

Eating disorders: Condition of interest to a restoring dentist: A narrative review

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Abstract

Eating disorders (EDs) are psychosocial conditions having a significant impact on the patient's general and oral health status. Since dentists are usually the first health professionals to encounter patients with EDs, it is important to be aware of the characteristic presentations of these disorders. This narrative review aims to provide a knowledge base for restoring dentists about three main eating disorders –Anorexia nervosa, Bulimia nervosa and Binge Eating Disorders, their systemic and oral manifestations, protocol for preventive care and comprehensive treatment plan. Literature search was conducted in electronic databases and 60 articles were selected for the review. Considerable emphasis is placed on diagnosis and management of such disorders. These patients pose a challenging situation to the dental fraternity, since most restoring dentists are unaware of the fundamental importance of their role in the multidisciplinary treatment and due to lack of training regarding strategies involved in their dental treatment.

Keywords: Eating disorders, Oral manifestations, Diagnosis, Prosthodontic management.

Introduction

Eating disorders (EDs) are defined as persistent disturbance of eating behavior or behavior intending to weight loss, which significantly impairs the physical health or psychosocial functioning.¹ EDs include anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED) and various other specified and unspecified feeding or eating disorders.²

AN patients have a severe repugnance towards food causing drastic weight loss. BN patients are marked by recurrent episodes of binge and purge cycles.³ BED is associated with recurrent episodes of uncontrolled eating until the person is uncomfortably full.⁴

The objective of this narrative review is to provide a highlight of the diagnostic features, systemic and oral manifestations and prosthodontic management of EDs.

Materials and Methods

Literature search was conducted in the following electronic databases, namely; PubMed/Medline, Science direct and Google scholar, and was based on the following keywords; "eating disorders", "oral manifestations", "diagnosis" and "prosthodontic management". The search was augmented by a manual search of the relevant journals and textbooks unavailable through online database.

Results

A total of 154 articles were retrieved, which included clinical trials, cross-sectional studies, case reports and systematic reviews. Ultimately, 60 articles were selected and summarized as they met the inclusion criteria.

Discussion

The prevalence of eating disorders has increased in recent years. This has been attributed to the phenomenon of urbanization and westernization of society, leading to excessive importance directed towards body image.⁵ The exact cause for EDs is unknown, however, it has been

significantly associated with psychological, biological (genetic predisposition), personality traits and environmental factors- child maltreatment, social isolation, parental pressure, cultural and peer pressure. It is more commonly encountered among young women.⁶⁻⁸ These disorders are primarily a manifestation of a psychic suffering, which consequently affects the integrity and functioning of multiple organ systems. This can further result in significant morbidity and life-threatening outcomes.⁶⁻⁸

Patients with EDs are usually reluctant to seek medical evaluation and treatment. Nevertheless, since EDs are directly influenced by body image and appearance, these patients tend to seek dental care before seeking medical treatment.⁹ Also, some of the initial signs and symptoms associated with EDs are found in or around the oral cavity.⁶ Thus, Oral Healthcare Professional (OHCP) are often the first individuals to encounter patients with undiagnosed EDs.

Recognition of the oral manifestations is important because these signs and symptoms can provide insights about disease progression and parallel general health and psychic status. Thus, knowledge of the medical and oral aspects of EDs can enlighten the OHCP about these disorders, bringing early attention to the problem and, further improving the overall prognosis of such patients. Early detection can prevent or reduce serious conditions associated with EDs, such as, malnutrition, decreased basal metabolic rate, dysphagia, trauma of oral soft tissue, etc.^{10,11} Moreover, failure to detect an undiagnosed case can result in post-treatment dental complications, which occur due to undiagnosed cause of the dental lesions. EDs are an extremely complex set of conditions characterized by abnormalities in feeding patterns, extreme weight control practices, excessive concern for physical fitness and altered perception of body image.¹²

Anorexia nervosa

Anorexia nervosa is characterized by deliberate self starvation and consequent weight loss associated with a pathological fear of gaining weight.¹³

According to DSM-5, there are three diagnostic criteria for AN:¹² 1) Restriction of energy intake relative to requirements leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. There is a refusal to maintain body weight equal to or greater than 85% of that expected for the patient's age and height, 2) An intense fear of gaining weight or becoming fat, although underweight, 3) A distorted view of one's body weight, size or shape exists. Also, there is undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriousness of the current low body weight.

