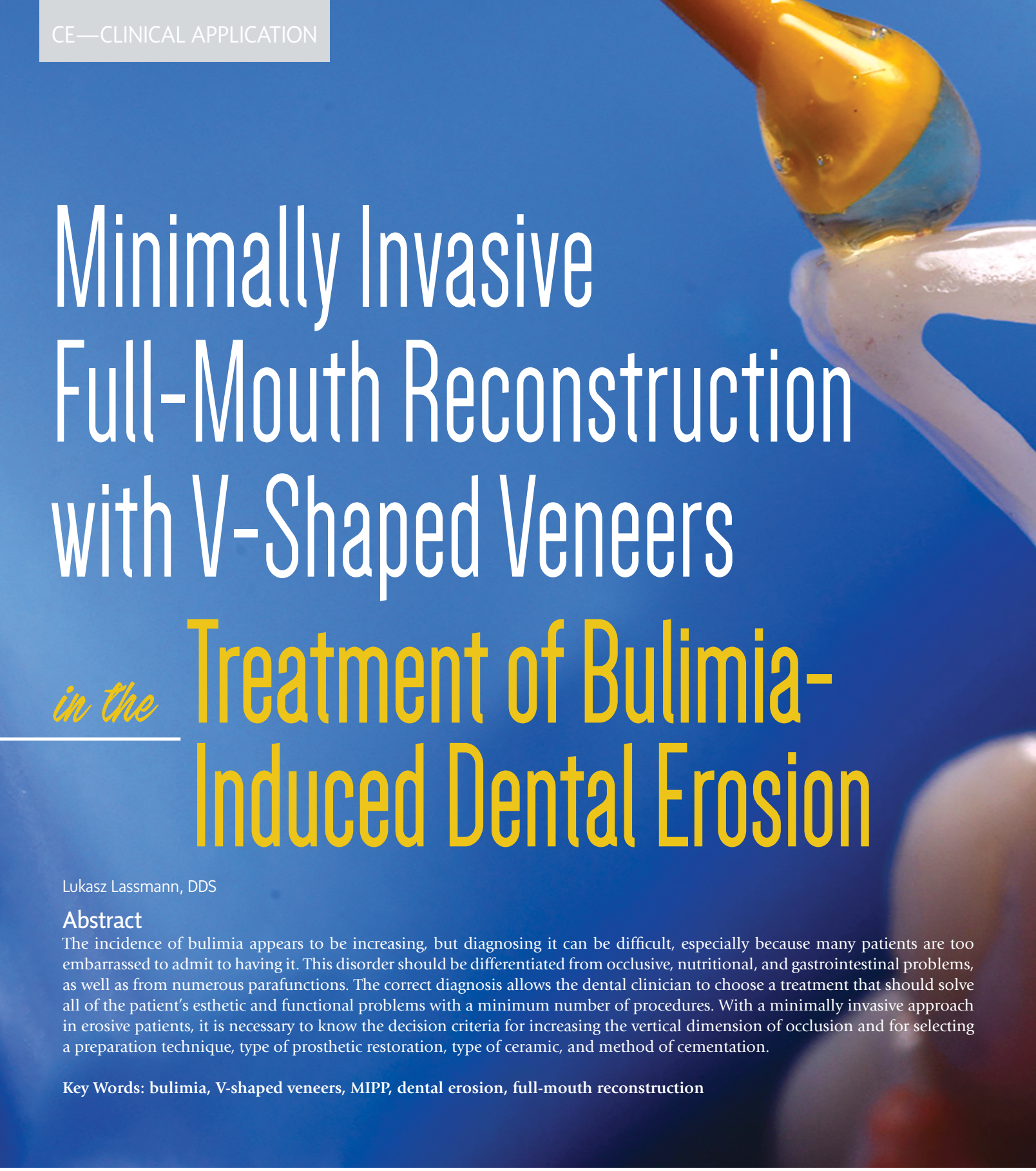

# Minimally Invasive Full-Mouth Reconstruction with V-Shaped Veneers *in the* Treatment of Bulimia-Induced Dental Erosion

