LUMEN ET VIRTUS
ISSN: 2177-2789

THE IMPACT OF BARIATRIC SURGERY ON ORAL HEALTH

https://doi.org/10.56238/levv15n42-054

Submitted on: 10/20/2024 **Publication date:** 11/20/2024

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ABSTRACT

This study explores the impact of bariatric surgery on oral health, highlighting the importance of the dental surgeon in the multidisciplinary team for the pre- and postoperative follow-up of these patients. Through a literature review, studies were analyzed that relate bariatric surgery to dental complications, such as reflux, vomiting, vitamin deficiency, xerostomia and dental erosion. The results show the vulnerability of bariatric patients to these conditions, reinforcing the need for constant dental follow-up. It is concluded that the integration of the dental surgeon in the team is essential to prevent and treat these complications, promoting a better quality of life for patients.

Keywords: Dentistry, Oral Health, Bariatric Surgery, Obesity.

INTRODUCTION

Obesity is one of the great challenges of contemporary public health, impacting millions of people around the world. In addition to the associated risk factors, such as hypertension and diabetes, studies point to a correlation between obesity and oral health problems, including cavities and periodontal diseases[1].

These conditions are aggravated by the high consumption of foods rich in sugars and fats, common in the diet of obese individuals, as well as by the frequent use of medications to control comorbidities[2].

In this context, bariatric surgery emerges as an effective alternative for the treatment of obesity, resulting in significant weight loss and an overall improvement in the quality of life of patients[3].

This procedure, however, is not without consequences, especially with regard to oral health. The reduction in the absorption of essential nutrients can trigger conditions such as xerostomia and dental erosion, due to the higher incidence of gastroesophageal reflux, which alters the pH of saliva and favors the demineralization of tooth enamel[4].

In addition, nutritional deficiencies seen after bariatric surgery, including a lack of vitamins and minerals such as calcium and vitamin D, have direct implications for bone and dental health. Santos et al.[1] point out that the absence of these nutrients can lead to loss of bone mass, increasing the susceptibility of patients to bone fractures and carious injuries, especially in a context of low salivation.

The presence of xerostomia, or dry mouth, after surgery also contributes to an environment conducive to bacterial growth, compromising the oral microbiota and increasing the risk of cavities and other oral infections[4]. This effect is exacerbated by restricted dieting and changes in the digestive system, which often lead patients to prefer easily digestible foods such as simple carbohydrates, further increasing oral health risks[5].

Considering the complexity of oral impacts associated with bariatric surgery, the need for specialized and continuous dental follow-up becomes evident.

The integration of dentists in the multidisciplinary team that cares for bariatric patients allows for early and effective intervention to minimize dental complications[6].

The literature suggests that preventive practices, such as fluoride application and dietary counseling, are essential to preserve the oral health of these individuals[7]. Therefore, this integrative literature review seeks to investigate the repercussions of bariatric surgery on oral health and to propose strategies that promote comprehensive and preventive care.