Physical symptoms include emaciated appearance (body mass index <17.5), lanugos hair covering the face and trunk, bradycardia, hypotension, cyanosis of the feet and hand, hypothermia, amenorrhea, loss of heart and brain tissue, osteopenia and osteoporosis.^{14,15}

Bulimia nervosa

It is an eating disorder characterized by recurrent episodes of binge eating and purging behaviors. These patients over eat and then purge themselves, usually through self-induced vomiting (SIV) with or without the help of ipecac.³ Self-induced vomiting is initiated with a finger or an object like pencil or comb to trigger the gag reflex. This may lead to calluses on the dorsal side of the fingers (Russell's sign).¹⁶ Misuse of laxatives and/or diuretics, or other medications; fasting; or excessive exercise are other means to prevent weight gain. These patients also indulge in alcohol, drugs and tobacco abuse, shoplifting, promiscuity and abnormal sexual practices. Bulimics are within 10% of ideal body weight.^{16,17}

According to DSM-5, the diagnostic criteria for BN include:¹² 1) Eating an unusual amount of food in a discrete time period, 2) A perceived lack of control over eating during an episode, 3) Compensatory behavior to rid the body of excess calories and prevent weight gain, 4) Binge eating and inappropriate compensatory behaviors, that occur at least once a week for three months, 5) A persistent concern with body shape and weight, 6) the disturbance does not occur exclusively during episodes of anorexia nervosa.

Medical complications include sore throat, oesophageal tears, dehydration, electrolyte imbalance leading to irregular heart beat or cardiac arrest and damage to the liver, bowels and kidneys.¹⁸ In addition, cutaneous changes are also noted such as acne, alopecia and hypertrichosis.¹⁹

Binge eating disorders

Binge eating disorders (BED) is identified by repeated episodes of uncontrolled eating.¹²

According to DSM-5, diagnostic criteria for BED include:¹² 1) These patients eat large volumes of food within a discrete time period, 2) They have no control on the quantity they eat, 3) Three (or more) of the following occur in BED:- a) They eat faster than normal, b) eat until they feel

uncomfortably full, c) eat large quantities of food even when not hungry, d) eat alone out of embarrassment, or e) feel disgusted with oneself, depressed or guilty about overeating, 4) the binge eating occurs, at least once a week for three months, 5) It is not accompanied with recurrent use of inappropriate compensatory behaviors and does not occur exclusively during the course of bulimia nervosa or anorexia.

BED patients are overweight and have chronic diseases like diabetes, hypertension, heart disease, high cholesterol, gall bladder disease or certain cancers. When untreated these patients develop AN or BN.¹⁷

Oral manifestations of eating disorders

Oral health is a reflection of the general health condition. Oral manifestations of eating disorders are chiefly caused by nutritional deficiencies and presence of stomach acids in the mouth caused by chronic and frequent self-induced vomiting. These signs are seen as early as six months following consistent disordered eating behaviors.^{18,20}

The oral manifestations include dental erosion, dental caries, dentine hypersensitivity, xerostomia, salivary gland hypertrophy, periodontal disease and oral mucosal lesions.⁹

Dental erosion

Holst and Lange coined the term "Perimolysis". According to Hellström, it is described as "a loss of enamel and dentin on the lingual surfaces of the teeth as a result of chemical and mechanical effects caused mainly by regurgitation of gastric contents and aggravated by the movements of the tongue".^{21,22}

