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# Eating Disorders and their Impacts in Dentistry: An Examination of Case Management Evidence*

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**Abstract:** Eating disorders are severe psychiatric illnesses associated with physical and psychological morbidity and mortality. Their incidence has increased, highlighting the emerging public health importance of these conditions and their comorbidities. Oral healthcare professionals may be among the first to observe the signs and symptoms of an eating disorder due to the recognizable links with oral pathology. It is crucial that they are sufficiently informed and confident in diagnosing and treating oral comorbidities. This review describes the oral impacts of Anorexia Nervosa (AN) and Bulimia Nervosa (BN) in the oral cavity, and presents a related case study.

**Keywords:** Anorexia Nervosa; Bulimia Nervosa; Oral Implications; Oral Care; Public Health

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* Case Report

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## *Trastornos alimentarios y sus impactos en odontología: un examen de la evidencia de gestión de casos*

**Resumen:** Los trastornos alimentarios son enfermedades psiquiátricas graves asociadas con morbilidad y mortalidad física y psicológica. Su incidencia ha aumentado, destacando la importancia emergente en salud pública de estas condiciones y sus comorbilidades. Los profesionales de la salud bucal pueden estar entre los primeros en observar los signos y síntomas de un trastorno alimentario debido a los vínculos reconocibles con la patología bucal. Es fundamental que estén suficientemente informados y confiados en el diagnóstico y tratamiento de las comorbilidades orales. Esta revisión describe los impactos bucales de la anorexia nerviosa (AN) y la bulimia nerviosa (BN) en la cavidad bucal y presenta un estudio de caso relacionado.

**Palabras clave:** anorexia nerviosa; bulimia nerviosa; implicaciones bucales; cuidado bucal; salud pública

## *Transtornos alimentares e seus impactos na odontologia: um exame da evidência de gestão de casos*

**Resumo:** Os transtornos alimentares são doenças psiquiátricas graves associadas à morbidade e mortalidade física e psicológica. Sua incidência aumentou, destacando a importância emergente na saúde pública dessas condições e suas comorbidades. Os profissionais de saúde bucal podem estar entre os primeiros a observar os sinais e sintomas de um transtorno alimentar devido aos vínculos reconhecíveis com a patologia bucal. É fundamental que estejam suficientemente informados e confiantes no diagnóstico e tratamento das comorbidades orais. Esta revisão descreve os impactos bucais da anorexia nervosa (AN) e da bulimia nervosa (BN) na cavidade bucal e apresenta um estudo de caso relacionado.

**Palavras-chave:** anorexia nervosa; bulimia nervosa; implicações bucais; cuidado bucal; saúde pública

## Introduction:

Eating disorders are psychiatric diseases with a multifactorial etiology, characterized by alterations in diet and the psychosocial sphere, primarily affecting late adolescents and young adults. They include Anorexia Nervosa (AN), Bulimia Nervosa (BN), and binge-eating disorder (1). AN is marked by low weight, food restriction, body image disturbance, fear of gaining weight, and an uncontrollable desire to be thin. BN begins after a period of food restriction, where patients consume large amounts of food (binge eating) and then induce vomiting or use laxatives to compensate (2).

The prevalence of AN and BN begins during adolescence, most commonly in women, and their etiology is unknown; however, the most common theory is that these disorders are related to the pressure for thinness (2).

The prevalence of AN and BN has recently increased worldwide. From 2000 to 2006, the prevalence was 3.5 %, rising to 7.8 % from 2013 to 2018. (3). BN is more frequent than AN, among adolescents, women, and young adults (4). The National Institute for Health and Care Excellence (NICE) reports that BN and AN in women present prevalence of 0.5-1.0 % and 0.7 %, respectively. Studies in the United States, Canada, and Europe indicate a 5 to 6 times increase in incidence during 1960s and 1970s (5). For the last two decades, the rates of new diagnoses of AN and BN have remained relatively stable (6).