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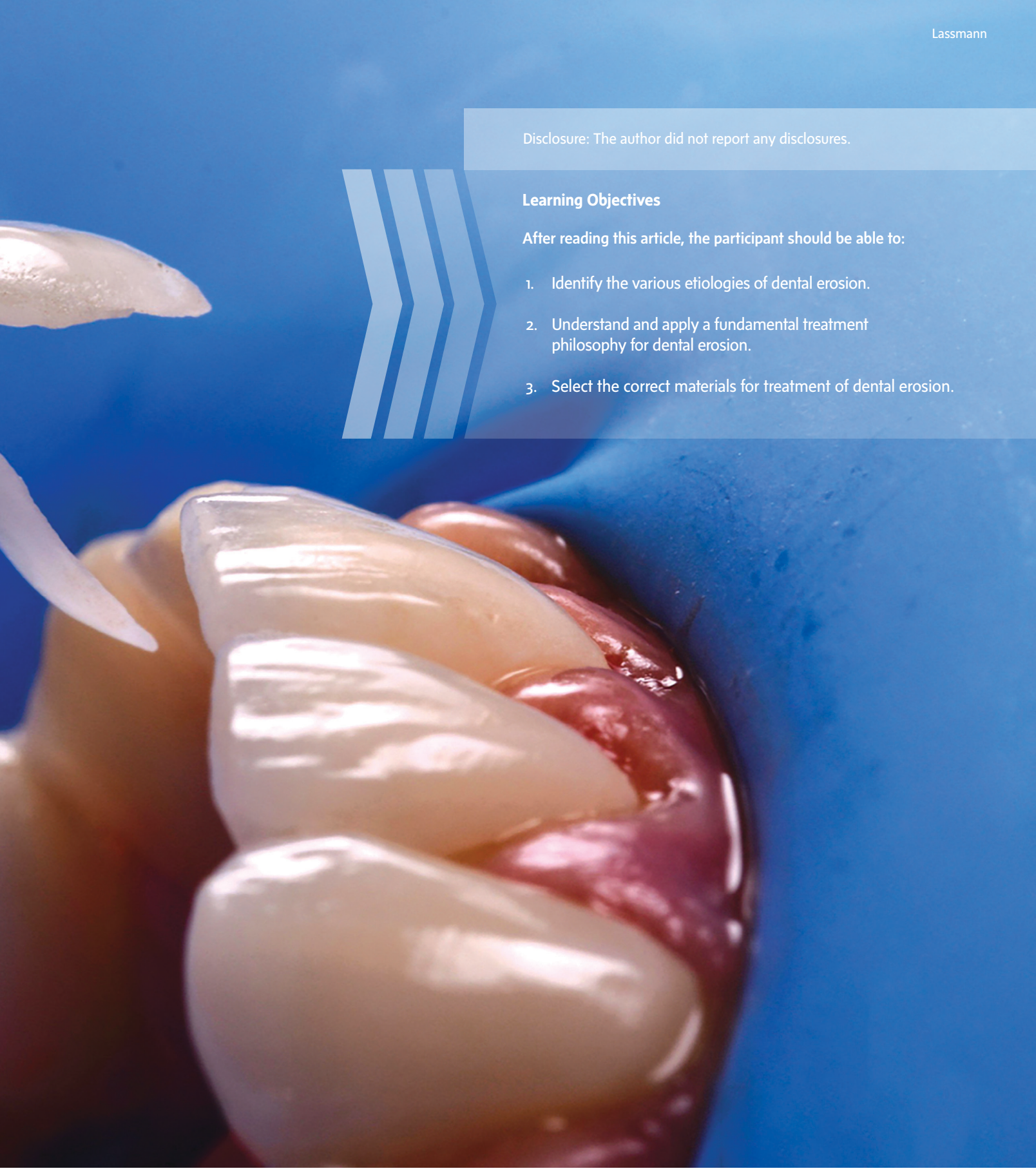
## Abstract

The incidence of bulimia appears to be increasing, but diagnosing it can be difficult, especially because many patients are too embarrassed to admit to having it. This disorder should be differentiated from occlusive, nutritional, and gastrointestinal problems, as well as from numerous parafunctions. The correct diagnosis allows the dental clinician to choose a treatment that should solve all of the patient's esthetic and functional problems with a minimum number of procedures. With a minimally invasive approach in erosive patients, it is necessary to know the decision criteria for increasing the vertical dimension of occlusion and for selecting a preparation technique, type of prosthetic restoration, type of ceramic, and method of cementation.

**Key Words: bulimia, V-shaped veneers, MIPP, dental erosion, full-mouth reconstruction**



Disclosure: The author did not report any disclosures.

**Learning Objectives**

**After reading this article, the participant should be able to:**

1. Identify the various etiologies of dental erosion.
2. Understand and apply a fundamental treatment philosophy for dental erosion.
3. Select the correct materials for treatment of dental erosion.

## Introduction

### Bulimia and GERD

Dental erosion is a common cause of tooth damage that may range from a superficial loss of the enamel surface to complete exposure of the dentin. The origin of erosive acid can be intrinsic or extrinsic, but the lower pH of gastric acid (intrinsic) corrodes tooth structure more than an acidic diet (extrinsic). This acid exposure often happens in patients with bulimia nervosa or gastroesophageal reflux disease (GERD).[1] Bulimia nervosa is a multifactorial disorder characterized by cycles of binge eating followed by compensatory behaviors, such as self-induced vomiting or excessive exercise. GERD is characterized by frequent regurgitation of gastric acid from the stomach into the esophagus or oral cavity. The prevalence of bulimia nervosa in the U.S. is between 1% and 3%, and the prevalence of GERD is between 18% and 28%.[1]

Intrinsic erosion is the result of endogenous acid (i.e., gastric acid making contact with the teeth during recurrent vomiting, regurgitation, or reflux). Eating disorders of psychosomatic origin, such as nervous vomiting, anorexia nervosa, or bulimia, often are the cause of regurgitation or vomiting, which in these cases is self-induced. Causes of somatic origin include pregnancy, alcoholism,[2] antabus therapy for alcohol abuse,[3] and gastrointestinal disorders, such as gastric dysfunction,[4] chronic obstipation,[5] hiatal hernia,[6] duodenal or peptic ulcers,[7] and GERD.[8]

In GERD, the digestive enzyme pepsin (but not trypsin) is able to degrade the eroded organic dentin matrix. Additionally, pepsin alone, similar to trypsin, is not able to increase erosive mineral loss. However, the combination of both pepsin and trypsin leads to an increase in erosive mineral loss, which is probably the result of increased matrix digestion. This mechanism could play a role in patients with eating disorders in combination with vomiting who suffer from dentin erosion because both enzymes could reach the oral cavity during vomiting, affecting the eroded dental hard tissue.[9]

There are two patterns of acid decalcification. Chronic ingestion of organic or inorganic acids causes greater decalcification on the labial surfaces of the anterior teeth. With chronic regurgitation, however, the decalcification process involves the lingual, palatal, and posterior occlusal surfaces more severely, a process termed *perimolysis* or *perimylolysis.*[10]

Gastric acid after two to three hours has higher pH but more pepsins that destroy dentin. Gastric acid at the time of digestion (immediately after eating) has fewer pepsins but a much lower pH level (approximately 1), so it could be concluded that GERD is more destructive to dentin and bulimia is more destructive to enamel.

