nowadays, there is an epidemic of obesity, a condition that has several systemic ramifications, such as type 2 diabetes mellitus, dyslipidemia, hypertension, hepatic steatosis, cardiovascular diseases, including heart attacks, among other conditions, which constitutes a worrying public health challenge. In this context, it is essential to identify obesity, understanding its multifactorial causes, and in this scenario, including a diet based on processed and ultra-processed foods, as well as the absence of physical activity. However, multifactorial clinical intervention often fails, and surgical approach is necessary. (MAYORAL et al., 2020).

Bariatric surgery is categorized as restrictive, disabsorptive, and mixed, and is most commonly performed by two techniques. The first, sleeve gastrectomy, is a restrictive technique, known as sleeve, and the second, gastric bypass, is a mixed technique, which in addition to promoting restriction, also provides disabsorption. Among the bypass approaches, the most frequently performed is gastroplasty with a Roux-en-Y bowel bypass. The sleeve technique



accelerates gastric emptying and intestinal transit and also increases bile acid secretion. Gastric bypass, on the other hand, accelerates gastric emptying, decreases gastric acid secretion and increases serum bile acid levels. (STEENACKERS et al., 2021).

These bariatric surgical interventions are termed metabolic. In the case of bypass, this designation becomes evident because it reorganizes the metabolism between the proximal and distal parts of the intestine, since in today's dietary conditions, which are characterized by the supply of foods with a high glycemic index, there is disorganization. This reorganization is necessary, because it is known that the proximal part of the intestine is directly associated with gluconeogenesis, which, due to the high glycemic index of contemporary diets, becomes unnecessary, and therefore, the proximal intestine has its function suppressed. This reduced function reflects directly on the distal intestine, which is responsible for hypoglycemia and physiological hypolipidemia, in addition to promoting satiety and blockage of gastric emptying. This response given by the distal intestine is the reduction of its function, which consequently generates hyperglycemia, hyperlipidemia, increased hunger and accelerated gastric emptying, favoring and further aggravating obesity. (SANTORO et al., 2020).

In addition, bariatric surgical interventions also emerge as more effective therapeutic alternatives to drug treatments and lifestyle habits for Type 2 Diabetes Mellitus, one of the most common complications of obesity, so that through surgical interventions, one can even mention a cure for DM2. In this context, Gastric Bypass stands out, since through this technique, in addition to the already documented increases in GLP-1 levels, as well as insulin, there is an improvement in insulin sensitization, which is not reported in any other technique. (GENTILESCHI et al., 2021).

INDICATIONS

In Brazil, bariatric intervention is performed by the Unified Health System, but must comply with the following guidelines established by Ordinance No. 492 of August 31, 2007:

- a. Morbidly obese patients with BMI (body mass index) equal to or greater than 40 Kg/m², without comorbidities and who did not respond to conservative treatment (diet, psychotherapy, physical activity, etc.), performed for at least two years and under the direct or indirect guidance of a hospital team accredited/qualified as a High Complexity Care Unit for Patients with Obesity.
- b. Morbidly obese patients with a BMI equal to or greater than 40 Kg/m² with life-threatening comorbidities.



- c. Patients with BMI between 35 and 39.9 kg/m² with chronic diseases triggered or aggravated by obesity.