Erosion may be observed within 6 months after the onset of vomiting²³ and is characterized by progressive and irreversible loss of the mineralized tooth structure causing early lesions of smooth silky-shining glazed dental surfaces and progressive lesions in the form of flat or shallow concavities, coronal to enamel-cementum junction. Advanced lesions present changes in the original tooth morphology, with cupping or grooving on the occlusal/incisal surfaces. This characteristic pattern is usually found on the palatal surfaces of the maxillary teeth and occlusal surfaces of mandibular molars.²⁴ Amalgam restorations may appear raised like "islands of metal". Composite restorations may fail due to loss of marginal integrity. Further chronic purging may lead to thinning of the incisal edges of the maxillary anterior teeth with subsequent chipping and fracture. Ultimately loss of incisal edges of the anterior teeth may lead to an anterior open bite. Erosion when progressed to the posterior teeth may result in a decreased vertical dimension.²⁵⁻²⁷

The severity of perimolysis depends on duration and frequency of purging incidents per day, degree of acid dilution by means of water rinsing or drinking of neutralizing liquids such as milk and timing of teeth cleaning.²⁸ Active erosions are smooth, unstained and usually not sensitive to temperature. However, staining eventually occurs with the cessation of self-induced vomiting.²⁹

In the differential diagnosis, other intrinsic and extrinsic factors of tooth erosion should be considered. Intrinsic factors

are gastro-esophageal reflux, rumination, gastric ulcers, diabetes, nervous system disorders, vomiting associated with pregnancy and alcohol abuse.³⁰ Extrinsic factors include swimming in highly chlorinated water, chewing vitamin C tablets, pouching of lemon or other citrus fruits between the cheeks and the buccal surfaces of the teeth, sucking lemon drops and frequent intake of highly acidic fruit drinks.

In patients with no history of vomiting, a major cause of tooth surface loss may be a high intake of low pH carbonated beverages and sport drinks. Dietary citrus fruits usually erode the facial surfaces of teeth which have a dished out appearance in contrast to the smooth, glossy texture of perimolysis.³¹

Dental caries

Patients who binge on foods high in refined carbohydrates and sugars have an increased incidence of caries. Pit and fissure caries occur more frequently but smooth surface caries are found where enamel decalcification exists. Poor oral hygiene, xerostomia,³² impaired salivary buffering capacity and ingestion of medications such as dextrose tablets and ingestion of acidic beverages such as citrus juices, carbonated diet drinks or sucrose-containing vitamin C drinks, particularly in anorexic patients, can present with increased risk of dental caries.²⁰ Severe dental erosions combined with carious lesions can ultimately lead to pulpal necrosis.

Dentine sensitivity

The EDs patients may seek treatment in the dental office for treatment of dentine hypersensitivity caused due to enamel erosion.³³

Xerostomia

The EDs patients often report with xerostomia. This can be attributed to electrolyte imbalance from persistent vomiting and overuse of diuretics or laxatives. Also, use of psychotropic medications such as anti-depressants and anxiolytics, can contribute to xerostomia.^{34,35} Elevated salivary concentrations of ASAT (Aspartate aminotransferase) and total protein may serve as indicators for patients with EDs as well as the severity of the disease.³⁶

Salivary gland hypertrophy

Intermittent enlargement of one or both parotid glands and occasionally the submandibular glands has been reported in EDs patients especially who frequently binge and purge.³⁷ The swelling appears two to six days after a binge-purge episode. It gives a widened and square appearance to the mandible and this distorted appearance is distressing to the patient.^{4,9,19}

Oral mucosal lesions

Angular cheilitis, candidiasis, glossitis and oral mucous ulceration are possible sequelae to nutritional deficiencies. Also trauma to oral mucous membranes and the pharynx, from forceful regurgitation and rapid ingestion of food, has been noted in EDs patients. In addition, traumatic lesions on

the palate and oropharynx can be caused by insertion of objects to induce vomiting.^{9,38}

Periodontal disease

Patients with EDs may have poor oral hygiene, which may lead to gingivitis and potentially predispose to periodontitis. A generalized gingival erythema due to xerostomia and nutritional deficiencies may be seen. Vitamin C deficiency may be associated with marginal gingivitis.^{39,40}

Other oral manifestations

Multiple nutritional deficiencies associated with EDs can be a predisposing factor for oral opportunistic infections. Also, osteopenia and subsequently osteoporosis has been observed in patients with AN needing medical attention.³⁹