### The Role of Fluoride

The role of fluoride in the prevention and treatment of erosion and erosive wear has long been questioned. In caries, in addition to the effect of fluoride ions diffusing into the enamel (sub)surface and adhering to the hydroxyapatite crystal surfaces, fluoride present in the plaque fluid will greatly increase supersaturation and speed up remineralization at pH levels over 4.5. As the pH level of the acidic substances causing erosion lies in the range of 2 to 5, it was thought that the preventive effect of fluoride against erosion could be marginal at best. This hypothesis was coupled with the knowledge that, unlike caries, erosion occurs on clean surfaces, thereby eliminating a possible diffusion barrier effect of the plaque biofilm. Traditional formulations with monovalent fluorides in a low to medium concentration and at neutral pH, such as most available fluoride toothpastes and mouth rinses, are probably not effective or are only minimally so. High-concentration acidic formulations provide a higher level of benefit. Most promising are the polyvalent fluoride formulations, with the best evidence for effectiveness available for titanium tetrafluoride (TiF4) and stannous fluoride (SnF2). Other polyvalent cations, such as hafnium, zirconium, copper, and zinc, also have been studied but do not appear to have a better anti-erosion effect than conventional fluorides.[11] Fluorides might be more effective for enamel than dentin, as the organic matrix influencing the efficacy of fluorides might to some extent be affected by enzymatic and chemical degradation as well as by mechanical abrasion.[12]

> “…the pH of a dietary substance is *not predictive* of its potential to cause erosion, as other factors *modify* the erosive process.”

### Acidic Foods and Beverages

There is evidence that acidic foodstuffs and beverages play a role in the development of erosion. However, the pH of a dietary substance alone is not predictive of its potential to cause erosion, as other factors modify the erosive process. These factors are chemical (pKa values; adhesion and chelating properties; calcium, phosphate, and fluoride content); behavioral (eating and drinking habits, lifestyle, excessive consumption of acids); and biologic (flow rate, buffering capacity, composition of saliva, pellicle formation, tooth composition, dental and soft tissue anatomy).

The erosive potential of an acidic drink is not exclusively dependent on its pH, but is also strongly influenced by its titratable acid content (buffering capacity or titratable acidity) and by the calcium-chelation properties of the food and beverages, as they efficiently bind released calcium. The greater the buffering capacity of the drink, the longer it will take for saliva to neutralize the acid. Some beverages appear to be less erosive than others within the same class. Therefore, higher titratable acidity means greater erosive potential, regardless of the pH **(Table 1)**.[13]

### Erosion and Abrasion

The interplay between erosion and abrasion, especially oral hygiene practices, may be the main driver leading to the clinical manifestation of this disorder. Recommendations for patients at risk of dental erosion, such as reducing acid exposure by reducing the frequency and contact of acids, are discussed below.

The erosive process can be divided into two stages. In the initial stage, a softening of the surface occurs due to partial demineralization of the surface. At this stage of the process, repair (remineralization) is in theory still possible, as the remaining tissue could act as a scaffold.

In the second stage, the mineral of the outer enamel is totally lost, and repair is not possible, but the remaining softened enamel beneath the lost hard tissue is remineralizable. There may be a balance between loss of surface enamel caused by erosion and repair and subsequent acquired resistance. When the frequency and strength of the acid challenge are greater than the adaptation process, dental erosion will manifest clinically.[14]

Calcium and phosphate concentration, in combination with pH, determine the degree of saturation with respect to tooth minerals. Solutions supersaturated with respect to enamel or dentin will not cause them to dissolve, meaning that given sufficient common ion concentrations, erosion will not proceed even if the pH is low. Interestingly, the addition of calcium is more effective than phosphate at reducing erosion in acid solutions.

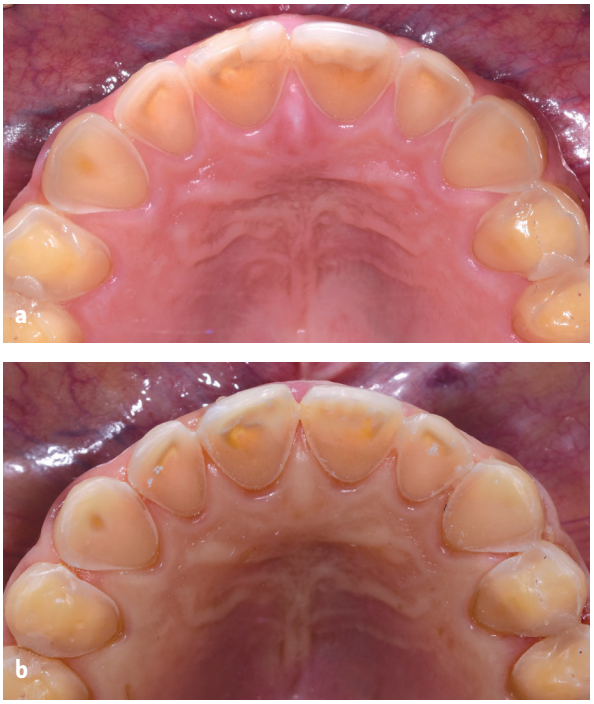
Several calcium-enriched soft drinks are currently on the market, and acidic products with high concentrations of calcium and phosphorus are available (such as yogurt) and do not soften the dental hard tissues. The greater the buffering capacity of the beverage or food, the longer it will take for saliva to neutralize the acid. A higher buffering capacity of a drink or foodstuff will enhance the processes of dissolution, because a greater release of ions from the tooth mineral is required to render the acid inactive for further demineralization. Temperature is also a significant physical factor; for a given acidic solution, erosion proceeds more rapidly the higher the temperature of