MATERIALS AND METHODS

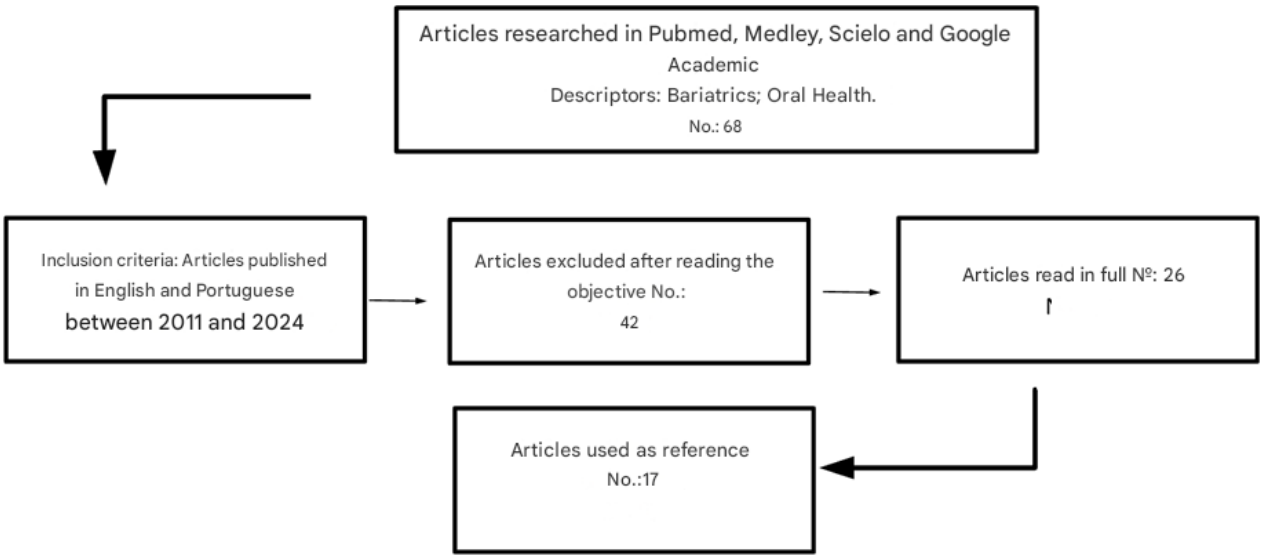
The present study aims to analyze the impact of bariatric surgery on oral health, highlighting the main dental changes and complications associated with this procedure. Specific objectives are intended to:

a) Map the main concepts related to oral health in patients undergoing bariatric surgery;
b) Identify the most common dental challenges and complications faced by these patients;
c) Explore opportunities for the implementation of new practices and protocols in pre- and postoperative dental care.

To this end, this study used a bibliographic approach to investigate the impact of bariatric surgery on oral health. The search was conducted in the PubMed, Mendeley, Scielo, and Google Scholar databases, covering the period from 2004 to 2024, with selected articles in Portuguese and English. Specific combinations of keywords such as "bariatric surgery teeth" and "bariatric effects" were used to identify studies that explored the relationships between bariatric surgery and its effects on oral health.

The selection of articles prioritized national and international journals that investigated oral complications related to bariatric surgery, including reflux, vomiting, vitamin deficiency, xerostomia, caries, and dental erosion. Chart 1 presents the flowchart of the selected articles, while Chart 2 summarizes the main findings of the reviewed studies.

Chart 01 - Flowchart for article searches



Source: The authors (2024)

Chart 02 - Summary of related articles

Authors	Goal	Conclusion
MOURA et al., 2012.	Identify the consequences of this procedure and its repercussions on oral health.	Maintaining adequate oral health in patients undergoing bariatric surgery contributes to success after the operation, safeguarding the benefits and minimizing side effects.
SANTOS et al., 2019.	Discuss the relationship of changes in the oral cavity as a result of bariatric surgery.	The review on the importance of the dentist in the pre and post was concluded.
GRECLL et al., 2011.	To evaluate oral alterations, such as dental caries, periodontal disease, tooth wear and salivary flow in bariatric patients.	Lifestyle changes after bariatric surgery and these changes can increase the severity of pre-existing dental problems. However, these changes in oral health did not influence quality of life.
BARBOSA et al., 2010.	Summary of dental manifestations in bariatric patients.	Current data indicate that recommended post-surgical meal patterns and gastric reflux may increase the risk of dental injury.
KARLSSON et al., 2018.	To survey the perceived oral health among individuals who have undergone bariatric surgery and compare the measurements with two cohorts consisting of healthy individuals with respectively equal to or below versus above a body mass index score of 30.	Perceived oral health problems appear to be more frequent among individuals who have undergone bariatric surgery compared to healthy obese and non-obese individuals.
ALDOWAH, 2022.	This cross-sectional study aims to evaluate the awareness and attitude of surgeons in relation to dental erosion in patients undergoing bariatric surgery.	General surgeons had inadequate awareness and attitude towards dental erosion in bariatric surgery patients.
YANG et al., 2021.	It evaluates the presence of dental erosion in obese patients before and after bariatric surgery using the BEWE (Basic Erosive Wear Examination) scoring system.	With sufficient education before surgery and consistent intake of vitamin and mineral supplements, significant erosive tooth wear after bariatric surgery can be prevented.
ASUNÇÃO et al., 2023.	To identify the various oral alterations in patients undergoing bariatric surgery, emphasizing the importance of integrating the dental surgeon into the multidisciplinary team.	A multidisciplinary approach for patients undergoing bariatric surgery is crucial to address all of these oral health implications, as collaboration between bariatric surgeons and dentists is essential to monitor and mitigate adverse effects on the oral cavity.
YOLAK et al., 2021.	To determine if periodontal health deteriorates after bariatric surgery.	BS can have a transient negative effect on periodontal health.
TAGHA et al., 2019.	To examine how individuals treated for obesity with gastric bypass surgery (GBP) perceived their oral health and oral health-related quality of life.	A large proportion of individuals undergoing GBP surgery reported problems with their oral health and impacts on their oral health-related quality of life, indicating the need for medical and dental staff, surgeons and general practitioners, as well as other health professionals to offer oral health promotion and prevention measures.
MACEDO et al., 2021.	The aim of this study was to observe the impact of bariatric surgery on oral health and to highlight the role of the dental surgeon in the multidisciplinary team.	The presence of the dental surgeon in the multidisciplinary team is essential in the pre and postoperative period of bariatric surgery; as well as in the prevention and treatment of oral lesions and, consequently, to improve the patient's quality of life.
MARSK et al., 2022.	The study aimed to investigate its impact on the risk of dental interventions.	Surgical intervention can have a substantial negative impact on oral health. These results imply an important

