



Review

# ORAL MUCOSAE MANIFESTATION IN PATIENTS WITH EATING DISORDERS: AN OVERVIEW

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## ABSTRACT

Eating disorders (EDs) are a group of complex disorders characterized by persistent disturbances in eating or eating-related behaviors, resulting in altered food consumption or absorption and significantly impacting physical health and psychosocial functioning. The dentist plays a significant role in these clinical issues. Through a properly conducted interview and a detailed extraoral and intraoral examination, the dentist can be the first healthcare professional to recognize the symptoms of an ED. The oral symptoms of eating disorders can manifest at any stage of the illness and serve as an essential indicator to assess its course, prognosis, and treatment. In the literature, there are many studies available on the effects of eating disorders on oral health and perioral tissues. Still, there are few studies on the relationship between oral surgery and eating disorders. This review aims to describe the oral mucosae manifestation in patients with eating disorders and their leading causes. EDs are highly prevalent conditions, and the likelihood of a dentist encountering such patients is substantial. When encountering a patient with a history of EDs, currently undergoing treatment for EDs, or suspected of having EDs, it is advisable, before proceeding with oral surgery, to assess the risk/benefit ratio of oral therapy.

**KEYWORDS:** *eating disorders, EDs, oral mucosae, food consumption/absorption, oral symptoms, oral surgery*

## INTRODUCTION

Eating disorders (EDs) are a group of complex disorders characterized by persistent disturbances in eating or eating-related behaviors, resulting in altered food consumption or absorption and significantly impacting physical health and psychosocial functioning (1).

In Italy, EDs affect up to 5% of the population, meaning that currently, almost 3 million people in Italy have one of these disorders. From 2019 to 2022, there was a 40% increase in new cases, from 680,000 cases in 2019 to nearly 1.5 million in 2022. The recent pandemic likely contributed to the increased prevalence of these disorders, as the post-traumatic origin of eating disorders is recognized and well-documented. Eating disorders predominantly affect females (90%), but in recent years, there has been a higher incidence among males. These disorders often onset at a young age, with 58% of the population affected being between 13 and 25 years old. Furthermore, recent data indicate a further

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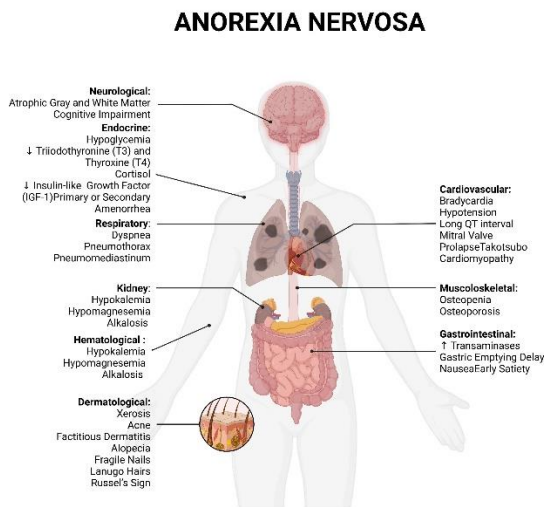
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decrease in the age of onset, as 30% of the affected population is under 14 years old. The most common forms are Anorexia Nervosa (36.2%), Bulimia Nervosa (17.9%), and Binge Eating Disorder (12.4%) (2).

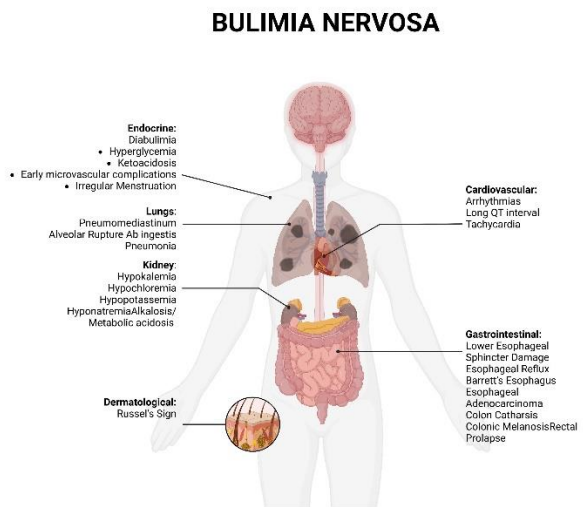
Nutrition and eating disorders have been included in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), published in 2013 by the American Psychiatric Association (APA). The DSM-5 contains diagnostic criteria for mental disorders to assist clinicians in evaluating patients and making accurate diagnoses (1). Table I lists the diagnostic criteria for the most common eating disorders (Fig. 1-3).