**Table 1.** The pH, Titratable Acidity, and Erosion Potential of Some Commonly Consumed Beverages

| Beverage | pH | Titratable Acidity | Erosion Potential |
|---|---|---|---|
| Cola | 2.5 | 0.7 | Medium |
| Carbonated Orange | 2.9 | 2.0 | Medium |
| Grapefruit Juice | 3.2 | 9.3 | High |
| Apple Juice | 3.3 | 4.5 | High |
| White Wine (Chardonnay) | 3.7 | 2.2 | Medium |
| Orange Juice | 3.8 | 4.5 | High |
| Beer (Bitter) | 3.9 | 0.6 | Low |
| Lager | 4.4 | 0.5 | Low |
| Sparkling Water | 5.3 | 0.1 | Low |

(Source: L. Shaw and A.J. Smith. Dental erosion—the problem and some practical solutions. *British Dental Journal*, vol. 186, iss. 3, Feb. 13, 1999. Adapted with permission from the publisher.)

> When digitally *designing a smile*... the most important step is to superimpose a photograph of the smile in a *resting position* over a photograph taken during maximum smile with the patient's head in a *fixed position*.



**Figures 1a and 1b:** Maxillary teeth before and after preparation.

**Figures 2a and 2b:** Mandibular teeth before and after preparation.

that solution. In recent years, a number of interesting potentially erosion-reducing drink and food additives have been investigated.[15]

## Case Report

### Patient Complaint and History

A 34-year-old patient reported for prosthetic reconstruction of damaged teeth. She admitted that she had struggled with bulimia for many years, but had not had an episode in the previous two years. She reported significant tooth sensitivity and a desire to improve esthetics. Examination of the right temporomandibular joint (TMJ) showed partial displacement of the disc with late reduction and no pain in the masticatory muscles or joints. A large part of the enamel was damaged from brushing immediately after vomiting for many years. Destruction due to intrinsic erosion was particularly visible on the palatal surfaces of the maxillary teeth and the occlusal surfaces of the mandibular teeth **(Figs 1a-2b)**.

If tooth wear is present, but opposing wear cannot be made to contact, other etiologic factors must be considered. The patient should be questioned regarding any possible oral habits such as chewing on a pipe or bobby pins. One also must be aware that some teeth that appear worn may in fact be chemically abraded, which is an important distinction, as the treatments are different. Chemical abrasion is normally found on the lingual cusps of the maxillary posterior teeth and the palatal areas of the maxillary incisors, since these are the areas that seem to be the most exposed to high acid levels.[16]

### Treatment

**Deprogrammer:** In the absence of contraindications to treatment, preparatory work was initiated, which in this case included digital smile design and deprogramming with a Kois deprogrammer **(Figs 3-5)** to determine the musculoskeletally stable centric relation (CR) position. The concept behind a deprogrammer is that when only the anterior teeth occlude (disengaging the posterior teeth), the directional force provided by the elevator muscles (temporalis, masseter, medial pterygoid) seats the condyles in a superoanterior position within the fossae. The anterior stop provided by the anterior platform acts as a fulcrum, allowing the condyles to be pivoted to a musculoskeletal position in the fossae. This can be accomplished with any frontal separator, such as a leaf gauge or a Lucia jig.

**Vertical dimension of occlusion:** Because the patient's teeth were significantly damaged, it was decided to perform a full dental reconstruction with minimal or no dental preparation. To rebuild the bite employing the minimally invasive prosthetic procedure (MIPP) technique,[17] it is necessary to create space for future prosthetic reconstruction that is connected by raising the vertical dimension of occlusion (VDO). In this case, the new VDO was calculated knowing that in the posterior area, 1.6 mm (0.8-mm thickness for each of two overlays) of free space was needed, provided that lithium disilicate was used for bonding to enamel[18] without preparation. Knowing that space in the anterior area generally is two times bigger[19] than in the posterior area, the height of the deprogrammer platform was determined to be 3.5 mm, and that was the final VDO needed.

**Wax-up:** After digitally designing the smile and registering the new VDO in CR on the platform of the deprogrammer (which was worn for two weeks, with breaks only for eating), the dental technician could create a wax-up in accordance with the desired esthetics and function **(Fig 6)**. The wax-up was transferred to the patient's mouth using a silicone

index to create a mock-up (Luxatemp, DMG America; Ridgefield Park, NJ). Mock-ups are used to test esthetics, phonetics, and function (sometimes it is necessary to equilibrate the mock-up in static relation and during chewing). For any intraoral corrections, it is necessary to take an impression to allow the laboratory technician to copy the mock-up to ceramics. The next step is the preparation of an equilibrated mock-up[20], which can ensure that only the necessary amount of tooth tissue is removed to obtain optimal thickness of the ceramics.

**V-shaped veneers:** The tooth structure had not been cut after removing the cut mock-up, so no preparation work was necessary. The interproximal areas also remained uncut, and the only reason for even the minimal preparation was to create an emergence profile via a small chamfer and correction of path of insertion for V-shaped veneers. In this case, lithium disilicate V-shaped veneers (IPS e.max shade A1, Ivoclar Vivadent; Amherst, NY) were bonded on resin-based luting material (Vitique shade A1, DMG) **(Figs 7-14)**.