		role for metabolic surgery counseling for patients on preventive oral health measures.
CASTILHO et al., 2019.	To analyze the impact of bariatric surgery on gastroesophageal reflux and tooth wear.	Patients undergoing bariatric surgery show a higher prevalence of gastroesophageal reflux and tooth wear.
AZNAR et al., 2019.	To evaluate and compare the occurrence of tooth wear and tooth loss in eutrophic, morbidly obese patients undergoing Roux-en-Y gastric bypass.	Individuals who underwent Roux-en-Y gastric bypass, regardless of the period of the operation, had more tooth wear on the incisal/occlusal surfaces, and the anterior teeth were the most affected. Tooth wear was associated with age and the number of teeth lost.
SAPORITI et al., 2015.	To observe the existence of a possible relationship between obesity and the following oral diseases: caries, periodontal diseases and dental trauma.	The results are controversial among the different studies, highlighting the still existing lack of evidence supporting this association.
PATARO et al., 2016.	To compare the frequency of oral periodontopathogens and H. pylori in the mouth and stomach of obese individuals.	Obese individuals had high frequencies of periodontopathogens and H. pylori in their mouths and stomachs. Bariatric surgery has shown an inverse microbial effect in the oral and stomach environments by revealing higher oral and lower stomach bacterial frequencies.
FANDIÑO et al., 2004.	Present an update on surgical techniques, as well as clinical and psychiatric aspects involved with this procedure.	A careful clinical and psychiatric evaluation is extremely important, aiming at reducing possible postoperative complications.

Source: The authors (2024)

The data analysis was qualitative, seeking to integrate the findings on oral impacts and highlight the importance of dental follow-up in the pre- and postoperative care of bariatric patients. With this, the research followed a descriptive methodology, divided into three stages:

i. Definition of the theme and objectives;
ii. Exploratory research and comprehensive literature review;
iii. Development of work focusing on the dental effects of bariatric surgery.

RESULTS

Fandiño et al.[8] describe that the WHO (World Health Organization) classifies obesity into three grades, categorizing patients according to their BMI (Body Mass Index):

- Grade I: BMI between 30 and 34.9 kg/m²
- Grade II: BMI between 35 and 39.9 kg/m²
- Grade III: BMI above 40 kg/m²

According to Santos et al.[1], obesity is a public health issue that, in addition to being associated with several comorbidities, negatively impacts oral health. This is because there is a proven relationship between obesity and conditions such as hypertension and diabetes.

In these cases, the use of medications to control these diseases can result in side effects, such as xerostomia and caries. Santos et al.[1] also observe that the diet of obese people is often rich in saturated fats, sugars and carbohydrates. When this diet is combined with inadequate oral hygiene, there is a greater risk of dental erosion, often associated with gastroesophageal reflux and eating disorders.