**Table I.** Diagnostic criteria DSM-5 for major eating disorders.

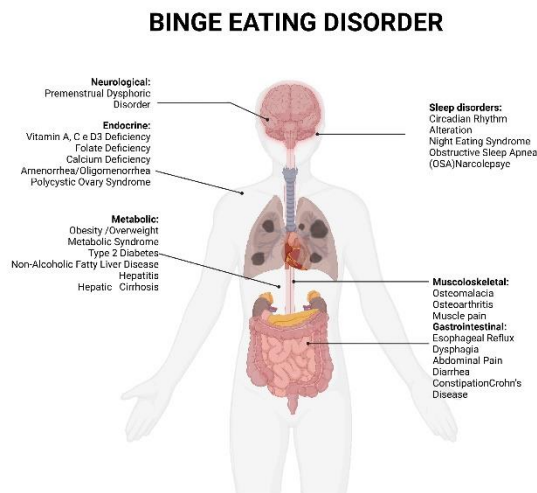
<b>Anorexia Nervosa</b>	<ul style="list-style-type: none"> <li>● Restriction of calorie intake necessary for maintaining a healthy body weight, with significantly low body weight in the context of age, sex, developmental trajectory, and physical health. Significantly low body weight is defined as a weight below the normal minimum or, for children and adolescents, less than expected minimum weight.</li> <li>● Intense fear of gaining weight or becoming fat, or persistent behavior that interferes with weight gain, even when significantly underweight.</li> <li>● Disturbance in how one's body weight or shape is experienced, excessive influence of body weight or shape on self-esteem levels, or persistent lack of recognition of the seriousness of the current underweight condition.</li> </ul> <p>Restricting type: Over the past 3 months, the individual has not engaged in recurrent episodes of binge eating or purging behaviors (e.g., self-induced vomiting or misuse of laxatives, diuretics, or enemas). In this subtype, weight loss is primarily achieved through dieting, fasting, and/or excessive physical activity.</p> <p>Binge-eating/purging type: Over the past 3 months, the individual has engaged in recurrent episodes of binge eating or purging behaviors (i.e., self-induced vomiting or misuse of laxatives, diuretics, or enemas).</p>
<b>Bulimia Nervosa</b>	<ul style="list-style-type: none"> <li>● Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following aspects: <ul style="list-style-type: none"> <li>○ Eating, within a discrete period of time (e.g., within a two-hour period), an amount of food that is significantly larger than what most individuals would eat in a similar period of time and under similar circumstances.</li> <li>○ Feeling a loss of control during the episode (e.g., feeling unable to stop eating or control what or how much one is eating).</li> </ul> </li> <li>● Recurrent and inappropriate compensatory behaviors to prevent weight gain, such as self-induced vomiting, misuse of laxatives, diuretics, or other medications, fasting, or excessive physical activity.</li> <li>● Binge eating and inappropriate compensatory behaviors both occur on average at least once a week for 3 months.</li> <li>● Self-esteem levels are unduly influenced by body shape and weight.</li> <li>● The disturbance is not exclusively manifested during episodes of anorexia nervosa.</li> </ul>
<b>Binge eating disorder</b>	<ul style="list-style-type: none"> <li>● Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following aspects: <ul style="list-style-type: none"> <li>○ Eating, within a discrete period of time (e.g., within a two-hour period), an amount of food that is significantly larger than what most individuals would eat in a similar period of time and under similar circumstances.</li> <li>○ Feeling a loss of control during the episode (e.g., feeling unable to stop eating or control what or how much one is eating).</li> </ul> </li> <li>● Episodes of binge eating are associated with three (or more) of the following aspects: <ul style="list-style-type: none"> <li>○ Eating much more rapidly than normal.</li> <li>○ Eating until feeling uncomfortably full.</li> <li>○ Eating large amounts of food even when not feeling physically hungry.</li> <li>○ Eating alone because of embarrassment over how much one is eating.</li> <li>○ Feeling disgusted with oneself, depressed, or very guilty after the episode.</li> </ul> </li> <li>● There is marked distress regarding the binge eating.</li> <li>● The binge eating occurs, on average, at least once a week for 3 months.</li> <li>● The binge eating is not associated with the systematic use of inappropriate compensatory behaviors as in bulimia nervosa, and it does not occur exclusively during episodes of bulimia nervosa or anorexia nervosa.</li> </ul>