Dental management

The role of an OHP is very crucial to diagnose this bio-psycho-social disease in the early phase and to provide proper multidisciplinary approach with the help of a physician, psychotherapist and nutritionist before commencement of the complex dental treatment.⁴¹ Although EDs associated oral manifestations may be evident, the patient may deny vomiting and thus, it is mandatory for the dental clinician to foster a trusting doctor-patient relationship to gain the patient's confidence and must be aware of the associated symptoms, since early diagnosis can be instrumental in early detection and adequate referral for a prompt recovery.³⁹

Two questions that have high sensitivity and specificity for diagnosing bulimia and anorexia nervosa are "Are you satisfied with your eating patterns?" and "Do you ever eat in secret?" which require a yes or no answer.⁹ In addition, patients can be asked to fill out questionnaire forms to confirm the diagnosis, Eating Attitudes Test (EAT) and The Bulimia Investigatory Test, Edinburgh (BITE) self rating scale for AN and BN patients respectively.^[42] Moreover, Morgan *et al.* suggested "The SCOFF questionnaire" as a more reliable and easier screening tool for eating disorders. This questionnaire uses an acronym in a simple five question test, addressing sickness associated with food, loss of control over eating, loss of weight, distorted perception of weight and dominance of food in life.⁴³

Literature has recorded the knowledge and attitude of dentist and patients with EDs towards oral health and oral health behavior.⁴⁴⁻⁴⁶ Patients who had less-positive experiences previously emphasized a need for dental professionals with specialized knowledge of the physical and psychological aspects of EDs. Patients also highlighted that communication skills, that extended an empathic approach from the dentist toward the patients with EDs could be a motivating factor for such patients to attend a dental clinic.⁴⁴⁻⁴⁶

Emergency care

Patients with eating disorder may come to the dental office for treatment of thermal sensitivity. If the teeth are not affected pulpally, an indirect pulp capping and composite resin restorations can be done. Teeth with pulpal involvement

should receive endodontic therapy.⁴⁷ Also patients with eating disorders are vulnerable to hypoglycemic syncope which is aggravated by the stress of the dental appointment. Orange juice, glucose or concentrated sports drinks should be available in the dental office emergency kit. The patient should be advised to eat a light meal or snack before the next dental appointment.⁴²

Preventive care^{4,42,48}

Emphasis is placed on prevention of further tissue damage during all phases of management and following completion of the treatment. Timely and regular follow up by dental professionals is crucial in order to avoid or minimize tooth damage and other oral complications. Besides educating the patients on the causes and effects of perimolysis and being supportive to them, controlling the pH of the oral environment, consumption of water, healthier juices and healthy foods, such as, nuts, cheese, whole grain products, vegetables, raw fruits, etc. should be recommended. Use of fluoride to harden and desensitize the teeth, maintenance of oral hygiene by brushing and flossing twice a day is also advised. Calcium and phosphate ions help to restore mineral balance, neutralize acid changes and stimulate salivary flow. Immediate brushing after vomiting is to be avoided since it makes the softened demineralized surface more susceptible to tooth brush abrasion. Rinsing with water after vomiting to neutralize acids and raise the pH in the mouth is advised. Sodium bicarbonate in water, magnesium hydroxide solution, liquid sugar free antacids or milk can be used as mouth rinses. Use of a mouth guard can protect teeth during vomiting. However, the mouth guard should not be kept in the mouth after vomiting as it will hold the acids and increase tooth surface loss.

