

# Timeline of bariatric surgery: from malabsorptive techniques to current approaches

## Linha do tempo da cirurgia bariátrica: das técnicas malabsortivas às atuais

## Línea de tiempo de la cirugía bariátrica: de las técnicas malabsortivas a las actuales

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# REVISA

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### RESUMO

**Objetivo:** A cirurgia bariátrica consolidou-se como a principal abordagem terapêutica para o tratamento de obesidade grave, promovendo perda ponderal sustentada e controle metabólico após décadas de insucesso das estratégias clínicas isoladas. Esta revisão narrativa explora a evolução histórica das técnicas, desde os procedimentos malabsortivos iniciais, como o bypass jejunoileal, até as abordagens contemporâneas, mais seguras e eficazes, como o bypass gástrico em Y de Roux e a gastrectomia vertical. O advento da laparoscopia, seguido pela introdução da cirurgia robótica e dos métodos endoscópicos, reforçou a tendência de intervenções menos invasivas, com menor morbidade e recuperação mais rápida. Apesar dos avanços, ainda persistem desafios, como a necessidade de acompanhamento prolongado, as complicações nutricionais e o acesso desigual ao tratamento. Nesse contexto, a análise da linha do tempo da cirurgia bariátrica permite compreender as escolhas terapêuticas atuais e orientar o desenvolvimento de estratégias futuras ainda mais seguras e resolutivas.

**Palavras-chave:** Cirurgia bariátrica; Obesidade; Técnicas cirúrgicas; Perspectiva histórica.

### ABSTRACT

**Objective:** Bariatric surgery has established itself as the primary therapeutic approach for treating severe obesity, promoting sustained weight loss and metabolic control after decades of failure with isolated clinical strategies. This narrative review explores the historical evolution of these techniques, from early malabsorptive procedures, such as jejunoileal bypass, to contemporary, safer and more effective approaches, such as Roux-en-Y gastric bypass and sleeve gastrectomy. The advent of laparoscopy, followed by the introduction of robotic surgery and endoscopic methods, reinforced the trend toward less invasive interventions, with lower morbidity and faster recovery. Despite these advances, challenges remain, such as the need for prolonged follow-up, nutritional complications, and unequal access to treatment. In this context, analyzing the timeline of bariatric surgery allows us to understand current therapeutic choices and guide the development of even safer and more effective future strategies.

**Keywords:** Bariatric surgery; Obesity; Surgical techniques; Historical perspective.

### RESUMEN

**Objetivo:** La cirugía bariátrica se ha consolidado como el principal enfoque terapéutico para el tratamiento de la obesidad severa, promoviendo la pérdida de peso sostenida y el control metabólico tras décadas de fracaso con estrategias clínicas aisladas. Esta revisión narrativa explora la evolución histórica de estas técnicas, desde los primeros procedimientos malabsortivos, como el bypass yeyunoileal, hasta enfoques contemporáneos más seguros y eficaces, como el bypass gástrico en Y de Roux y la gastrectomía en manga. La llegada de la laparoscopia, seguida de la introducción de la cirugía robótica y los métodos endoscópicos, reforzó la tendencia hacia intervenciones menos invasivas, con menor morbilidad y una recuperación más rápida. A pesar de estos avances, persisten desafíos, como la necesidad de un seguimiento prolongado, las complicaciones nutricionales y el acceso desigual al tratamiento. En este contexto, analizar la cronología de la cirugía bariátrica nos permite comprender las opciones terapéuticas actuales y guiar el desarrollo de estrategias futuras aún más seguras y eficaces.

**Palabras clave:** Cirugía bariátrica; Obesidad; Técnicas quirúrgicas; Perspectiva histórica.

## Introduction

Obesity is one of the main health problems today, associated with various comorbidities that elevate the risk of serious complications, contribute to early mortality, and significantly compromise the quality of life.<sup>1-3</sup> Given the limited efficacy of conventional clinical approaches in severe cases, bariatric surgery has consolidated itself as the primary therapeutic alternative, promoting sustained weight loss and substantial improvement in related metabolic disorders.<sup>1-3</sup>

The development of bariatric surgery is intrinsically linked to advances in the understanding of digestive physiology and attempts to modify absorption and food intake. The first notable procedures were the jejunoileal bypasses, introduced in the 1950s, but progressively abandoned due to high complication rates.<sup>1-3</sup> The Roux-en-Y gastric bypass, described by Mason in the 1960s, consolidated itself as the gold standard by combining gastric restriction and discrete malabsorption.<sup>1,2</sup>

In the following decades, exclusively restrictive techniques, such as vertical banded gastroplasty and adjustable gastric banding, gained space, but presented long-term limitations.<sup>1,4</sup> Sleeve gastrectomy (SG), initially conceived as a preparatory step, proved effective as a standalone procedure.<sup>1,4</sup>

The introduction of laparoscopy in the 1990s marked the era of minimally invasive procedures.<sup>1,5</sup> More recently, robotic surgery and endoscopic approaches have broadened therapeutic possibilities, although they still face cost and availability limitations.<sup>5</sup>

In this context, it is fundamental to understand the timeline of bariatric surgery in order to evaluate its impact on safety and clinical outcomes and highlight how the refinement of surgical techniques has transformed the management of severe obesity into a progressively more effective and safer intervention, with expressive benefits for the patients' quality of life.