**Fig. 1.** Systemic involvement of anorexia.



**Fig. 2.** Systemic complications of bulimia.



**Fig. 3.** Systemic complications of binge-eating disorder.

Over time, various systemic complications can develop, affecting different systems and organs of the human body (Table II). This highlights the importance of multidisciplinary treatment (3-7).

**Table II.** Systemic complications of anorexia, bulimia, and binge-eating disorder.

Systemic complications of major eating disorders			
	Anorexia Nervosa	Bulimia Nervosa	Binge Eating Disorder
Cardiovascular	Bradycardia Hypotension Long QT interval Mitral Valve Prolapse Takotsubo Cardiomyopathy	Arrhythmias Long QT interval Tachycardia	
Respiratory	Dyspnea Pneumothorax Pneumomediastinum	Pneumomediastinum Alveolar Rupture Ab ingestis Pneumonia	
Renal	Hypokalemia Hypomagnesemia Alkalosis	Hypokalemia Hypochloremia Hypopotassemia Hyponatremia	

		Alkalosis/Metabolic acidosis	
Endocrine	Hypoglycemia ↓ Triiodothyronine (T3) and Thyroxine (T4) Cortisol ↓ Insulin-like Growth Factor (IGF-1) Primary or Secondary Amenorrhea	Diabulimia <ul style="list-style-type: none"> <li>• Hyperglycemia</li> <li>• Ketoacidosis</li> <li>• Early microvascular complications</li> </ul> Irregular Menstruation	Vitamin A, C e D3 Deficiency Folate Deficiency Calcium Deficiency Amenorrhea/Oligomenorrhea Polycystic Ovary Syndrome
Musculoskeletal	Osteopenia Osteoporosis		Osteomalacia Osteoarthritis Muscle pain
Gastrointestinal	↑ Transaminases Gastric Emptying Delay Nausea Early Satiety	Lower Esophageal Sphincter Damage Esophageal Reflux Barrett's Esophagus Esophageal Adenocarcinoma Colon Catharsis Colonic Melanosis Rectal Prolapse	Esophageal Reflux Dysphagia Abdominal Pain Diarrhea Constipation Crohn's Disease
Hematological	Anemia Neutropenia Thrombocytopenia		
Dermatological	Xerosis Acne Factitious Dermatitis Alopecia Fragile Nails Lanugo Hairs Russel's Sign	Russel's Sign	
Neurological	Atrophic Gray and White Matter Cognitive Impairment Leg and Arm Neuropaxia		Premenstrual Dysphoric Disorder
Metabolic			Obesity /Overweight Metabolic Syndrome Type 2 Diabetes Non-Alcoholic Fatty Liver Disease Hepatitis Hepatic Cirrhosis
Sleep Disorders			Circadian Rhythm Alteration Night Eating Syndrome Obstructive Sleep Apnea (OSA) Narcolepsy

### *Eating disorders in dentistry*

Patients with eating disorders require a thorough diagnosis and multidisciplinary treatment. However, the dentist plays a very important role in these clinical issues. The dentist can be the first healthcare professional to recognize symptoms of an ongoing systemic disease through an adequately conducted interview and a detailed extraoral and intraoral examination. Additionally, the dentist often precedes other healthcare professionals and can direct patients to competent specialists (8). Therefore, the dentist needs to recognize the signs and symptoms of oral cavity involvement in eating disorders to implement secondary prevention methods, allow appropriate diagnosis, and improve prognosis (9, 10).