Restorative care

The dentist should give palliative treatment initially along with a referral for psychologic counseling. Once the patient is stabilized psychologically and after cessation of bingeing and self induced vomiting, dental treatment may begin.⁴

Restoration of the worn dentition needs an analysis of the degree of structural damage. Hence, selecting restorative options require the analysis of remaining tooth structure, location of tooth loss, and occlusion. The treatment choice ranges from a conventional fixed and removable prosthesis to more conservative adhesive restorations. The patients with severe erosion need complex occlusal rehabilitation requiring correction of esthetic impairments, functional difficulties, and pain or sensitivity of teeth.⁴⁹

Erosion of the palatal surface of the maxillary anterior teeth directly affects the anterior guidance. Long-term complications of compromised anterior guidance include attrition and abfraction of posterior teeth, periodontal diseases due to trauma from occlusion, and temporomandibular joint disorders. Thus, care should be taken to establish accurate anterior guidance and harmonious occlusion in such patients.⁴⁹ Literature suggests the use of resin-bonded palatal metal alloy veneers, direct and indirect composite resin restorations and ceramic veneer restorations

for the restoration of anterior guidance. Palatal metal alloy veneers can be unaesthetic due to blanching of the incisal edge.⁵⁰ Indirect composite resin restorations and ceramic veneers exhibit improved physical properties as compared to direct restorations and minimal tooth preparation as compared to full crown restorations.^{51,52}

Loss of vertical dimension also contributes to the choice of treatment, as described by Schuyler.⁵³ Direct composite restorations are recommended for vertical dimension loss of less than 2 mm, while indirect ceramic veneer and overlays are recommended for more than 2 mm loss in vertical dimension. Indirect ceramic restorations are suggested for the rehabilitation of erosion with loss of vertical dimension more than 4 mm. Conventional crowns are effective in restoring extensively worn teeth, replacing missing teeth, and overcoming reduced crown height.⁵³ Milosevic and Burnside^[54] reported that nano-hybrid composite resin restorations on anterior worn out teeth with thick incisal edges and canine tips was a viable treatment modality provided the missing posterior teeth were restored to decrease the anterior loading on composite restorations.

Vailati *et al.*^{55,56} reported the used of two separate veneers, labial and palatal, with different paths of insertion which were adhesively luted with hybrid composite, to treat patients affected by severe erosion. They concluded that this technique, known as the sandwich approach, seemed promising with no loss of vitality or failure of the restorations.

Boitelle⁵⁷ suggested a three-step technical protocol, which included raising the occlusal vertical dimension using Bis-Acryl resin (Luxatemp Star, DMG Fabrik GmbH, Germany), restoration of posterior teeth with ceramic onlays, ceramic crown and direct resin restoration, and then anterior teeth restoration with indirect composite resin palatal veneers.

Moreover, literature reports minimally invasive approaches to treat localized anterior tooth erosion using adhesive restorations, centric relation and Dahl principle.^{58,59}

Tunkiwala and Chitguppi⁵⁹ reported that when treating eroded maxillary anterior teeth with deep bite, sufficient restorative space should be created anteriorly by combining centric relation and Dahl principles before bonding direct composite resin on the palatal surface and indirect porcelain veneers on the facial/incisal surfaces. This was done to reduce the need for extensive invasive palatal reduction. Gold palatal veneers in canine guidance can also be given for localized anterior teeth wear.⁶⁰

In more severe cases, when enamel erosion involving the posterior teeth has resulted in loss of vertical dimension, full mouth rehabilitation using direct composite resin restorations has been proven to be a valid treatment modality.⁶¹ In cases with no loss of vertical dimension besides esthetic correction of the teeth using full crowns, crown lengthening procedures may be considered to improve retention of the full crowns and to treat the soft tissue discrepancies.⁶²

The concept of immediate implant loading in the esthetic region of partially edentulous ED patient is considered as a predictable treatment to avoid the use of a removable interim

prosthesis during the healing phase. It avoids the gag reflex and uplifts the patient's self esteem.⁶³ Balshi *et al.* suggested the use of Teeth in a Day® (TIAD) immediate functional loading protocol to successfully rehabilitate a patient with active BN and to positively influence the psychological status of the patient.⁶⁴

Conclusion

This article has placed considerable emphasis on recognizing the oral signs, diagnosis and management of eating disorders. Post treatment follow-up and counseling with the help of physicians and psychologists are essential to motivate the patient to follow a healthy lifestyle and prevent reversal into previous eating behaviors that can negatively affect the prognosis of the dental treatment undertaken.

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