## Discussion

### Background

Ever since the development of adhesive procedures, dentists around the world have striven to restore teeth with as little preparation as possible. There are a number of minimally invasive techniques to treat dental erosion and attrition,[21-25] including MIPP[17] and the "three-step technique."[26-28]

As an alternative and simplified method of simultaneous reconstruction of palatal and labial wall of the teeth at he the same time V-shaped veneers were suggested.[29,30] With this type of restoration there is no need to eliminate interproximal enamel, which in many bulimia cases is the only existing enamel on the palatal wall. However, before initiating proper treatment we must know the diagnosis, since erosion and attrition have much different patterns of destruction.

### Digital Design

When digitally designing a smile, the author believes that the most important step is to superimpose a photograph of the smile in a resting position over a photograph taken during maximum smile with the patient's head in a fixed position **(Fig 3)**. In this way, it is possible to determine exactly where the incisal edge of the central incisor is located in relation to the position of the upper lip at rest (the norm is approximately 2 mm of exposure under the upper lip at rest[31]) and to calculate how much the teeth should be lengthened. In this case, the incisal edges of the central incisors coincided with the lower edge of the upper lip at rest, so for 2-mm exposure, it was necessary to lengthen these teeth by exactly 2 mm.

> "Some clinicians are reluctant to increase the VDO, *believing that this procedure* may destroy healthy TMJs."

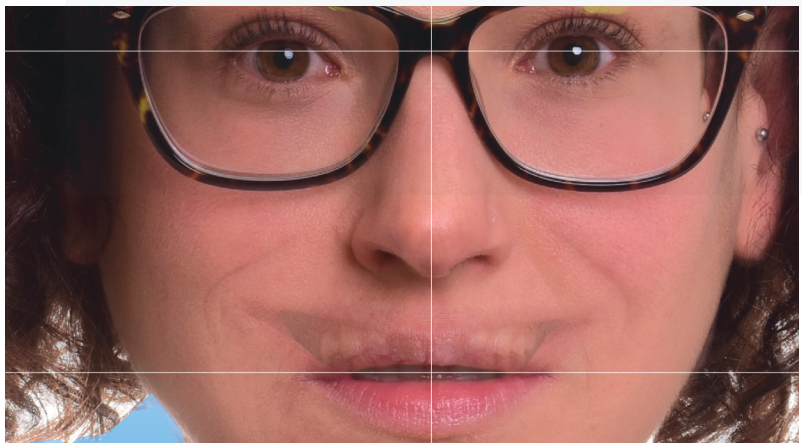


**Figure 3:** Superimposition of smile at rest and maximum smile with digital smile design software.

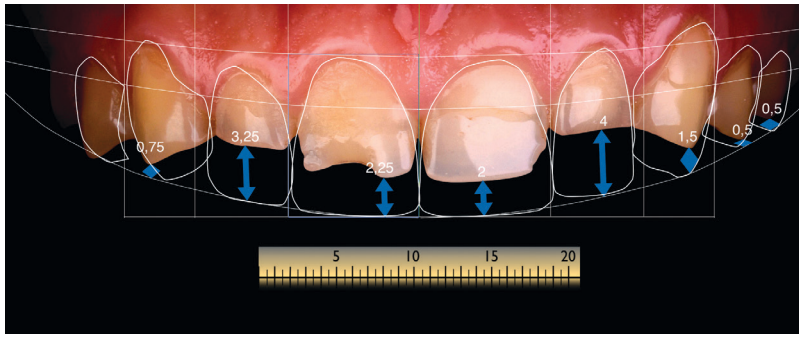



**Figure 4:** Final measurements with digital smile design software.

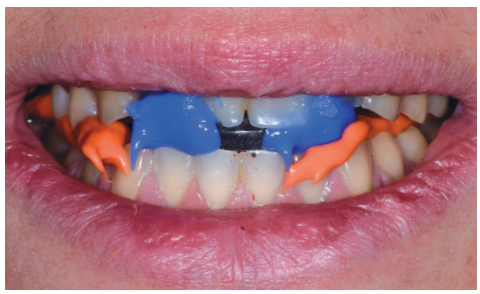


**Figure 5:** Bite registration on deprogrammer.

**Figure 6:** Functional and esthetic wax-up.

A superimposed photograph of the face in a resting position also provides several other benefits, such as determining the position of the canine edge. According to the "Zero Cuspid" rule,[32] the incisal edge of the canine should fall exactly on the lower edge of the upper lip at rest with a tolerance of 1 mm. Another value from this photo is the ability to determine the symmetry lines of the smile. Often, in the case of facial asymmetry, a reference point must be set. This point may be the center of the Cupid's bow, which marks the center of the frame of the smile. However, in a full smile, the Cupid's bow is stretched, and the reference is lost; therefore, it is worth using the photo in a resting position, which allows for determination of the future position of the maxillary central incisors and canines and the symmetry line.

### Increasing VDO

Some clinicians are reluctant to increase the VDO, believing that this procedure may destroy healthy TMJs. The belief that an increase in vertical dimension causes temporomandibular disorders is derived from the premise that an elevation induces an increase in the tonicity of the elevator muscles, with a possible onset of muscle pain, increased tooth mobility, and, finally, the intrusion of teeth. This ingression would generate a decrease in VDO and a return to its initial value.