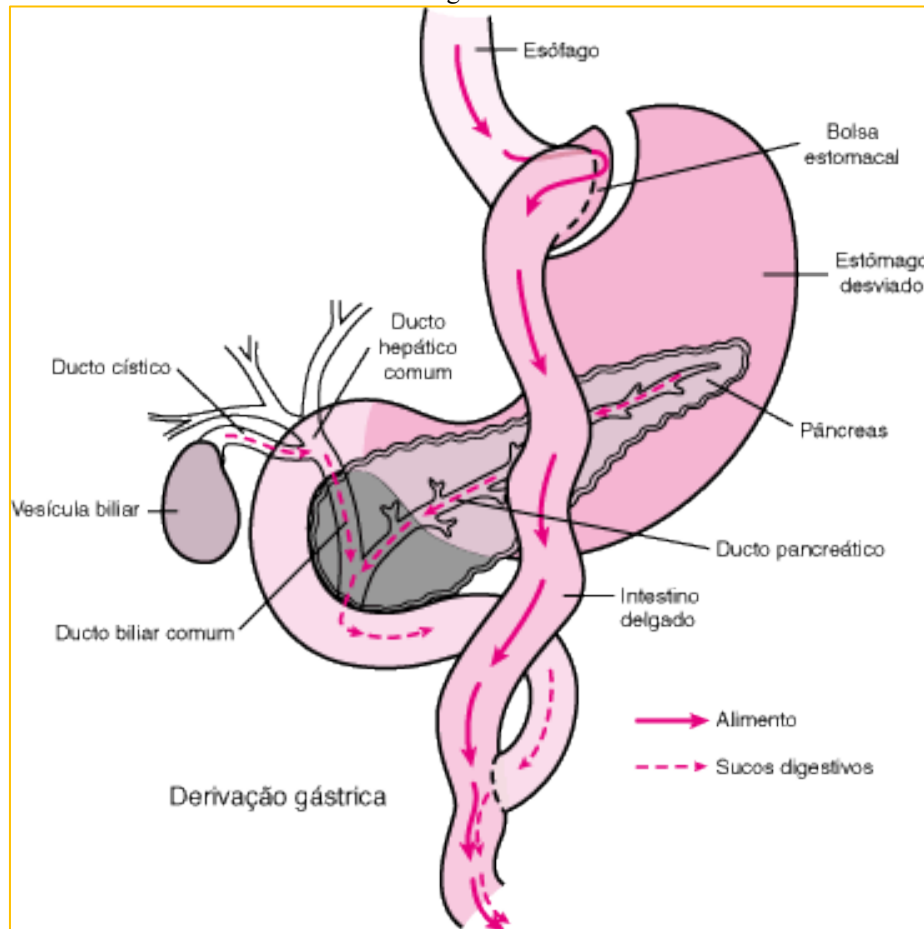
However, the following criteria must be observed:

- a. exclude cases of obesity due to endocrine disease (e.g., Cushing's syndrome due to adrenal hyperplasia);
- b. respect the limits of the age group of 18 to 65 years, and surgical treatment should not be performed before the growth epiphyses are consolidated in the young;
- c. the patient has the intellectual capacity to understand all aspects of the treatment, as well as constant family support;
- d. the patient and the relatives who support him/her to commit to postoperative follow-up, which should be maintained indefinitely;
- e. the patient does not have alcoholism or chemical dependence on other drugs, severe psychotic disorder or recent history of suicide attempt ("ORDINANCE No. 492", [n.d.]

BYPASS TECHNIQUE

In the Roux-en-Y technique, the proximal stomach region is separated from the rest of the organ, followed by the connection of the new stomach pouch with the proximal jejunum. Initially, there is a horizontal section in the stomach by means of staples, without removal of any organ. This procedure creates a small stomach pouch with a volume of less than 30 ml. Next, the Roux-en-Y feeding loop is made, which consists of anastomosis of the gastric pouch with the jejunum, representing a step in the technique. The other step connects the deviated stomach to the distal portions of the intestine. These distal portions receive bile acids and pancreatic juice, meeting the food from the stomach pouch that has passed through the jejunum. Thus, the "Roux-en" technique is classified as mixed, as it imposes restriction when creating the stomach pouch and promotes disabsorption by reducing the intestinal area with the formation of the Roux loop (MANUAL MERCK ONLINE, 2021; RODRIGUES et al., 2020). Figure 1 schematizes the Roux-en-Y technique.

Figure 1:



Source: MANUAL MERCK ON-LINE, 2021.

DIFFERENT SURGICAL TECHNIQUES

The procedure called biliopancreatic diversion with duodenal switching is a procedure that requires a lot of technique and can sometimes be done laparoscopically. (MSD ONLINE HANDBOOK, 2021).

Although the pharmacological approach to treating T2DM has expanded considerably, few patients are able to achieve and maintain optimal glycemic control in the long term. However, bariatric surgery has been proven to lead to greater weight loss in morbidly obese patients compared to intensive medical approaches. In addition, laparoscopic techniques have become safer in recent years. (GENTILESCHI et al., 2021).