In this context, Fandiño et al.[8] indicate that patients with a BMI above 35 kg/m², who have comorbidities such as hypertension, type 2 diabetes, and sleep apnea, and who have tried other weight loss techniques without success for at least five years, are candidates for bariatric surgery. Bariatric surgery, when performed in conjunction with lifestyle changes, a balanced diet and multidisciplinary follow-up, can positively modify the picture of preexisting diseases.

Fandiño et al.[8] also state that, after bariatric surgery, patients who previously had cardiorespiratory diseases, such as dyspnea, sleep apnea, hypertension, diabetes, and lipid disorders, showed improvement in quality of life and in physical and mental health.

In a study that demonstrates the negative impact of obesity on oral health, Santos et al.[1] point out that this condition compromises the integrity of the tooth structure, affecting bone health due to the lack of vitamins and the demineralization caused by erosion, resulting from the change in the pH of saliva. In addition, nutrient deficiency and gastroesophageal reflux increase susceptibility to caries, aggravated by frequent intake of foods high in sugar.

According to WHO data presented by Aldowah[9], more than 10% of the world's population is obese. To address this global public health problem, medicine offers bariatric surgery as a resource that can provide a significant improvement in the quality of life of patients with obesity. Over the years, the demand for bariatric surgeries has gradually increased, since this procedure is currently considered one of the most effective methods in combating obesity.

Bariatric surgery can be performed by different techniques, the choice of which depends on the medical evaluation. Jesus et al.[10] describe four main types of bariatric surgery:

Sleeve Gastrectomy (VG): also known as "sleeve", it involves the removal of up to 80% of the stomach longitudinally, without deviation of the intestine, and is performed laparoscopically. This approach significantly reduces gastric capacity and promotes weight loss.

Bileopancreatic Bypass (DBP): In this method, up to 85% of the stomach is removed, combined with the diversion of part of the small intestine, resulting in less absorption of nutrients. This technique is more complex and can negatively impact the patient's nutritional

status.

Adjustable Gastric Band: consists of placing a silicone ring around the stomach to limit food intake. The band can be adjusted by means of a valve that allows the addition or removal of saline, controlling the degree of restriction. It is a reversible and less invasive technique.

Roux-en-Y Gastroplasty (GYR) or Gastric Bypass: is the most widely used method, in which about 80% of the stomach is stapled, diverting food from the duodenum to the proximal jejunum. This technique reduces the capacity of the stomach and promotes early satiety, helping with calorie restriction.

In this context, it is understood that bariatric surgery is a procedure that provides significant weight loss and improvement in health conditions associated with obesity, although it can also have adverse effects on oral health. According to Aldowah[9], after surgery, many patients prefer easily digestible foods, such as simple carbohydrates, which can cause episodes of epigastric pain, hypoglycemia and flushing, known as "dumping" symptoms. This phenomenon occurs when the stomach quickly absorbs food, causing discomfort. Additionally, due to changes in the digestive system after surgery, fluid consumption may be poorly tolerated, which can reduce salivary flow and increase the risk of xerostomia and other oral complications.

Bariatric surgery can lead to significant nutritional deficiencies, such as malabsorption of iron, calcium, vitamin B12, and vitamin D, resulting in systemic effects that compromise the patient's overall and oral health[4]. These deficiencies occur due to anatomical and physiological changes in the gastrointestinal tract, which limit the body's ability to obtain essential nutrients from food.

Moura et al.[11] point out that, after surgery, vitamin supplementation becomes indispensable, as the diet alone cannot meet nutritional needs. Deficiency of vitamin B12, iron, calcium, and vitamin D3 can lead to conditions such as anemia, osteoporosis, and metabolic bone disease.

In particular, vitamin D deficiency negatively affects calcium metabolism, which is essential for maintaining bone and dental health, increasing the risk of secondary hyperparathyroidism, which elevates the production of parathyroid hormone, resulting in calcium loss in the bones and, consequently, osteoporosis. This process causes a decrease in bone density, compromising the trabecular bone and thinning the cortical bone, which increases vulnerability to fractures and dental problems[4], [11].