A degree of relapse sometimes occurs after increasing occlusal height, but the relapse is not constant, and VDO is not the original value when it is increased in one step of several millimeters (e.g., in orthognathic surgery or animal experiments).[19] If increasing VDO changes anterior facial height with primarily rotational condylar movement, it is not accompanied by an increase of posterior facial height or muscle length. Studies on rhesus monkeys underlying the theory of recurrence of original bite height were carried out in extreme conditions of a 7-mm permanent increase in the VDO with cemented splint. And even with such a huge increase in VDO, no problems were observed.[33]

The effect of VDO includes alterations to the TMJs, the neuromuscular system, the teeth, and phonetics. Many studies have concluded that the effects on these were well accepted once the new 3D position is maintained from healthy, adapted, and stable TMJs; once the interocclusal contacts are bilateral and simultaneous and the teeth are receiving axial loads; and once the position of the anterior teeth permits adequate phonetics and a path of closure into the new 3D position.[34]

If the patient has any breathing problems, they should be evaluated first since increasing VOD may restrict the airways, especially when the obstruction is at the level of the larynx. Knowing the connection between mild obstructive sleep apnea (OSA) and bruxism, patients suffering from both diseases may expect them to worsen after uncontrolled increase of VOD.[35]

### Questions to Ask

First, the clinician must ask: Why am I planning to increase the VDO? What do I want to achieve by doing this? Do I plan to reposition the articular disc? Do I plan to improve the incisal relationship? Or maybe I plan [as in the present case] to create enough space for porcelain? Another question then arises: What is the minimum

## Tips

**Beginner**

» When bulimia is suspected, ask the patient indirect questions such as "Have you vomited recently?"

» If the problem is active, suggest that the patient seek therapy.

» Provide the patient with a flat, hard, thin night guard and remind them to get regular checkups.

**Intermediate**

» Be minimally invasive and try not to prepare at all.

» Increase the VDO in CR (if load test is negative) to create adequate space for restorative material.

» Use only lithium disilicate or zirconia when an acid problem is suspected

**Advanced**

»If there is no occlusal dysfunction or sleep apnea, use a leaf gauge to register final VDO in the mouth—otherwise a deprogrammer or full-coverage splint is necessary.

» If you can save interproximal enamel, use porcelain V-shaped veneers as a restorative option.

» Keep in mind parotid gland hyperactivity while bonding—use a rubber dam.

thickness of porcelain for adequate crack resistance? E.max on molars may be reduced to 0.8 mm if it is bonded to the enamel. The same durability is achieved when 1.5 mm of e.max is bonded to dentin,[18] and it must be monolithic e.max when bonded to an occlusal surface. This is related to the modulus of elasticity of materials that combine with each other. If two materials with a similarly high modulus of elasticity, such as e.max and enamel, are combined, it is a bit like combining two layers of glass. This design can be very durable; however, if a thin glass (e.max) is stuck to a cushion (material with a low modulus of elasticity, e.g., composites or dentin), such a glass would have to be thick for someone to sit on it (occlusal load).

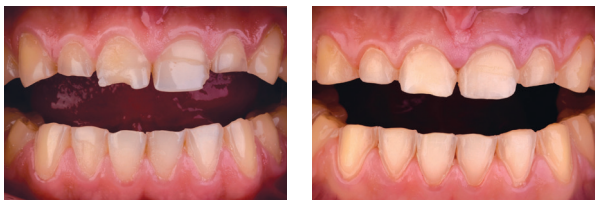
### Factors to Consider

In this case, due to the presence of enamel on the occlusal surfaces, the total thickness of both contacting ceramic overlays (assuming complete absence of preparation) should be approximately 1.6 mm, which, according to the 1:2:3 rule,[19] creates 3.2 mm of separation in the anterior region. In most cases, this is the minimum height of the deprogrammer platform or leaf gauge thickness that gives the opportunity to rebuild damaged teeth with existing enamel and without preparation.

The new VDO must be registered in the patient's mouth (on the deprogrammer platform, on the splint, or with the use of a leaf gauge) if the condylograph is not used and the individual rotation axis not determined. Thanks to this, potential occlusion errors that can occur when manipulating the pin height in the articulator can be avoided. By increasing VDO, the MIPP technique removes the obligation for classic preparation of a 1.5-mm chewing surface. This leaves healthy enamel and allows for the thickness of the ceramic restoration to be reduced, which consequently allows for an even more conservative (or no) preparation. Therefore, clinicians should not be afraid of increasing VDO, but the following critical factors should be considered:

- Healthy (or adapted) and painless muscles and TMJs. This is not only about the muscles of mastication (which, especially in the initial period of increasing VDO, often become tenser), but primarily about the muscles of the neck. Some findings indicate that of all the muscles tested, the trapezius is the most responsive to changes in mandibular position.[36]
- Correct facial proportions. After increasing the VDO, a short face with a protruding chin will look better than a long face with a retracted chin.
- Incisal relationships. Due to posterior rotation of the mandible during VDO increase, the increased overjet increases even more, which often makes it impossible to close the prosthetic occlusion in the anterior region.
- Pronunciation. This especially affects the "S" sound, for which a new arch-to-arch relationship may be crucial.[37]
- The correct cranial-vertebral angle (96 to 106 degrees) and the spaces between the C0-C1-C2 (4 to 8 mm) vertebrae measured on the cephalometric (or CBCT) image in the head's natural position.[38] Narrowing these spaces when increasing the VDO can lead to compression of the trigeminal nerve nuclei located in this area and pain radiating to the face.[38] This is important because there was extension of the head after one hour of bite opening in 90% of the subjects, with the range varying from 0.3 to 9 degrees.[39] The VDO-cervical spine correlation is still controversial, and one author believes that the way in which head and neck posture responds to a change in vertical dimension depends on the degree of cervical spine dysfunction already present in the individual.[40] Therefore, clinical examination of the cervical vertebrae is indicated for patients suffering from OSA or neck and face pain.