In Colombia, studies on young schoolchildren and university students in different cities have been conducted. Two of these studies were completed with students from Bucaramanga in 2005 and medicine students from the Universidad Nacional in 2012. They estimated that about 30 % of the participants presented symptoms of ED; of these, 1.7 % corresponded to anorexia, 6 % to bulimia, and 28 % to unspecified eating disorders (5).

Oral implications of EDs include necrotizing sialometaplasia, dental erosion, dental caries, osteoporosis, periodontal diseases, and issues affecting the buccal mucosa, tongue, and lips, such as sialadenosis and TMJ dysfunction, have been reported and should be continuously highlighted amongst dentists (7).

The objective of this narrative review is to describe the oral impacts of AN and BN, case management, and the limited evidence of oral care received by patients with these conditions. The review analyzes three key topics that the authors consider to be of great importance in the subject. The first one consists of the oral and dental implications of the eating disorders AN and BN. The second one is the oral care in patients with AN and BN, and the third, but not less important, is the evident barriers and limited access to oral care for patients with these two ED. We also include a case presentation of Necrotizing Sialometaplasia.

## I. Oral and Dental Implications in Anorexia and Bulimia

AN and BN affect hard and soft tissues in various ways. A common dental issues in BN is dental erosion or Perimylolysis (8), characterized by ‘‘loss of enamel texture, a silky glossy appearance, and sometimes a dulling of the surface gloss.” (9) This erosion is associated with excessive consumption of acidic foods such as soft drinks or citrus fruits, but also in concordance with gastroesophageal reflux disease or psychosomatic diseases (anorexia nervosa or bulimia nervosa) (10).

BN is characterized by self-induced vomiting, where gastric juice with a PH close to 1 reaches the oral cavity, producing an irreversible loss of dentin and enamel in greater proportion. Dentine lesions are frequently found in the lower first molars, while upper central incisors show enamel lesions (11). Even though dental erosion is a usual sign, it has a delayed manifestation, as a long time of regurgitation of the gastric contents is needed to induce these kinds of lesions (12). The literature is unclear, failing to distinguish between enamel and dentin lesions, making it difficult to assess the severity of erosions and complicating the ability of examiners to monitor the progression of lesions (11).

In a clinical study that evaluated the occurrence, distribution, and severity of dental erosions in patients who experienced bulimia, the results

showed dental erosions in 69.7 % of the individuals, with women being the most prevalent. Nineteen of them presented only enamel lesions, and 27 had both enamel and dentine lesions (11). Due to erosion, the destruction of the hard tissue of the tooth is greater, which can lead to other dental injuries such as abrasion or abfraction (13).

Oral symptoms related to bulimia nervosa that have been described in case reports, descriptive studies, and case-control studies include enamel erosion, dental caries, dental pain, orthodontic abnormalities, xerostomia, reduced saliva secretion, parotid enlargement, and dysphagia, among others (14). To properly diagnose and treat these conditions, it is crucial to classify the severity of dental erosion. The scoring system established to identify both early and advanced stages of erosion is Visual Erosion Dental Examination (VEDE) system: Score 0: No erosion; score 1: Initial loss of enamel, no dentine exposed; Score 2: Pronounced loss of enamel, no dentine exposed; score 3: Exposure of dentine, < 1/3 of the surface involved; score 4: 1/3-2/3 of the dentine exposed; score 5: > 2/3 of dentine exposed(11).

### *Necrotizing Sialometaplasia:*

Necrotizing Sialometaplasia (NS) is an uncommon benign, inflammatory, self-limiting pathology that affects the minor salivary glands located in the posterior area of the hard palate in most cases. Although its etiology is not clear, many authors suggest that NS is caused by a chemical, physical, or biological injury to the blood vessels, leading to ischemic changes. This may cause infarction of the glandular tissue with necrosis, inflammation, and repair attempts (15). For instance, local irritative or traumatic factors such as smoking, alcohol abuse, drugs, and prosthetic trauma are related to a significant number of cases (16). In addition, systemic diseases with vascular compromising effects, may also be associated with NS, such as diabetes mellitus, hypertension, atherosclerosis among others. There is also a relation with very hot foods, tobacco, and alcohol consumption as triggers for NS (16).