## Objectives

The present study aims to review the historical evolution of bariatric surgery, from the first techniques that limited nutrient absorption in the 20th century to modern minimally invasive approaches. It seeks to analyze how technical evolution influenced outcomes in terms of weight loss, perioperative safety, metabolic impact, and comorbidity control. Furthermore, it intends to discuss emerging trends, such as the incorporation of digital technologies, the expansion of endoscopic therapies, and the personalization of the therapeutic approach.

## Methodology

This is a narrative literature review, constructed through the search and critical analysis of scientific articles on the progression of bariatric surgery techniques. The research was conducted in the PubMed, Scopus, Web of Science,

SciELO, and LILACS databases, using combinations of the following terms in English and Portuguese: "bariatric surgery," "gastric bypass," "sleeve gastrectomy," "history," "timeline," "evolution," connected by Boolean operators (AND/OR).

Articles published in the last 20 years, as well as historical reviews and comparative studies that contemplated technical, metabolic, and safety aspects of the main bariatric techniques, were considered eligible. Isolated case reports and studies without relevant clinical data or adequate methodology were disregarded. The selection occurred in two stages: screening of titles and abstracts, followed by full reading for confirmation of eligibility. In the end, eight articles were included as the basis for the historical and technical discussion presented in this review.

## Results

Bariatric surgery evolved from invasive and experimental interventions to systematized approaches widely accepted as a treatment for severe obesity and its comorbidities. The first procedure with a metabolic objective was described by Kremen in 1954, with the jejunoileal bypass, performed by anastomosis between the proximal jejunum and the distal ileum.<sup>1,3,4</sup> Although effective in weight loss, it presented a high rate of complications, such as diarrhea, dehydration, and liver failure.<sup>1,3,4</sup>

In 1966, Mason proposed the first actual bariatric surgery: the gastric bypass (GB).<sup>1</sup> This procedure was developed due to the weight loss observed in patients undergoing subtotal gastrectomy, initially performed through a horizontal gastric transection. Subsequently, it evolved into the Roux-en-Y reconstruction (RYBG), in order to reduce biliary reflux, and became the gold standard because it presented fewer complications than the jejunoileal bypass.<sup>1,3,4</sup> Later modifications, such as the Fobi-Capella band, aimed to limit the enlargement of the gastric pouch and weight regain.<sup>1,3,4</sup>

The first laparoscopic gastric bypass was performed by Wittgrove in 1994, marking the transition to minimally invasive techniques.<sup>1-3</sup> In 1997, Rutledge introduced the mini-gastric bypass (MBG or OAGB), which simplifies the procedure by requiring only one anastomosis, with superior results in weight loss and a shorter learning curve.<sup>2</sup> In 2018, the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) recognized OAGB as a standard technique.<sup>2</sup>

Another important milestone was the biliopancreatic diversion (BPD), described by Scopinaro in 1976.<sup>1</sup> The technique involves partial gastrectomy and extensive intestinal diversion, having been motivated by the complications associated with jejunoileal diversions.<sup>1</sup> In order to preserve vagal innervation and pyloric function, the variation with duodenal switch (BPD-DS) was developed, resulting in a lower incidence of adverse effects.<sup>1</sup>

In addition to metabolic surgeries, restrictive procedures were also developed, such as the gastric band, introduced by Mason in 1982.<sup>1</sup> The objective was to restrict passage from the proximal to the distal stomach, a technique that was improved by Kuzmak in 1986, with the adjustable band, reducing the need for other surgical interventions.<sup>1</sup> Despite its minimally invasive appeal, it showed limited efficacy and long-term complications.<sup>2-4</sup>

Sleeve gastrectomy (SG), also known as vertical gastrectomy, was initially proposed by Gagner as a variation for super obese patients (BMI>60).<sup>1</sup> The technique consisted of performing vertical gastrectomy followed by duodenal diversion, but it began to be performed as a standalone technique, demonstrating good results.<sup>1,2</sup> After its recommendation in 2008, it became the most performed bariatric surgery globally starting in 2014.<sup>1</sup>

Procedures such as Roux-en-Y gastric bypass and sleeve gastrectomy are strongly associated with the improvement of metabolic comorbidities.<sup>3,4</sup> It is estimated that up to 80% of patients with type 2 diabetes normalize serum glucose levels within two years after surgery, while about 50% of hypertensive patients achieve adequate blood pressure control.<sup>6</sup> There is also an improvement in the lipid profile, with reduction of total cholesterol, LDL, and triglycerides, and an increase in HDL, which contributes to the reduction of cardiovascular events, such as myocardial infarction and stroke.<sup>6,7</sup>

