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## Clinical Technique/Case Report

# Minimally Invasive Intervention in a Case of a Noncarious Lesion and Severe Loss of Tooth Structure

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### Clinical Relevance

Minimally invasive interventions play an important role considering human life expectancy and the evolution of restorative materials. Lower amounts of tooth structure removal will result in a stronger tooth and will positively influence patient satisfaction.

### SUMMARY

**The present article describes a minimally invasive technique used for the restoration of loss of tooth structure caused by erosion of intrinsic etiology. First, the cause of erosion was treated and controlled. Subsequently, taking into consideration patient characteristics, especially a young age, a more conservative technique was chosen for dental rehabilitation with the use of composite resin. The advantages and disadvantages of the technique employed are discussed.**

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### INTRODUCTION

On a daily basis, clinical observation has shown that an increasing number of patients have been affected by dental erosion. In this scenario, the early diagnosis of lesions, the study of etiologic factors, and the discussion of possible treatment approaches stand out as primary goals to be fulfilled.

Erosion is defined as the progressive and irreversible loss of tooth structure, resulting from chemical processes that do not involve bacterial action.[1-3] The process starts with demineralization of enamel

surface layers and may evolve to loss of relevant amounts of tooth structure. Dental tissue demineralization is caused by the frequent and long-lasting contact between acids and the tooth surface.[4]

The acids that cause dental erosion may originate from extrinsic or intrinsic sources. Intrinsic factors have been associated with several eating disorders, such as bulimia and anorexia, with systemic abnormalities, such as gastric reflux[5,6] and a decreased salivary flow. In particular, dental erosion affecting the posterior teeth are an important finding in the diagnosis of gastroesophageal reflux disease. Among extrinsic factors, it is possible to mention working for manufacturers of corrosive agents, such as acids used in the production of batteries, aerosols, and acidic foods and beverages.[1,5,7]

The onset and progression of erosion has a multifactorial etiology and is modulated by chemical, biological, and behavioral factors.[2] Biological factors, such as saliva, biofilm, tooth structure, and position, are all related with the pathogenesis of dental erosion. In particular, saliva is considered to be the most important biological parameter involved in dental erosion, as it promotes the dilution and clearance of erosive substances from the mouth, neutralizes acids, controls the passage of fluids, and enhances the remineralization process by providing calcium, phosphate, and fluoride to eroded areas.[8] Behavioral factors may include the frequent consumption of soft drinks or acid energy drinks and the practice of sports activities that reduce salivary flow and consequently affect the protection of tooth structures.

The most common characteristic of erosion is the opaque appearance of enamel, with a wedge-shaped, smooth surface. Lesions are usually large, shallow, with no clear-cut angles.[3] On the palatal surface, lesions resemble shoulder preparations with grooves.[9] More advanced disease stages include the development of concavities in enamel, in which the width clearly exceeds the depth, surrounded by a wall of intact enamel along the gingival margin. In more severe cases, the whole occlusal morphology of the tooth disappears. In sum, then, some typical signs of erosion include a smooth, silky-glazed, or "ground glass" appearance; a wall of intact enamel along the gingival margin; change in tooth color; and cupping and grooving on occlusal surfaces.[2]

The morphology and severity of defects may vary substantially, depending on the predominant etiologic factor.[10] Patients with eating disorders such as bulimia may present wear or chipping of the incisal edges, open bite, and loss of occlusal vertical dimension due to occlusal wear in posterior teeth.[11]

Erosion should be distinguished from attrition and abrasion; the latter usually produce lesions with a smooth and shiny appearance. However, the clinical differentiation of noncarious lesions is often complex. Moreover, different types of tooth wear lesions may occur simultaneously.[12]

The sequelae of dental erosion in more severe cases may include compensatory tooth eruption, diastema formation, changes in occlusal vertical dimension,[5,6] muscle pain resulting from occlusal instability, and temporomandibular joint dysfunction.[6]

The present article describes the case of a young patient presenting with erosion of intrinsic etiology submitted to a minimally invasive treatment approach.