**Figure 7:** Maxillary teeth after bonding.
**Figure 8:** Mandibular teeth after bonding.



**Figures 9a and 9b:** Full-mouth images before and after preparation.

**Figure 10:** Rubber dam isolation

**Figure 11:** Before preparation.



**Figures 12a and 12b:** After bonding.

Generally, when indicated, permanent increase of VDO of up to 5 mm is a safe and predictable procedure without detrimental consequences, and the associated signs and symptoms are self-limiting, with a tendency to resolve within two weeks.[41]

Patients with bulimia often no longer have healthy enamel on the palatal surfaces of the incisal teeth. The only healthy enamel is between the teeth, and removing it during preparation simultaneously removes the substrate for proper adhesion. As long as the tooth ferrule is maintained and the ratio of future restoration to abutment height is not greater than 2:1, cohesive cementation seems to be sufficient. However, in this case, tooth 10 has a height of 4 mm, and the future restoration was to be 8 mm. In such cases (questionable cohesion), it is crucial to keep as much enamel as possible for proper adhesion. In the author's opinion, the best prosthetic solution for patients with bulimia (with the correct path of insertion) is not the bilaminar technique,[42] but rather V-shaped veneers that allow coverage of the vestibular and lingual surfaces at the same time.

The size of glass particles lost in glass-ceramics during acid exposure is directly proportional to the amount of surface roughness change. Thus, because the grain size of leucite glass-ceramic (1 to 5 µm) and feldspathic porcelain (4 µm) is larger than that of lithium disilicate (0.2 to 1.0 µm), they show more surface roughness change than lithium disilicate. Zirconia or lithium disilicate ceramic materials should be used to restore teeth in patients with bulimia or GERD, as these materials are minimally affected by acid exposure.[1] Therefore, lithium disilicate is the material of choice for patients with bulimia due to the potential risk of relapse. Additionally, parotid gland enlargement occurs in about 25% of patients with bulimia.[43] Due to this ailment, which sometimes causes excessive saliva production, it is necessary to apply full rubber dam isolation during bonding.

Static occlusal contacts (OC) must be equal, bilateral, and simultaneous on both sides, confirmed using 8-µm foil. The buccal cusps of the mandibular posterior teeth occlude in the central fossa of the maxillary posterior teeth. There must be at least one occlusal contact per tooth to ensure axial stability by neutralizing the eruptive forces of the periodontium. From a mechanical standpoint, it is irrelevant whether the OC is established between the buccal cusp of a mandibular tooth and the

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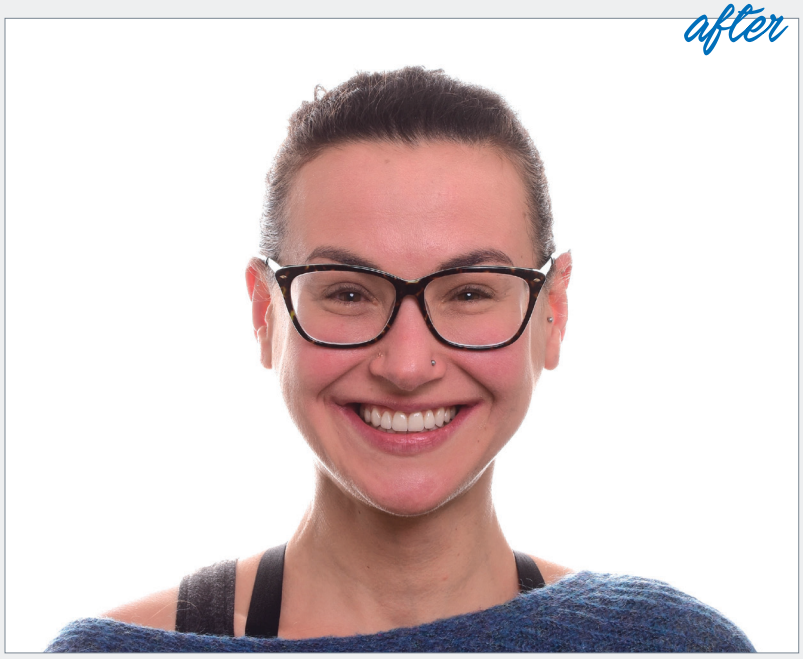


**Figures 13a and 13b:** Smile before and after restoration.

central fossa of a maxillary tooth, or the lingual cusp of a maxillary tooth and the central fossa of a mandibular tooth. From an esthetic viewpoint, however, the former is desirable inasmuch as establishing contact on the lingual cusps of the maxillary teeth generally leads to a "hanging cusp" effect.[44] Proximal contacts stabilize the teeth mesiodistally by antagonizing the effect of the transseptal fibers. An anterior guidance should provide for disclusion of the posterior arch segments on excursive movements. The key is also the lack of interference during chewing, which can be confirmed using 200-µm articulating paper.

The author recommends that, in every full prosthetic reconstruction case, the protective night guard should be made of a hard, flat material of minimum thickness (so as not to increase the VDO, which could cause narrowing of the airways at night).[45]

"Stable occlusion" is now a very popular concept, but we must recognize that the physical aspects of our patients' lives are not stable. They gain and lose weight, change jobs (and sometimes the physical positions in which they work), play sports, play instruments, suffer from periodontitis, etc.; and therefore, their occlusion, as well as their whole body, changes throughout life. If the expected occlusal adaptation does not occur, then controlled, accelerated adaptation in the form of an annual minimum equilibration may be necessary.