In addition to deficiencies in essential vitamins and minerals, bariatric surgery can trigger major oral complications, such as bone loss. The drastic reduction in body weight after the procedure causes metabolic changes and releases a greater amount of pro-

inflammatory proteins, increasing the predisposition to gum problems, such as gingivitis. This condition, characterized by inflammation, edema, redness, and bleeding gums, can progress to periodontitis if not treated properly, causing irreversible damage to the supporting tissue of the teeth, formation of periodontal pockets, and tooth mobility[4].

Malabsorption of nutrients, especially calcium — common after bariatric surgery — further aggravates the risk of bone resorption. Deficiency of this essential mineral compromises bone density, making patients more susceptible to bone fractures and tooth loss. Without periodic dental follow-up and adequate supplementation, this condition can progress to clinical conditions that require more drastic interventions, such as tooth extractions[4].

Gastric alterations, such as reflux and vomiting, carry hydrochloric acid from the stomach to the oral cavity, causing changes in the pH of saliva and promoting an acidic environment that favors tooth demineralization and erosion[4]. This environment, due to the low pH of hydrochloric acid, is harmful to the teeth, and xerostomia — or dry mouth sensation — common after surgery, aggravates the condition by compromising speech, swallowing and creating ideal conditions for bacterial proliferation that alters the oral microbiota.

Barbosa et al.[5] point out that gastroesophageal reflux induced by bariatric surgery exposes the teeth to an acid pH of approximately 1.2, which is far below the critical pH of 5.5 for the dissolution of hydroxyapatite, and results in enamel demineralization and greater vulnerability to carious lesions. In addition, malabsorption of nutrients after surgery contributes to poor oral health, presenting symptoms such as dentin hypersensitivity due to exposure of the dentin tubules.

Santos et al.[1] describe that caries is a multifactorial disease caused by the imbalance between the tooth surface and the bacterial biofilm, resulting in loss of minerals and can vary from an initial opacity to deep cavities that reach the dental pulp. Bariatric patients, who are usually recommended to eat small portions every three hours, often fail to clean their mouths between meals. This, associated with reduced salivary pH, increases oral acidity and increases enamel demineralization.

In addition, Jesus et al.[10] point out that, with guidance for a restricted diet and frequent meals — sometimes every 30 minutes — the oral health of bariatric patients can be compromised. Therefore, it is essential that they adopt low-sugar practices, perform periodic dental check-ups, and use fluoride to minimize adverse effects on oral health.

Dental erosion, characterized by the progressive loss of tooth structure, commonly affects the lingual, palatal, occlusal, and buccal surfaces of the teeth, especially the anterior ones. An initial clinical manifestation is the opaque appearance of the enamel, which loses

its shine and is accompanied by an increase in tooth sensitivity. This condition results from chemical processes caused by exposure to acids, which can have an extrinsic origin (such as acidic foods and drinks) or an intrinsic origin (such as gastroesophageal reflux). The latter often occurs in patients undergoing bariatric surgery, who may present with eating disorders and recurrent vomiting[1].

According to Macedo et al.[6], chronic regurgitation is common in patients undergoing Roux-en-Y gastric bypass, especially when a silicone ring is used to reduce the stomach, facilitating vomiting episodes. These episodes expose the oral cavity to stomach acid, increasing the risk of tooth erosion. Many patients, without adequate knowledge of the necessary care, brush their teeth immediately after vomiting, which intensifies the erosive action by spreading acidity over the tooth surface and further aggravates the demineralization of the enamel.

Studies by Jesus et al.[10] indicate that the risk of tooth wear increases two to four times in bariatric patients, due to the higher frequency of vomiting and reflux. Frequent contact of gastric acid with the teeth reduces the critical pH of the enamel, favoring the dissolution of hydroxyapatite crystals and promoting dental erosion. This repeated exposure to acid alters the mineral balance of the tooth surface and accelerates wear.

Barbosa et al.[5] observed that post-bariatric gastroesophageal reflux increases acidity in the oral cavity, altering the pH of saliva and resulting in demineralization of dental tissues. This chemical process, in which acids act as chelating agents, dissolves the minerals in the teeth and causes erosion, being aggravated by the frequency and intensity of reflux episodes.