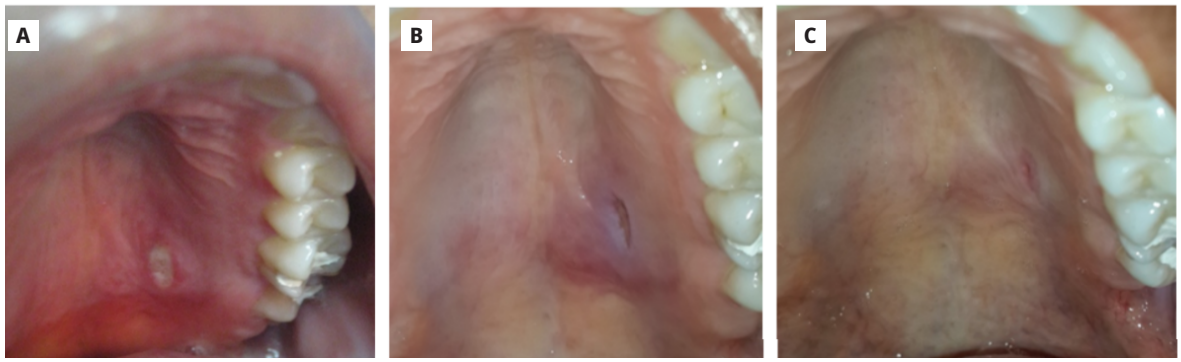
BN has also been reported as a possible cause of this affection (15). The clinical manifestations of NS are characterized by palatine ulcerations with regular, slightly raised margins, and its base is filled with necrotic tissue and a leukocyte fibrin exudate. The similarity between these characteristics and some malign glandular lesions of the oral cavity, such as adenoid cystic carcinoma, mucoepidermoid carcinoma, or squamous cell carcinoma, may result in unnecessary treatment, considering that NS is a self-resolving pathology. The most common symptom of NS is pain; however, patients can present with local paresthesia, local anesthesia or they can be asymptomatic (15)(16). Clinical and histopathological diagnosis, as well as promoting dentists' awareness about the cause-effect relationship between bulimia and NS, can prevent overtreatments by health providers.

## Case presentation:

This section presents pictures of a 27-year-old patient who had gastric sleeve surgery 9 months ago. Her reason for consultation was severe pain in an ulcerative lesion found on the left side of her hard palate. She reported experiencing six episodes of vomiting daily. The presumptive clinical diagnosis was Necrotizing Sialometaplasia. The patient was informed about the self-limited nature of the lesion**. Figure 1; a.** Clinical photograph showing a red ulcerative lesion on the left posterior hard palate. No biopsy was performed, and there was an agreement with the patient to return for follow-up appointments. **b**. Photograph taken with a 10-day interval, **c**. one-month since the first picture, showing a self-limited type of lesion that resolved completely in two months.

Other oral manifestations of eating disorders, either directly or due to nutritional deficiency, include dental caries, qualitative and quantitative salivary changes (xerostomia, altered buffering capacity and salivary pH), gingival and periodontal diseases, and oral mucosal lesions (erythema and palatal ulcers). However, the consequences are not only oral, as these eating disorders can be accompanied by comorbidities such as cardiovascular diseases and dysfunction of the endocrine system,

**Figure 1.** Necrotizing Sialometaplasia




Source: Authors.

gastrointestinal, pulmonary and musculoskeletal ailments (17).