## DESCRIPTION OF THE TECHNIQUE

A 26-year-old female patient sought treatment for dental esthetic complaints, referring specifically to chipping of maxillary central incisors. Clinical examination revealed extensive erosion of the occlusal surfaces of maxillary and mandibular posterior teeth, on the palatal surface of maxillary teeth, and on the lingual surface of premolars and canines (Figure 1).

The suspected cause of erosion in our patient was a systemic condition. The patient was referred to a physician, and a diagnosis of bulimia was established. Dental rehabilitation was initiated after completion of the medical treatment for bulimia.

Using cast models and an articulator, it was possible to identify approximately 2 mm of total loss of tooth structure, equally distributed in maxillary and mandibular areas (but sometimes more intense in one arch than in the other). This procedure was decisive to determine the amount of material needed to restore each tooth.

Restorative treatment was conducted with composite resins despite the fact that direct restorations have a shorter life span when submitted to extreme conditions. However, the decision was based on patient age, with an aim to preserve tooth structure, and on physician information that the systemic condition was under control.

Following anesthesia and complete isolation of the operating field, low-speed diamond burs were used to create roughened surfaces in preparation for application of the adhesive system. The restorative treatment phase followed the conventional adhesive protocol: enamel was acid etched for 30 seconds and

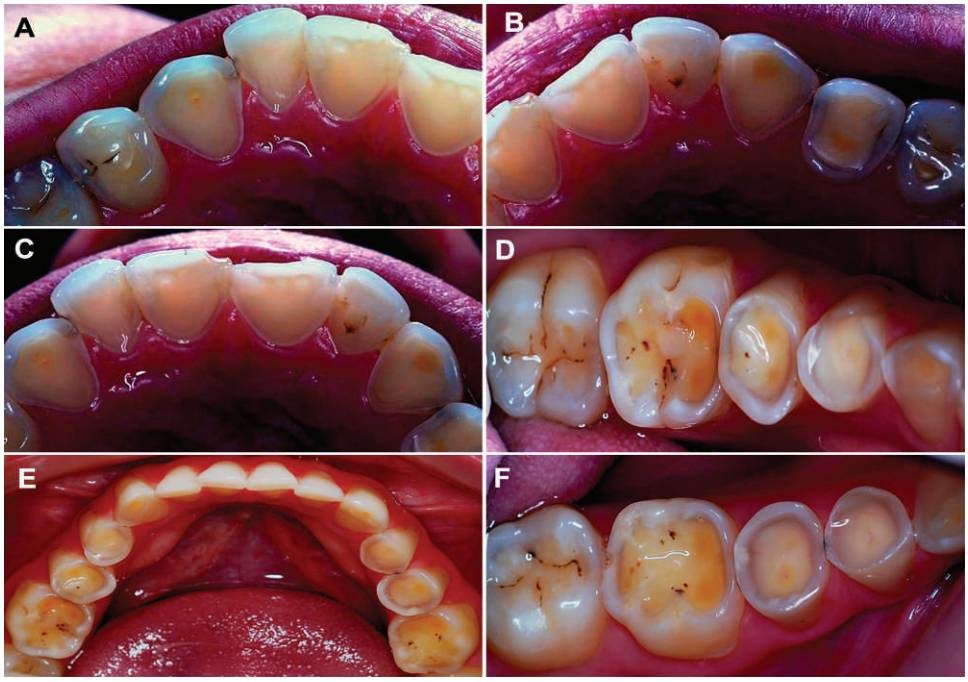


Figure 1. *Baseline photograph: (a): First quadrant, palatal view. (b): Second quadrant, palatal view. (c): anterior teeth, palatal view. (d): Third quadrant, occlusal view. (e): Occlusal view. (f): Fourth quadrant, occlusal view*

dentin for 15 seconds, followed by thorough rinsing and gentle drying. Subsequently, the adhesive system was applied according to the manufacturer's instructions: 1) application of one layer of primer, 2) drying, 3) application of adhesive layer, and 4) light curing for 20 seconds (Figure 2).