Castilho et al.[12] highlight that bariatric patients have a higher risk of tooth wear compared to the general population, with the frequency of regurgitation and gastroesophageal reflux being determinant factors for greater susceptibility to dental erosion in these individuals. It points to a significant negative impact on the oral health of these patients, reinforcing the importance of rigorous dental monitoring and preventive interventions to minimize adverse effects on the oral cavity.

Dental follow-up plays an essential role in the care of obese patients, both pre- and postoperatively after bariatric surgery. As pointed out by Macedo et al.[6], this monitoring is essential to assess systemic conditions and eating habits that directly impact oral health. Obese patients often have risk factors that increase their vulnerability to periodontal diseases, tooth wear and problems resulting from gastroesophageal reflux, complications that can intensify after bariatric surgery due to the metabolic and dietary changes inherent to the procedure.

DISCUSSION

This study addresses the implications of bariatric surgery on oral health, with emphasis on the physiological changes and oral risks that accompany the procedure, including xerostomia, dental erosion, bone loss, and caries. Several studies corroborate the need for regular dental follow-up to mitigate these effects, while others suggest that preventive dental intervention could minimize postoperative complications.

Xerostomia, often seen after bariatric surgery, has been associated with reduced salivary flow, which increases susceptibility to caries and erosions. According to Santos et al.[1] and Assunção et al.[4], gastroesophageal reflux and recurrent vomiting favor the maintenance of an acidic environment in the oral cavity, demineralizing the enamel and aggravating dental erosion. In contrast, Yang et al.[7] suggest that erosion can be prevented with a balanced diet and regular intake of vitamin supplements, indicating that post-surgical dietary control is a relevant measure for the preservation of oral health.

Nutrient deficiency, especially vitamins such as B12 and D, compromises the structural integrity of bones and teeth, which can lead to bone resorption and increased vulnerability to dental fractures[4],[5],[11]. Studies such as the one by Karlsson et al.[13] suggest that the impact on bone density is more pronounced in bariatric patients compared to obese non-operated patients, reinforcing the need for supplementation. Yang et al.[7] state that adequate calcium and vitamin D supplementation is essential to avoid the worsening of bone complications, but may be insufficient without specific dental follow-up.

In addition, patients who have undergone bariatric surgery often report increased caries and dentin hypersensitivity, aggravated by the post-surgical diet rich in simple carbohydrates, as pointed out by Santos et al.[1] and Castilho et al.[12]. This dietary pattern, combined with the need for frequent meals, increases the risk of cavities and periodontal diseases, since oral acidity increases and makes it difficult to maintain oral hygiene. Macedo et al.[6], on the other hand, observed that adequate dietary guidance in the postoperative period could reduce these risks.

Gastroesophageal reflux is another complication observed in the postoperative period, often exacerbated by gastric bypass techniques[10]. Castilho et al.[12] and Barbosa et al.[5] report that constant contact with gastric acid causes a progressive demineralization of the enamel, resulting in greater tooth wear. On the other hand, Marsk et al. [14] highlight that preventive measures, such as avoiding brushing teeth immediately after reflux episodes, can minimize damage, suggesting that dental guidance is essential in this context.

Dental erosion has been widely discussed in studies, and authors such as Yolak et al.[15] state that bariatric surgery can amplify the severity of this problem compared to patients who have not undergone the procedure. However, Barbosa et al.[5] argue that

erosion is controllable with strict preventive care and adequate dental follow-up. This difference in approach reinforces the importance of an individualized preventive protocol for each patient.

The integration of the dental surgeon in the multidisciplinary team has been pointed out as essential for the success of dental treatment in the context of bariatric surgery. Macedo et al.[6] and Assunção et al.[4] suggest that without this continuous follow-up, patients face a substantial risk of oral complications that can compromise overall health. This consensus highlights the need for collaborative practices between the fields of dentistry and medicine to ensure the integral well-being of the patient.

CONCLUSION

It is concluded that bariatric surgery, although an effective solution for obesity, brings significant challenges to oral health, highlighting the importance of preventive and continuous dental follow-up. The integration of the dental surgeon in the multidisciplinary team is essential to identify and mitigate complications such as xerostomia, bone loss, and dental erosion, promoting a better quality of life for patients.

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