Patients with AN and BN can present marginal gingivitis due to a lack of vitamin C, and periodontitis because of poor oral hygiene and micronutrient deficiency. In some cases, patients present erythematous lesions and trauma-induced ulcerations in the palate, caused by physical and acidic trauma (17). Another common sign in these patients is the exfoliation of the mucous membrane of the lips, caused by dehydration, low saliva secretion, and a lack of vitamins A and B (13). On the other hand, vitamin D could be included in the treatment of these or other injuries since it is considered a necessary micronutrient to prevent some diseases due to its role in cell proliferation, immunomodulation, resistance to viral infections, and prevention of severe infection symptoms. For example, in COVID-19 or opportunistic infections with the potential to colonize lesions(18), such as lip bites and buccal mucosa biting due to stress tension, as occurs in bulimia(13).

Dental caries, mainly cervical, and dentinal lesions with large areas of undermined enamel are frequently observed in patients with BN and AN. Patients with ED usually take antidepressants that cause xerostomy as a side effect. Hence salivary viscosity increases and buffering capacity decreases. The low salivary pH promotes the survival of acidogenic and cariogenic microbes (S. mutans and Candida). These factors magnify the risk of demineralization and breakdown of the dental structure. In addition, xerostomia can lead to taste alterations (hypogeusia) and candidal infections, producing angular cheilitis.

Patients with BN can also present Sialadenosis, which may the first noticeable clinical sign. Studies describe the enlargement of parotid glands in bulimic patients, where chronic vomiting is associated with bilateral parotid enlargement (19). Some patients with BN show slightly elevated levels of serum amylase, probably reflecting an increase in the salivary isoenzyme as a marker along with the particularly marked enlargement of the parotid glands. This last symptom should also alert the dentist during an extraoral examination as an indicator of a probable bulimia patient (20).

Clinical manifestations on teeth include reduced thickness of enamel, increased translucency of the cutting, edges and exposure of the dentin due to the total loss of enamel, causing dentine hypersensitivity (16). People with eating disorders who suffer from gastrointestinal reflux disease can also suffer from sleep bruxism, causing attrition of occlusal surfaces, and consequently leading to temporomandibular disorders. The TMJ disorders are caused by the lack of stability of the interact contacts and loss of vertical dimension. Patients present a high sensitivity to muscle palpation, prevalence of intensive gum chewing, and high levels of craniofacial pain; all these symptoms are related to the somatization of their anxiety (17).

## ll. Dental Care in Anorexia and Bulimia Patients:

Given that oral health is an indicator of the systemic state of illness, it is essential to guarantee the general well-being of patients. In many cases, the oral cavity may be the main site of manifestations of eating disorders, hence the importance of the dentist in the early diagnosis of this underlying systemic pathology through a careful and thorough examination of the oral cavity. This helps to detect the disease early and also saves patients from the consequences of the disease (17).

Dental treatment for people with disorders such as AN and BN involves discouraging obsessive-compulsive tooth brushing to hide their embarrassment after vomiting episodes or even to induce vomiting. Therefore, tooth brushing should be recommended and limited to a maximum of three times a day (17). Once the eating disorder has been diagnosed and a subsequent treatment plan has been prepared to recover the damaged dentition (with medical, psychotherapeutic, nutritional advice and dental management) it is necessary to establish treatment plans according to severity. For example, in mild but painful cases due to the loss of exposed enamel and dentin (hypersensitivity), desensitizing agents and direct restorations with composites and glass ionomer cement are applied conservatively. In a more advanced state, removable prostheses are not the recommended treatment for these patients. The need for computer-assisted restorations arises for the elaboration of porcelain veneers and crowns to restore the vertical dimension in patients with the loss of dental substance in posterior teeth, which implies full dental arch reconstruction. The cost of treatment is another important aspect, as people with eating disorders may face social and economic hardship. Mainly because studies have reported a high proportion of unemployment in people with eating disorders due to psychiatric problems (17).

## lll. Evident barriers and limited access in oral care for patients with ED

A study of the German health system carried out a cost compensation analysis for the treatment of eating disorders, based on evidence, and using data from the results of a psychotherapy trial involving cognitive behavioral therapy and focal psychodynamic therapy. Since AN and BN are associated with a very high level of suffering for affected patients, the need to establish an adequate and early treatment based on evidence is necessary and needs to be included in public health services to generate a reduction in costs and a better quality of life for patients, since the greater use of medical care services by these patients results in longer hospital stays(21).