The oral symptoms of eating disorders can manifest at any stage of the illness and serve as an important indicator to assess its course, prognosis, and treatment. The impact of eating disorders on the soft and hard tissues of the mouth depends on the diet and the duration and intensity of the illness (11, 12). Oral manifestations occurring in eating disorders are mainly caused by nutritional deficiencies and subsequent metabolic alterations. Still, they can also be related to the low priority given to personal hygiene care, underlying psychological disorders, altered nutritional habits (tendency to eat certain foods), or the intake of certain medications and bone healing (13-15).

### *Signs and symptoms of the oral cavity*

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#### *Dental lesions*

Dental erosion, also known as perimolysis, is the most common oral manifestation in individuals with eating disorders. Perimolysis is the dissolution of enamel and dentin, without bacterial involvement, caused by frequent exposure to internal or external acids. This leads to functional and aesthetic compromise of the dental elements (17). In the case of bulimia and anorexia nervosa, this wear is due to chronic vomiting and regurgitation, and these eating disorders are considered intrinsic causes of dental erosion. These lesions primarily appear on the incisal and lingual surfaces of the anterior teeth, which are thin and fractured. In severe cases, the patient's vertical dimension may decrease due to tooth wear. Dental erosions and their complications can cause oral symptoms ranging from tooth sensitivity to episodes of pain (13).

Dental caries typically have a multifactorial etiology; therefore, its occurrence cannot be solely attributed to the patient's eating disorder. Personal oral hygiene, genetic tendency, malnutrition, cariogenicity of the diet, fluoride exposure during odontogenesis, and the intake of specific medications are usually responsible for differences in caries prevalence in patients with eating disorders.

Chronic self-induced vomiting, excessive intake of laxatives, diuretics, and/or appetite suppressants, and strenuous workouts usually result in incessant dehydration. This, in turn, negatively affects the volume of saliva production and secretion. The intake of antidepressants as a therapeutic regimen for eating disorders can further induce a xerostomic effect, worsening the scenario. Increased salivary viscosity and decreased buffering capacity can thus lead to a decrease in salivary pH, contributing to demineralization and dental caries (18).

#### *Periodontal diseases*

Eating disorders have a peak incidence in children and young adults when the onset of advanced periodontal disease is less frequent. However, patients with eating disorders may have poor oral hygiene, which can lead to gingival inflammation and potentially predispose to periodontitis. Furthermore, nutritional deficiencies, especially vitamin C, can also affect the marginal periodontium predisposing to gingivitis. In particular, vitamin C deficiency, known as scurvy, causes defective collagen synthesis, which may be associated with generalized gingival swelling, spontaneous gingival bleeding, ulcerations, tooth mobility, and increased severity of periodontal infections (13).

#### *Salivary gland manifestations*

Patients with eating disorders often present with enlargement of the parotid glands. The onset of swelling usually follows a binge-eating episode. In the early stages of the eating disorder, glandular enlargement may appear and disappear, but it later becomes more persistent. This is caused by sialadenosis, a non-inflammatory enlargement of the salivary glands, caused by peripheral autonomic neuropathy, which is responsible for a disorder of metabolism and secretion, resulting in acinar enlargement and functional compromise (13). Sialadenosis can also involve the minor salivary glands (19). Another important aspect is the decrease in salivary flow. Xerostomia is caused by various factors, such as:

- structural alterations of the glands;
- the psychotropic medications prescribed to treat patients with eating disorders;
- the fluid imbalance caused by excessive use of diuretics and laxatives to prevent weight gain, as well as persistent vomiting.