On the other hand, the transit bipartition carries the ileum to the antrum, creating rapid ileal stimulation as in a BPD. The entire proximal intestine is partially deactivated by the displacement of food through the gastroileal anastomosis. Since the goal is not malabsorption, but rather a new balance in proximal and distal bowel activities, exclusion is replaced by bipartition. Endoscopic access is maintained. The bowel procedure helps to decrease the high



intra-gastric pressure of the mangoes and, in fact, utilizes this high pressure as a motor to propel the food through the gastroileal anastomosis.

Both retrospective and prospective data show a similar potency to the published results for DBPs and therefore these approaches appear to be superior to gastric and sleeve bypasses. (SANTORO et al., 2020).

Despite the wide variety of effective surgical options, evolutionary biology offers valuable insights into the understanding of metabolic surgery in general. In reality, the simultaneous supply of glucose and insulin is the central function of the proximal intestine. In excess, this condition can result in insulin resistance and obesity. In contrast, the distal gut plays a role in lowering blood glucose (increasing the secretion of

insulin with blocking of glucagon secretion), reducing gastric emptying and promoting satiety. Deficiency in these activities can lead to the same conditions. All effective metabolic surgery procedures succeed in reducing proximal bowel activities and enhancing distal bowel activities. (SANTORO et al., 2020).

COMPLICATIONS

As with any surgical intervention, in the Roux-en-Y bypass technique, complications can also occur, both in the short and long term. These complications range from hemorrhages to issues related to medical malpractice, such as inadequate construction of the Roux loop, which can culminate in the formation of a gastrogastic fistula (ACQUAFRESCA et al., 2015; PALERMO et al., 2015).

It requires a careful evaluation of procedures to discern what is more straightforward and what results in better adaptation to the new context, with fewer complications. However, it is evident that the most effective solutions should minimize proximal intestinal activity and potentiate distal intestinal activity. (SANTORO et al., 2020).

The ileal transposition allows the complete passage of food through the duodenum. The duodenum is the most dynamic region of the proximal intestine, and techniques that facilitate total passage have less impactful results, motivating the proponents of these approaches to incorporate duodenal exclusion^{11,10}. In this later format, the procedure is highly efficient, yet quite intricate, presenting numerous mesenteric challenges and several potential subsequent complications. (SANTORO et al., 2020).



However, postoperative complications are rare and the long-term results are encouraging. Participants in the surgical groups had fewer diabetes-related complications than those in the medical therapy group. (GENTILESCHI et al., 2021).

The LRGYB procedure resulted in longer hospital stay in two RCTs (4/3.1 vs. 2/1.5 days) and a higher number of major late complications (26.1% versus 11.6%) in one RCT. (COLQUITT et al., 2014).

In bariatric surgery procedures, such as adjustable gastric banding, long-term complications include repeated operations, which are more likely, possibly occurring in up to 15% of patients. On the other hand, vertical gastropasty with gastric band is no longer routinely performed because the prevalence of complications is high and the resulting weight loss is insufficient. (MSD ONLINE HANDBOOK, 2021).

Perioperative risks are lower when bariatric surgery is performed at an accredited center and include the following complications: gastric and/or anastomotic leaks (in 1 to 3%); pulmonary complications (eg, ventilator dependence, pneumonia, pulmonary embolism); myocardial infarction; wounds with infection, and deep vein thrombosis. These complications can cause significant morbidity, prolonged hospitalization, and increased costs. Tachycardia may be the only early sign of anastomotic leakage. Late problems may include prolonged nausea and vomiting secondary to small bowel obstruction and anastomotic stenosis. (MSD ONLINE HANDBOOK, 2021).

COMPLICATIONS OF GASTRIC BYPASS

Gastric bypass is currently the most commonly performed bariatric procedure, but despite this, several complications can occur with varying morbidity and mortality. Gastric bypass complications can be divided into two groups: early (short-term) and late (long-term), taking into account the period of two weeks after the operation.

SHORT-TERM COMPLICATIONS

(ACQUAFRESCA et al., 2015)

Anastomosis or staple line dehiscence

It refers to the escape of substances from the gastrointestinal tract, resulting from impaired healing.



Hemorrhagia

It corresponds to the bleeding that occurs in the places where the staple was performed, as well as in the margins of the tissue section.