Eating disorders represent a serious public health problem, raising direct and indirect costs. Direct costs related to the prevention, diagnosis, and treatment of a mental health disorder, and indirect costs the payment of sickness benefits or loss of productivity. To evaluate all of this, a formula is generated which includes the consequences of the lack of treatment and therapy for AN and BN. In addition, the improvement in the quality of life and the reduction in the risk of mortality derived from the treatment are taken into account, leading to the conclusion that treating with evidence generates several types of savings, for example, the reduction of the loss of gross value, savings due to cost of individual therapy sessions per patient, savings due to improvement in quality of life, savings due to reduction in days of hospitalization, and savings due to reduction in mortality(21).

Currently, over the last 10 years, a stable incidence of AN is reported; however, in the younger population group (<15 years), it has increased. This implies the need to investigate risk factors and highlights the need for prevention programs. When we talk about the incidence of BN, we know that it has decreased in the general population over

time. In addition, recent studies suggest that not only for AN the mortality risk is five or more times elevated, but also for BN. In terms of incidence, it is not known whether it has actually increased or if the changes in case detection systems, diagnostic criteria, increased availability of treatment facilities, or heightened awareness have lead to early detection and referral. Without forgetting the changes that can occur in the incidence due to variations in the study methods or differences in the stage of detection. When we talk about mortality, it is suggested that men are at greater risk, highlighting the importance of detection and treatment of anorexia nervosa and bulimia nervosa in men (22).

A study carried out in 2019 evaluated self-perception and oral health in a population of anorexic and/or bulimic patients in which 46 individuals participated. Prior to teaching dental health, a knowledge survey showed that, although most patients were aware that dental erosion was a consequence of their health situation, only 30 % knew the exact location of the erosion. However, after the teaching process, which lasted 6 weeks, 73 % of the patients were able to correctly identify the erosion site, demonstrating an improvement in their knowledge and the teaching being fruitful. Additionally, an increase in patients who went to the dentist was reported. This positively influenced the patient's self-perception and self-esteem (23).

## Discussion

Due to the fundamental role of dentists in the evaluation and timely diagnosis of these eating disorders, it is necessary to consider the inclusion of this illness in dental study curriculums. A study evaluated the knowledge, clinical experience, and professional attitude on this topic, finding that the main source of knowledge and information on this topic came from television (17).

Young people and adolescents with eating disorders show a clear influence on the perception of their body image. To prevent the increase in prevalence and incidence of eating disorders among adolescents, it is convenient to control the messages, myths, and falsehoods propagated by the media, particularly television (24).

A paradigm shift in health messaging should be considered, not only by working to eradicate harmful messages that encourage extreme and/or unhealthy dietary practices on social media but also by replacing pervasive public health messages about the "dangers of dieting" with more nuanced messages. These should consider the positive effects of reducing calories along with messages about vulnerability factors that could put some people at risk of developing eating disorders(25).

Dentists have a very important role in the early detection of AN and BN. It is essential that dentists are familiar with the oral manifestations of EDs to provide integrated care to these patients. Dentists and dentistry students should know how to identify and treat these alterations. Sialometaplasia does not need any treatment besides reinforcing oral hygiene, and the only medication prescribed is analgesics (if needed), along with follow-up of the lesion until it resolves. If dentists are not knowledgeable about this pathology, chances are that the patient will be over-treated (with biopsies, extensive surgeries, and unnecessary panic if it is diagnosed as a possible oral cancer) (19). Dental erosion can be treated and prevented if we are aware of the main cause of this affection. A study in the US, collecting data from different dental and dental hygiene programs, reported that few of them included ED within their curricula and the time dedicated to the topic was between seventeen to thirty-five minutes. Only 58 percent of dental programs and 56 percent of dental health programs included in their curricula patient communication skills related to ED. They stated that appropriate training is needed for oral health professionals, to provide comprehensive patient care (26). Universities should reinforce their curriculums by including eating disorders to the topics taught on the respective subject. (26)

