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Clinical Technique / Case Report

Prosthetic Rehabilitation of a Patient With Gastroesophageal Reflux Disease: Five-Year Follow-up

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Clinical Relevance

This article discusses the different levels of clinical manifestation of acid erosion and indicates that veneers may be a promising alternative for restoring esthetics and function when combined with an appropriate medical diagnosis and clinical follow-up.

SUMMARY

Tooth wear is a multifactorial process that is a growing concern in dentistry. This phenomenon can be caused by mechanical (attrition, abrasion, or abfraction) or chemical (erosion) processes. Etiologic factors in dental erosion can be due to changes in behavior, an unbalanced diet, or gastrointestinal disorders such as acid regurgitation, which may influence the salivary flow rate and buffering capacity of saliva. This case report describes an esthetic rehabilitation of a patient with gastroesophageal reflux and dental erosion, with a treatment rationale that includes the use of a diagnostic template and five-year follow-up. This technique, presented here in a clinical case with moderate enamel loss, integrates an additive wax-up and a direct intraoral bis-acryl resin mock-up. Lithium disilicate glass-ceramic (IPS e.max Press, Ivoclar Vivadent) laminate veneers were fabricated with the heatpress technique. They were veneered with a layering ceramic (IPS e.max Ceram, Ivoclar Vivadent) to improve the appearance of the incisal edge. The case demonstrated the success of veneers as an effective, conservative, and esthetic treatment for patients with this pathology.

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INTRODUCTION

The incidence of patients presenting dental wear has represented a growing concern for dentistry. Dental experts have indicated over the last decade that there has been an increased prevalence and severity of wear caused by the process of dental acid erosion.[1-4] Other studies have reported that the cause of tooth wear is multifactorial, or a combination of erosion, abrasion, and attrition.[2,3,5-7]

Early forms of erosive wear can be neglected because there are few or no symptoms or signs.[3,4]

Figure 1. *Initial appearance.*
Figure 2. *View of incisal and vestibular tooth structure loss.*
Figure 3. *View of initial palatal and incisal wear.*

Thus, it is necessary for a dentist to carefully evaluate the clinical characteristics of the lesions to establish the diagnosis of dental erosion. In most cases, patients do not seek treatment and only discover an issue at a more advanced stage where the teeth are already sensitive or the esthetics are compromised. This is a common symptom in patients with anorexia nervosa or bulimia.[3] Gastric reflux directly affects the lining of the esophagus and is responsible for dental erosion. Gastroesophageal reflux disease (GERD) affects all age groups.[1,8]

Dental erosion may be defined as the loss of tooth structure due to a chemical process that does not involve bacterial action and may be multifactorial in origin.[1,2,5,7,9] Causes can be intrinsic (eg, gastric) or extrinsic (eg, acidic foods or drinks).[6,7,9] Behavior changes, an unbalanced diet, various drugs, and acid regurgitation can influence the composition and buffering capacity of saliva, with these etiologic factors considered for dental erosion. Acidic foods are a common part of the modern diet, particularly fruit acids. The frequency of consumption of acidic foods and beverages plays an important role in dental erosion. Saliva may provide some protective benefits, particularly through the clearance and neutralization of acids.[2,9,10] Patients who present with GERD present a diminished capacity to buffer saliva and a higher prevalence of tooth wear, especially on the palatal aspect of their teeth. This is the retrograde movement of gastric juices into the esophagus, reducing the pH of the oral cavity and causing irreversible loss of minerals in the enamel surfaces, and can result in inflammation of the oral mucosa.[11]

Various treatments have been described to treat patients with tooth erosion. The choice of treatment should be planned, which initially must be performed using a diagnostic wax-up to determine appropriate treatment.[12,13] The restorative options include the following: direct composite resin and indirect partial and full ceramic restorations, with the goal of using the most conservative approach possible.[14] The present study describes a case report of esthetic rehabilitation of a patient with GERD and dental erosion, with a five-year follow-up.

CLINICAL CASE

A 50-year-old female patient (STC) was admitted to the dental clinic at the University Tuiuti of Parana reporting a diagnosis of GERD a few years ago and dissatisfaction with her smile. Upon clinical examination, there was wear on the incisal and buccal surfaces of her anterior teeth caused by acid erosion. A radiographic examination, study models, and photographic documentation of the clinical case were made (Figures 1 through 3). The patient was referred for medical evaluation, undergoing hiatal hernia surgery.