Intestinal obstruction

When there is a defect in the abdominal cavity that allows the passage of some part of the intestine, the formation of the so-called internal hernia occurs, resulting in the complication known as intestinal obstruction.

LONG-TERM COMPLICATIONS

(PALERMO et al., 2015)

Anastomotic stenosis

A stenosed anastomosis can result from abnormal scarring, as well as technical errors that can cause tension disproportions. In the surgeon's lack of skill, mistakes may occur in the construction of anastomoses.

Marginal ulceration

Near the junction between the stomach pouch and the jejunum, peptic ulcers may develop, which is called a marginal ulcer.

Gastrogastric fistula

This complication involves communication between the stomach pouch and the excluded stomach, resulting from breaks in the staple lines and even improper technique during the construction of the stomach pouch.

FINAL THOUGHTS

Therefore, in view of all the above, gastric bypass represents a surgical approach that has been shown to be an effective and safe alternative in the management of obesity. In addition to significant weight reduction, the intervention also provides improvements in several conditions associated with obesity, such as diabetes, high blood pressure, and dyslipidemia. In addition, benefits are observed in quality of life and decreased mortality. However, the decision to adopt this technique should be carefully evaluated and monitored by a multidisciplinary team, as the



surgery presents risks and can lead to complications. It is critical that patients receive complete information about the risks and benefits of the procedure and follow medical advice after surgery to ensure the success of treatment. It is clear that the understanding of strategies to reduce the risk and incidence of unwanted complications should be progressively developed, and each surgeon should be familiar with these developments in order to identify them early and perform the most appropriate intervention.



REFERENCES

- MAYORAL et al. Obesity subtypes, related biomarkers & heterogeneity. *Indian Journal of Medical Research*, v. 151, n. 1, p. 11, 2020.
- STEENACKERS et al. Adaptations in gastrointestinal physiology after sleeve gastrectomy and Roux-en-Y gastric bypass. *The Lancet Gastroenterology & Hepatology*, v. 6, n. 3, p. 225–237, mar. 2021.
- SANTORO, S. et al. DOES EVOLUTIONARY BIOLOGY HELP THE UNDERSTANDING OF METABOLIC SURGERY? A FOCUSED REVIEW. *ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo)*, v. 33, n. 1, 2020.
- GENTILESCHI, P. ; BIANCIARDI, E. ; BENAVALI, D.; CAMPANELLI, M. Metabolic surgery for type II diabetes: an update. *Acta Diabetologica*, v. 58, n. 9, p. 1153–1159, 18 maio 2021.
- PORTARIA Nº 492. Disponível em: <<http://www1.saude.rs.gov.br/dados/1190226903775PT-492.html>>.
- MANUAL MERCK ON-LINE. Disponível em: <<https://www.msmanuals.com/pt-br/profissional/dist%C3%BArbios-nutricionais/obesidade-e-s%C3%ADndrome-metab%C3%B3lica/cirurgia-bari%C3%A1trica>>
- RODRIGUES et al. Cirurgia bariátrica por bypass gástrico em Y de Roux: abordagem da técnica e de possíveis complicações tardias no pós-operatório. *Revista Eletrônica Acervo Científico*, v. 16, p. e 4979, 26 dez. 2020.
- ACQUAFRESCA, P. et al. Early surgical complications after gastric by-pass: a literature review. *ABCD. Arquivos Brasileiros de Cirurgia Digestiva (São Paulo)*, v. 28, n. 1, p. 74–80, 2015
- PALERMO, M. et al. Late surgical complications after gastric by-pass: a literature review. *Arquivos Brasileiros de Cirurgia Digestiva: ABCD = Brazilian Archives of Digestive Surgery*, v. 28, n. 2, p. 139–143, 2015.
- BUCHWALD H, Avidor Y, Braunwald E, et al. Bariatric surgery: a systematic review and meta-analysis. *JAMA*. 2004;292(14):1724-1737.
- SJÖSTRÖM L, Narbro K, Sjöström CD, et al. Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med*. 2007;357(8):741-752.
- COLQUITT JL, Pickett K, Loveman E, Frampton GK. Surgery for weight loss in adults. *Cochrane Database Syst Rev*. 2014;(8):CD003641.