In addition to restrictive and malabsorptive effects, bariatric surgery promotes relevant hormonal and metabolic changes, such as the reduction of ghrelin and the increase in GLP-1 and PYY secretion, favoring satiety and improving insulin sensitivity.<sup>6</sup>

However, nutritional complications are still frequent, such as deficiencies of vitamin B12, iron, calcium, and vitamin D, in addition to dumping syndrome, more common in type 2 diabetics and after revision surgeries.<sup>2,3,4,7</sup> These effects require continuous follow-up and supplementation.<sup>2,4</sup>

With this in mind, the popularization of minimally invasive techniques, such as laparoscopy and robotic surgery, has contributed to better results and lower morbidity, with the da Vinci robotic system being an example of an alternative that offers greater precision and control.<sup>2,5</sup> Technologies such as augmented reality (AR) and virtual reality (VR), 3D printing, and telemonitoring are also being incorporated into surgical planning.<sup>5</sup> In parallel, endoscopic and less invasive methods have gained prominence, such as intragastric balloons (Orbera, ReShape Duo, Obalon), endoscopic sleeve gastropasty, performed with the Overstitch system, and Endobarrier, which acts as a duodenojejunal liner, aiding in metabolic control.<sup>2,5</sup>

In Brazil, a progressive increase in the number of bariatric procedures performed is observed, following the world trend.<sup>7</sup> However, unequal access persists, with greater availability in the supplementary sector in contrast to long waiting lists in the public health system, which reinforces the need for equity policies.<sup>7</sup>

## Discussion

The evolution of bariatric surgery evidences a clear shift from aggressive, high-risk methods to progressively safer and more efficient techniques. The first metabolic methods, such as the jejunoileal bypass, although effective in promoting significant weight loss, presented severe complications such as hydroelectrolytic and hepatic disorders, which culminated in their abandonment.<sup>1,4,8</sup> This scenario reinforces the importance of the search for procedures that reconcile clinical efficacy with long-term safety.

Among the techniques, the Roux-en-Y gastric bypass consolidated itself as the standard technique for decades by balancing gastric restriction and discrete malabsorption, promoting metabolic control, improved insulin resistance, type 2 diabetes remission, and reduction of cardiovascular risk factors.<sup>1,3,6,8</sup> However, in the last 15 years, sleeve gastrectomy has gained space by presenting similar results, but shorter surgical time and lower risk of nutritional complications, surpassing the adjustable gastric band, which is now obsolete due to high failure rates and the need for reinterventions.<sup>2,5</sup> Despite the observed benefits, long-term nutritional complications remain clinical challenges that require rigorous follow-up, supplementation, and a multidisciplinary approach.<sup>3,5,6,8</sup>

The advent of laparoscopy marked the transition to less invasive procedures, with lower morbidity and faster recovery.<sup>1,4</sup> Endoscopic methods emerge as promising alternatives by combining lower risk and encouraging results in weight loss, especially when integrated into combined strategies.<sup>5</sup> More recently, robotic surgery brought gains in precision and visualization, especially in complex cases, although its high cost limits large-scale adoption.<sup>2,5</sup> Current trends point to the personalization of the surgical approach, integrating clinical, metabolic, and even genetic factors in the choice of the most appropriate technique. In this scenario, the incorporation of digital technologies must redefine the future of bariatric surgery, offering more precise planning and optimized postoperative follow-up.<sup>5</sup>

In Brazil, the findings corroborate the global trend of bariatric surgery expansion, but with a particular scenario marked by the inequality of access between the public and supplementary sectors.<sup>7</sup> This discrepancy highlights the need for public policies that expand the offering of procedures and ensure greater equity in the treatment of severe obesity.

Thus, bariatric surgery ceases to be just a restrictive or malabsorptive intervention and begins to be understood as a complex therapeutic strategy, with broad metabolic repercussions and transformative potential on the quality of life and survival of patients. Even so, relevant gaps remain, especially regarding long-term outcomes and metabolic sustainability, issues that deserve deeper investigation in future research.

## **Conclusion**

The timeline of bariatric surgery reflects a continuous process of searching for greater therapeutic efficacy associated with a reduction in risks and complications. The initial techniques, marked by high morbidity and mortality, paved the way for current procedures, in which restriction and metabolic modulation are combined more safely. In this journey, Roux-en-Y gastric bypass and sleeve gastrectomy consolidated themselves as therapeutic benchmarks, unifying significant weight loss and lasting metabolic effects.

The advance of laparoscopy and, more recently, robotic surgery and endoscopic techniques, reinforces the trend toward less invasive approaches and faster recovery. Despite the progress, challenges remain related to unequal access, the need for prolonged follow-up, and the investigation of late metabolic effects. Understanding the historical trajectory of bariatric surgery is, therefore, fundamental

to guide current practices, identify limitations, and substantiate the incorporation of new strategies in the treatment of severe obesity.

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