Finally, reduced saliva production is responsible for lowering the pH of the mucosal surfaces in the hard palate region, which may be the reason for the pathologies of the minor salivary glands in the hard palate. A pathology observed very frequently is necrotizing sialometaplasia, mainly observed in association with bulimia. This is a self-limiting disorder with uncertain etiopathogenesis, probably caused by ischemic necrosis of the salivary gland lobules (5). Necrotizing sialometaplasia can mimic invasive carcinoma, and recognizing this pathology is essential to avoid misdiagnosis and unnecessary surgical therapies (13).

*Lesions of the oral mucosa and perioral tissues*

In patients with bulimia, erythematous lesions of the palate and ulcerations induced by trauma to the soft palate and pharynx are often observed due to chronic acid contact and repeated digital trauma (18).

Mucosal atrophy is often observed, mainly caused by reduced intake of vitamins, especially B group vitamins (B1, B6, and B12), which are associated with cellular turnover, and other nutrients, such as iron deficiency, which can lead to anemia. Mucosal atrophy is associated with a burning sensation, particularly intense on the tongue (glossodynia) (13). The burning sensation may be secondary to underlying psychological (anxiety, depression, and stress) and neurological disorders (20).

Furthermore, a yellow-orange discoloration of the mucosa can be observed at the level of the soft palate. This particular coloration is caused by an increase in the serum level of carotene: this can be provoked in patients with anorexia, by a diet rich in carotenoids, by the abuse of vitamin A analog supplements, and by hypothyroidism (21).

The increased incidence of exfoliative cheilitis in patients with eating disorders may be correlated with dehydration and decreased salivary secretion, lack of nutritional micronutrients (including vitamins A and B groups) due to periodic fasting, and parafunctions such as lip biting due to stress and emotional factors (22). In patients with bulimia, lip erythema is frequently observed, caused by the irritating chemical action of self-induced vomiting. It is mainly observed on the vermilion border of the lips and more commonly affects the lower lip (21).

Furthermore, oral mucosal hemorrhagic lesions (petechiae, ecchymosis, hematoma) can be observed, caused by a coagulopathy disorder or soft tissue injury, leading to vascular damage with extravasation of red blood cells (23). Patients with eating disorders are often affected by candidiasis. Fungal proliferation can be caused partly by the acidic environment and high carbohydrate intake in bulimic patients and, in part, by nutritional deficiencies (24,25). Chronic candidiasis has also been associated with the onset of angular cheilitis, although the latter can also be caused by superinfection by *Staphylococcus* (26).

**DISCUSSION**

EDs are highly prevalent conditions, and the likelihood of a dentist encountering such patients is substantial. While the dentist is not tasked with treating the eating disorder itself, they can undoubtedly contribute significantly to the multidisciplinary treatment of EDs.

When encountering a patient with a history of ED, who is currently undergoing treatment for ED, or who is suspected of having ED, it is advisable to assess the risk/benefit ratio of oral surgery before proceeding with it (27, 28). Oral surgery should be avoided during active phases of ED and postponed until stabilization phases.

In the absence of treatment guidelines for patients with ED, it is recommended to gather comprehensive patient history data, including information on the type of disorder, duration, presence of systemic sequelae, substance use, or medication for ED treatment. Additionally, laboratory and instrumental examinations are useful to assess the patient's health status. An anesthesiological evaluation of the patient is also beneficial to determine the need for sedation or pre-anesthesia anxiolysis, taking into account potential pharmacological interactions that may cause excessive sedation.

Before the procedure, it is advisable to consult other specialists involved in the patient's care, such as a psychiatrist or psychologist and a nutritionist, for postoperative dietary guidance. All members of the multidisciplinary team should closely monitor the patient in the postoperative phase to prevent relapses or exacerbations of ED (29, 30).

**CONCLUSIONS**

In conclusion, the dentist can collaborate with the patient's eating disorder treatment team to maximize oral success and reduce complications by being aware of the issues this patient presents.

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