## Summary

Bulimia nervosa affects more and more people today. It is important to be able to recognize and diagnose these patients and differentiate this problem from occlusal problems or other eating disorders. Patients with bulimia should receive psychiatric treatment and appropriate prevention strategies. For full-bite reconstruction with adhesive materials, the best solution is to use the MIPP technique. In asymptomatic patients whose elevation of VDO in rotational motion does not cause pain or breathing disorders; or impaired esthetics, phonetics, and/or problems closing the mouth, the fear of negative consequences of such a procedure is unjustified.

In terms of preparation, the most important rule is to utilize a mock-up and save interproximal areas, which often are the only regions on the palatal surface with healthy enamel for proper adhesion. With such a conservative preparation, the best solution is to use V-shaped veneers to simultaneously reconstruct the labial and lingual surfaces. The material of choice is lithium disilicate, as it is resistant to acidic environments in the case of potential bulimia recurrence. During adhesive bonding, due to very frequent parotid hyperplasia, one should take into account the production of large amounts of saliva and isolate the teeth with a rubber dam.

**Figure 14:** V-shaped veneers.

> In asymptomatic patients whose elevation of VDO in rotational motion *does not cause pain or breathing disorders;* or impaired esthetics, phonetics, and/or problems closing the mouth, the fear of negative consequences of such a procedure is *unjustified.*

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# jCD Self-Instruction

Full-Mouth Reconstruction (CE) Exercise No. jCD44 AGD Subject Code: 610

3 Hours Credit

This Continuing Education (CE) self-instruction examination is based on the article *Minimally Invasive Full-Mouth Reconstruction with V-Shaped Veneers in the Treatment of Bulimia-Induced Dental Erosion* by Lukasz Lassmann, DDS. This article appears on pages 66-77.

The exam is free of charge and available to AACD members only. AACD members must log onto www.aacd.com/jcdce to take the exam. Note that only Questions 1 through 5 appear in the printed and digital versions of the jCD; they are for readers' information only. This exercise was developed by members of the AACD's Written Examination Committee and jCD's Contributing Editors.

1. **In the United States, what is the prevalence of bulimia nervosa compared to GERD?**
   a. The prevalence of bulimia nervosa is between 1% and 3%, and the prevalence of GERD is between 9% and 12%.
   b. The prevalence of bulimia nervosa is between 18% and 28%, and the prevalence of GERD is between 1% and 3%.
   c. The prevalence of bulimia nervosa is between 1% and 3%, and the prevalence of GERD is between 18% and 28%.
   d. The prevalence of bulimia nervosa is between 9% and 11%, and the prevalence of GERD is between 18% and 28%.

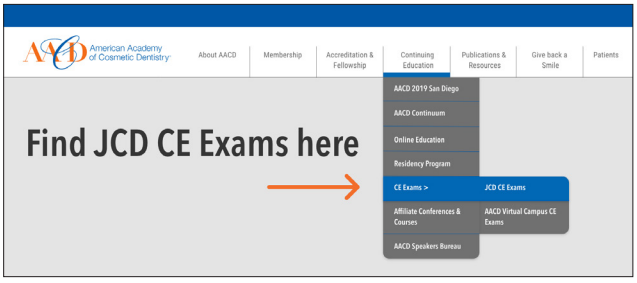
2. **In comparing extrinsic and intrinsic origins of dental erosion,**
   a. the higher pH of gastric acid corrodes the tooth structure more than an acidic diet.
   b. the lower pH of gastric acid corrodes the tooth structure more than an acidic diet.
   c. the lower pH of gastric acid corrodes the tooth structure less than an acidic diet.
   d. the higher pH of gastric acid corrodes the tooth structure less than an acidic diet.

3. **Intrinsic erosion**
   a. can be of psychosomatic origin, resulting in self-induced regurgitation and vomiting.
   b. can be the result of pregnancy, alcoholism, or gastric dysfunction.
   c. produces acid lower in pH and is less erosive than an acidic diet.
   d. degrades the inorganic matrix of the dental structure.

4. **Which of the following best describes acid decalcification of the teeth?**
   a. Chronic ingestion of organic or inorganic acid causes greater decalcification on the labial surfaces of anterior teeth.
   b. Chronic regurgitation causes decalcification of the lingual and labial surfaces of anterior teeth.
   c. Chronic ingestion and chronic regurgitation cause decalcification only on anterior teeth.
   d. Chronic regurgitation of organic or inorganic acid causes greater decalcification on the lingual surfaces of anterior teeth.

5. **What of the following is most true about the erosive potential of an acidic drink?**
   a. It is predictive of its potential to cause erosion based solely on its pH.
   b. It is dependent on chemical factors, behavioral patterns, and its biological characteristics.
   c. It will be neutralized quickly by saliva if the buffering capacity of the drink is low.
   d. It correlates indirectly with the drink's titratable acidity.

**To take the complete exam, log onto www.aacd.com/jcdce**




## AACD Self-Instruction Continuing Education Information

Exams will be available for 3 years from publication date for dentists, and 1 year from publication date for laboratory technicians.

Original release date: February 28, 2021. Expiration for dentists: February 28, 2024. Expiration for laboratory technicians: February 28, 2022.

To receive course credit, AACD members must answer at least 70% of the questions correctly.

Participants will receive test results immediately and can only take each exam once. A current web browser is necessary to complete the exam.

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