Based on the diagnostic data and initial esthetic evaluation, wax-up of her maxillary anterior teeth (Figures 4 and 5), which was created freehand,

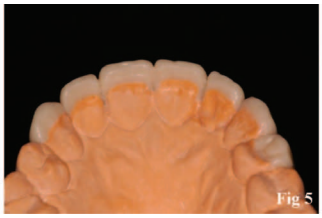

Figure 4. *Diagnostic wax-up of the upper jaw.*
Figure 5. *Palatal view of the diagnostic wax-up.*
Figure 6. *Bis-acryl resin mock-up.*

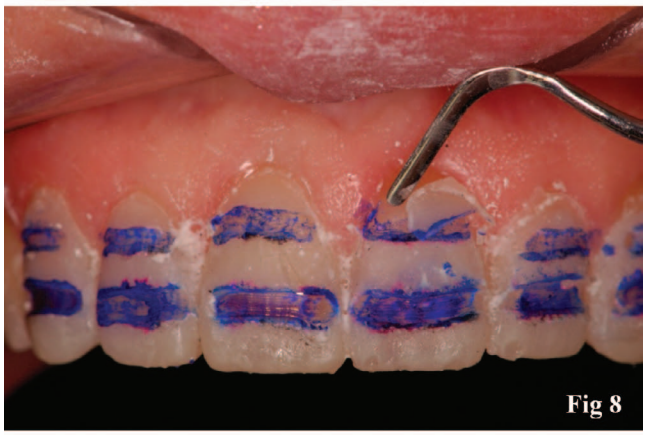

Figure 7. *Groove guidance made in the mock-up to a depth that represents the final thickness of the porcelain veneer and allows for the variable thickness of enamel on the eroded surface.*
Figure 8. *Removing the mock-up after completing the orientation grooves.*
Figure 9. *Preparations of the buccal face.*

served as a baseline for the initial diagnostic evaluation for the patient. The silicone index, which was made on the cast, was filled with Bis-acryl resin (Structur, VOCO GmbH, Cuxhaven, Germany) and adapted to maxillary anterior teeth with finger pressure until the material was fully polymerized (Figure 6). Excess polymerized resin was removed with a blade. A thin layer of acrylic resin was visible on gingival tissues and was removed with a blade.

When the patient returned, preparations were performed with care (Figure 7), because the teeth had already lost tooth enamel. Two horizontal grooves were prepared on the buccal surface of the mock-up, with depths varying from 0.5 to 0.7 mm, using a bur with a diamond tip. The grooves were cut to a depth that represents the final thickness of the porcelain veneer and allows for the variable thickness of enamel on the eroded surface. Then, two marks with pencil on the mock-up were drawn to aid in preparing two grooves. The marks were measured with a millimeter probe for evaluation of the depth of the preparations (Figure 8). The mock-up was removed, and the buccal surfaces were reduced using a #4138 diamond bur (Jota, Rüthi, Switzerland), according to the restorative plans (Figure 9). The cervical margin was exposed using #00 retraction cord (Ultrapack, Utradent Products Inc, South Jordan, Utah, USA), and the gingival margins of the porcelain veneers were set at the cervical gingival level. The incisal reduction was set at 1.5 mm using guiding grooves (Figures 10 and 11). This step was performed to facilitate insertion of the veneer and color stratification in this area by the prosthetic technician. The preparation was finished using ultra-fine diamond burs (Jota) and Soft-Lex discs (3M ESPE, St Paul, MN, USA) at low speed.

With the preparations completed (Figure 12), an impression of the maxillary arch was made using a condensation silicon impression material (Speedex, Vigodent, Rio de Janeiro, RJ, Brazil). Provisional restorations (Structur 2QM, VOCO GmbH) were cemented after the tooth preparation procedures. Cementation of the relined acrylic resin provisional restorations was done using a noneugenol temporary cement (Provicol, VOCO GmbH).

Figure 10. *Incisal grooves.*
Figure 11. *The incisal reduction of the maxillary right central incisor, which was performed in the incisal with a diamond bur at 45° in the direction of palate.*

Lithium disilicate glass-ceramic (IPS e.max Press, Ivoclar Vivadent, Schaan, Liechtenstein) laminate veneers were fabricated with the heatpress technique. They were veneered with a layering ceramic (IPS e.max Ceram, Ivoclar Vivadent) to improve the appearance of the incisal edge. The internal surfaces of the ceramic laminates were treated with 10% hydrofluoric acid for 20 seconds, followed by washing, drying, and application of a silane coupling agent. The tooth surfaces were cleaned with a pumice and prophy cup in a slow speed handpiece and etched with 37% phosphoric acid for 15 seconds, the adhesive system placed (Scotchbond Multi-Purpose, 3M ESPE) and then light cured for 10 seconds. The resin cement, RelyX ARC (3M ESPE), was used. Excess cement was removed with dental floss and dental explorer prior to curing. The resin cement was light cured on the buccal and palatal surfaces of all teeth for 40 seconds. At the end of treatment, the patient was pleased with the esthetics and function of the restorations (Figures 13 through 15). The clinical case was followed up at five years, analyzing the marginal contour, the presence of cracks, staining, care, and patient satisfaction with the restorations (Figures 16 through 18).