Dentists are not trained to identify pathologies associated eating disorders. This lack of training could lead to unnecessary treatment or treating the dental implications without addressing the underlying cause. Also, dentists refer to the need for more relevant university training in these issues,

and it was found that preventive knowledge on this topic varies between female and male dentists, and between hygienists and dentists, supporting the fact that the training of oral health professionals is needed (17). A study regarding ED knowledge from dentists and dental hygienists indicated that dental hygienists would more likely identify the oral manifestations than dentists (27), leading us to reflect on the great importance of the dental hygienist's role and recognize it as part of the process. Swedish countries have reported that female dentists had more knowledge of ED than male dentists, and this knowledge was obtained mainly from media sources such as newspapers and television (28). The necessity of generating changes in terms of attitude and knowledge of dentists regarding ED is not new. A 2006 study revealed that dentists did not feel properly trained to diagnose these disorders and it showed that the lack of policies led them to act according to what they think is best. When the patient is a minor, most of the dentists agreed to talk with their parents regarding the suspicions of an ED (29). Secondary prevention (ie measures leading to early diagnosis and rapid intervention) meets a need felt by patients who suffer of eating disorders (30).

Oral care instructions such mouth rinses with acid-neutralizing solution or simply using still water instead of brushing teeth after vomiting are needed. Other instructions for these patients include the use of an additional source of fluoride, continuous monitoring, and written recommendations, reinforcing atraumatic brushing of teeth and tongue, including the need to change from regular toothbrushes to electric toothbrushes. Excessive tooth brushing together with excessive force applied, leads to dental abfraction that can be prevented in time (17)(31). The collaboration of the patient is very important for dentists to correctly diagnose ED. However, there are some cases where patients deny they have this pathology, and the treatment is limited to restorative intervention. An example is shown in a case report from a dental school in Belgium, where the patient denied having an ED and reported using fruit juices daily; this led the dentists to the conclusion that those juices were the cause of the erosions. Six years later, the patient confirmed the existence of an ED. Composite restoratives are resistant to dissolution by acids, and their placement in erosion lesions should be part of preventive care even if the diagnosis is not confirmed yet (32).

As healthcare providers we are responsible to ensure the well-being of our patients. Dentists must be aware about the relationship between these disorders and how they affect the oral cavity and impact their bodies and their lives. (33). The relationship between mental health and dentistry plays a significant role, especially in the 21st century, given the widespread impact of the COVID-19 virus on both fields. Overall, the pandemic has had a significant impact on the mental health of dental students and professionals. Increased stress, anxiety, and depression have been reported among dental students and dentists. (34)(35)(36) Dentistry must undergo a process of reinvention, exploring new methods to comprehend the novel scenarios linked to oral health.

Health, dentistry and eating disorders must be integrated into much more complex research processes, understanding this last one, as one of the key theoretical frameworks within the concept and processes of health. Life itself requires approaches such as Machine Learning, Deep Learning, or artificial intelligence. This type of analysis is required to delve into these important issues (37).

Dentists are just part of the team when ED are being diagnosed and treated; they can only prevent and treat oral affectations, but this is not enough. They need help from different healthcare providers such as physicians, nutritionists, and psychiatrists. Dentists are the first healthcare professionals to identify oral symptoms of ED, thus we have a duty to direct patients to receive an integral treatment (27). Encouraging doctors to include dentists as part of the multidisciplinary teams in the treatment of ED is fundamental for a comprehensive and equitable care for these patients.

## Conclusions

Oral conditions, access, and the conceptual notion of what eating disorders mean in dentistry are key to understanding the oral health of patients of this

type and improving the quality of life in systemic conditions such as these. Differential care requires interdisciplinary work and various disciplines, included oral health must be part of the team. This article highlights a public health problem that already has consequences for the oral health and quality of life of the implicated population.

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