Composite resin was applied using approximately 2-mm-thick layers and the incremental technique.


Figure 2. *(a): Rubber dam isolation. (b): View following isolation. (c): Acid etching in preparation for application of adhesive system. (d): Application of adhesive system. (e): Finishing and polishing. (f): Final view*


Figure 3. *Posttreatment photograph: (a): Front view. (b): Palatal view. (c): Occlusal view. (d): Final view of patient wearing a Michigan-type occlusal splint*

Each layer was light cured for 40 seconds. This procedure was repeated until each tooth was entirely restored. Rubber dam isolation was a key factor for successful adhesion.

In order to ensure functional stability, treatment sessions were planned so that teeth were restored in pairs: two teeth on the right side and two on the left, thus allowing bilateral occlusal contacts to be obtained at the end of each session. This system was adopted to improve patient comfort throughout treatment.

Areas submitted to increased masticatory forces, such as the occlusal surface of molars and the palatal surface of canines, received a composite resin specifically indicated for posterior restorations undergoing heavy loads.

Finishing and polishing were performed using multiblade burs, Sof-Lex polishing discs, and silicone tips, according to the surface under treatment.

On completion of the restorative treatment, a Michigan-type occlusal splint was fabricated to protect composite resin restorations. This decision was based on information provided by the patient referring to tooth clenching at some parts of the day (eg, while watching television, reading, or driving). The patient was instructed to wear the occlusal splint every night and also during the day whenever possible (Figure 3).

## LIST OF MATERIALS USED

- Filtek Z350, A2 shade (3M ESPE Dental Products, St Paul, MN, USA)
- Phosphoric acid 35% (3M ESPE)
- Scotchbond Multipurpose Adhesive System (3M ESPE)
- Sof-Lex Pop-On polishing discs (3M ESPE)
- Silicone tips (Cosmedent, Chicago, IL, USA)
- Filtek P60, A3 shade (3M ESPE)

## POTENTIAL PROBLEMS

Even with the recent advances observed in the field of restorative materials, composite resins still have limited indications in cases requiring extensive restoration of occlusal surfaces. However, such limitation becomes more evident when thinner layers of material are used.

Treatment of eroded areas with composite resins has to be fully performed in office and demands a high level of technical expertise, knowledge of occlusion and restorative techniques, and a certain degree of manual dexterity. Recovery of occlusal vertical dimension requires an adaptation period, as the loss of dimension was gradual and lasted for an unknown period of time. Control of the systemic cause of erosion is mandatory, and any change in patient general health status may have direct effects on the lifespan of restorations.

## SUMMARY OF ADVANTAGES AND DISADVANTAGES

Noncarious loss of tooth structure in young patients poses a dilemma for dental practitioners. If, on the one hand, indirect restorations using ceramic, both as onlays and as full crowns, have a longer life span, on the other hand they demand extensive reduction

of tooth structure to an extent that exceeds the wear caused by the disease itself over a long period of time. Moreover, other aspects have to be taken into consideration when deciding to perform indirect restorations (eg, the potential need for endodontic treatment and the financial status of patients). In this sense, composite resins are a promising alternative therapeutic approach that allows preserving tooth structure and simplifying treatment procedures. Conversely, the shorter life span of resin when compared with ceramic restorations is indeed a limitation of the technique. Decisions should be made according to the peculiarities of each case, focusing on either preservation of the patient's teeth (which usually seems to be more relevant) or a longer life span of restorations. In addition, the use of composite resins at an initial stage does not invalidate the performance of more complex restorations in the future, partially or totally replacing more conservative restorations.

## CONCLUSION

Restoration of areas of dental erosion with composite resins is a simple, minimally invasive technique that allows patients to achieve esthetic rehabilitation and to recover stomatognathic function and balance and should therefore be considered a reliable therapeutic option.

Long-term satisfactory results in the treatment of dental erosion requires follow-up monitoring of the systemic condition and regular clinical follow-up with photographs of the areas affected, study models, and clinical assessment of the restoration conditions.

### Conflict of Interest Declaration

The authors of this manuscript certify that they 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.

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