Figure 12. *Finalized and preparations and placement of retraction cord.*

A list of comparable products used in the clinic case that could be substituted in the North American market is as follows: Bis-acryl resin (Structur, VOCO GmbH) can be substituted with Protemp™ (3M ESPE); diamond burs (Jota) can be substituted with diamond burs (SS White Burs, Inc, Lakewood, NJ, USA); and noneugenol temporary cement (Provicol, VOCO GmbH) can be substituted with RelyX™ Temp NE zinc oxide noneugenol temporary cement (3M ESPE).

DISCUSSION

When the sequela of tooth erosion, such as loss of tooth structure, are already established, a minimally invasive restorative approach should be chosen, and the etiology should be identified and monitored.[7,9] The diagnosis must be performed with a good history and clinical examination whenever possible, with the full history of general health, diet, evaluation of habits, evaluation of buffering capacity, and determination of salivary flow.[3,10,15] In this current report, a referral to a physician was required to confirm the diagnosis of GERD; rehabilitation was not started until medical treatment controlled the acid reflux.

When there is a need to change the shape, position, and color of dental structures, planning should be done using a diagnostic wax-up.[12] The wax-up will "guide the functional and esthetic procedures," such as aiding in case presentation, demonstrating final veneer form, finalizing incisal-cervical length, estimating thickness of the final veneer, and providing a guide for reestablishing incisal guidance. In this case study, the diagnostic mock-up was essential for the restorative procedures and provided predictable esthetics and maintenance of enamel preparations.

Among the treatment options, ceramic laminates were chosen in this present case because they presented as a conservative option, with the preparation remaining in enamel and in restoring the

Figure 13. *Appearance of the smile after cementation of the veneers.*
Figure 14. *Right side view of the smile after cementing the veneers.*
Figure 15. *Left side view of the smile after cementing the veneers.*

esthetics and form of the tooth structure. There are numerous advantages and results of ceramic laminates in relation to rehabilitation using composite resins in anterior teeth, including improved color stability, wear resistance, and esthetics.[16] In the present case, a lithium disilicate glass-ceramic was used because of its optical properties and adhesion to

Figure 16. *Appearance of the veneers five years after treatment.*

tooth structure.[17] Also, adequate resistance to support anterior and lateral guidance may have been provided by the low porosity and higher crystallinity of the lithium disilicate glass-ceramic.[18] Because of the relatively low refractive index of leucite and lithium disilicate, even with a relatively high crystalline content, these materials are still sufficiently translucent to restore the incisal edge.[18] Finally, these ceramics are biocompatible restorative materials, which improve the long-term gingival health.[18]

Clinical studies show success, clinical quality, and adequate long-term survival rates of porcelain veneers.[19,20] Given this context, we observed the maintenance of patient satisfaction immediately and after five years of clinical use. The literature reports success rates of ceramic laminates of 98.4% at five years of clinical follow-up[16] and up to 93.5% at 10 years.[21] The technical development of adhesives and composite resins in modern dentistry has provided for clinical predictability of cases with moderate tooth wear. These techniques have enabled the restoration of function and esthetics using more conservative approaches.[9] In this case, the lingual surface was not completely removed to preserve healthy dentin structures because the patient was stabilized in the treatment of gastroesophageal reflux.

Studies claim that predictability and successful outcomes in rehabilitating esthetics depends on correct diagnosis and adequate planning.[1,8,12,19] After four and five years, high patient satisfaction

was observed, the veneers were clinically in good condition, and there was no harm to the gingival health. The only detrimental observations with the current clinical case were staining along the gingival margins, although this had no impact on the clinical success. The definitive success of functional and/or esthetic treatments is only achieved when the patient is well informed and motivated to maintain oral health.[18] Excellent home care and periodic control by the dentist is essential to the long-term success of the rehabilitation.[18]

CONCLUSION

This case demonstrates the success of veneers as an excellent option for effective, conservative, and esthetic treatment for patients with dental erosion, particularly when removing the etiologic factor. It is noteworthy that the noncarious dental lesions caused by acid erosion require an accurate diagnosis for successful rehabilitation.

Conflict of Interest

The authors have no proprietary, financial, or other personal interest of any nature or kind in any product, service, and/or company that is presented in this article.

Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subjects oversight committee guidelines and policies of Universidade Tuiuti do Paraná.

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