



## Advanced Tooth Wear due to Bruxism Associated with Gastroesophageal Reflux Disease: Rehabilitation with Bite Elevators and Single Crowns

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### Abstract

Tooth wear has a multifactorial etiology. Among the main causes are parafunctional habits, such as bruxism and clenching, and gastroesophageal reflux disease. When there is an association between etiological factors, there may be severe dental destruction, requiring extensive dental rehabilitation. The purpose of this article is to report the case of a patient who presented severe dental wear due to the etiological association of bruxism and gastroesophageal reflux disease. The patient underwent dental rehabilitation in the maxilla with single crowns after endodontic and periodontal treatments and cast metal cores. In the mandible, a Branemark protocol prosthesis was installed on osseointegrated implants.

**Keywords:** Tooth Wear; Bruxism; Gastroesophageal Reflux Disease; Oral Rehabilitation

### Introduction

Tooth wear is frequently observed in dental practice. According to etiological factors, dental wear can be classified as abrasion, attrition, erosion and abfraction. Abrasion is determined by the loss of tooth substance through wear caused by the introduction or repeated contact of foreign objects with the teeth. It is particularly observed as a result of traumatic brushing with hard toothbrushes. In attrition, the loss of tooth substance occurs as a result of tooth-to-tooth contact, without any other foreign interference. A typical example is bruxism or clenching. In dental erosion, there is a loss of substance through a chemical process unrelated to the bacterial products of the dental biofilm or caries. An example is the loss of tooth substance caused by gastroesophageal reflux. Finally, the loss of tooth substance in abfraction occurs by flexion and failure caused by occlusal loading, usually presented in the cervical region, where the enamel is thinner [1-7].

Parafunctional habits such as bruxism and clenching have been occurring very frequently, especially after the onset of the COV-

ID-19 pandemic, considering emotional stress as the main etiological factor [6,8-11]. Forces generated during bruxism episode can be up to 6 times higher than during normal chewing [2].

In turn, gastroesophageal disorders such as gastroesophageal reflux disease, anorexia nervosa, bulimia nervosa, hiatus hernia, sphincter incompetence, esophagitis, increased gastric pressure, gastritis or even in patients after bariatric surgery may be related to chemical erosion of teeth [3,6,7]. The term perimolysis has been used to describe tooth wear lesions resulting from vomiting, with loss of substance mainly in enamel, on the lingual and palatal faces of anterior teeth [3,6].

Several therapeutic modalities can be employed in cases of rehabilitation in patients who present bruxism or clenching, depending on the degree of tooth wear presented. Occlusal splints are generally employed, which may or may not be associated with therapeutic applications of botulinum toxin, especially in symptomatic cases [2,9,10,12]. However, in more advanced cases, in which there is

greater and generalized tooth wear, other rehabilitative treatments may be necessary, especially when there is loss of vertical dimension of the intermaxillary relationship due to generalized coronary destruction [1-4].

The purpose of this article is to present a case of advanced tooth wear caused by bruxism associated with gastroesophageal reflux disease, in which techniques were used with bite elevation to re-establish the vertical intermaxillary dimension followed by rehabilitation with single crowns in all maxillary teeth. In the mandible, a Branemark protocol prosthesis was installed on osseointegrated implants.

### Case Report

A Caucasian male patient, 42 years-old, attended the dental clinic with an aesthetic complaint during smiling. In addition to loss of vertical dimension, particularly in the lower third of the face, facial aging was also observed, with an inverted lip profile (Figure 1).



**Figure 1:** Extraoral aspects of the patient presenting from loss of vertical dimension due to excessive tooth wear.

Intraoral clinical examination revealed severe and generalized coronal destruction due to bruxism, particularly in the maxilla. Tooth absence and periodontal disease were also observed (Figure 2).

Radiographic examination revealed dental absences, bone loss due to periodontal disease, endodontic treatments performed on some teeth, periapical lesions, fixed conjugated prostheses in the mandible, and loss of dental substance due to attrition and carious



**Figure 2:** Generalized crown destruction due to bruxism associated with gastroesophageal reflux disease.

lesions (Figure 3). Magnetic resonance of the temporomandibular joint showed no significant changes, with the mouth closed and open (Figure 4).



**Figure 3:** Periapical radiographs showing tooth loss and tooth remnants.



**Figure 4:** Magnetic resonance of the temporomandibular joint showed no significant alterations.

Referring to the medical history, gastroesophageal reflux was reported on current treatment for 3 months with dexlansoprazole 60mg and domperidone 10mg daily.

Using the Willis bite gauge, it was possible to observe the loss of vertical dimension of occlusion, comparing the lower third with the middle third (Figure 5).



**Figure 5:** Loss of vertical dimension of occlusion, comparing the lower third with the middle third using the Willis bite gauge.

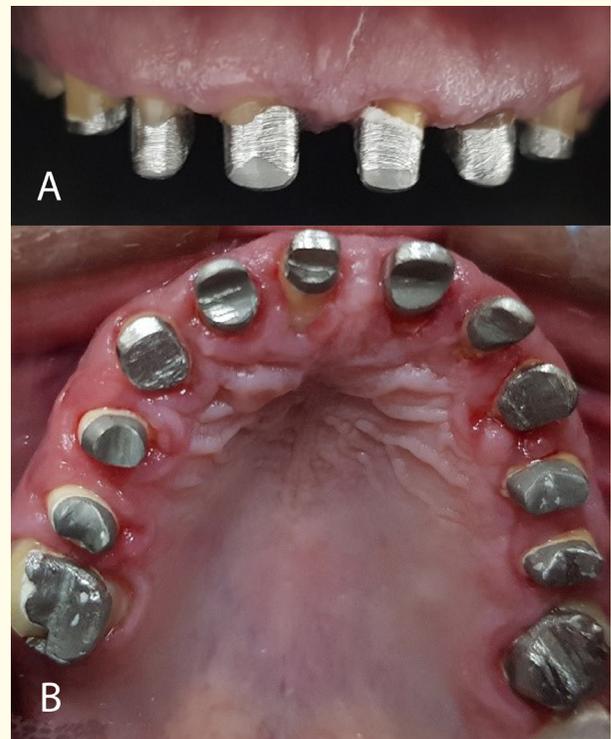
The planning of the case included periodontal treatment, starting with oral hygiene instruction and with sessions of scaling and root planning; endodontic treatment of the remaining teeth; installation of cast metal cores and single metal-ceramic crowns; as well as the installation and use of the occlusal splint, with the purpose of avoiding future fractures or tooth loss. In the mandible, it was planned to install a Branemark protocol prosthesis on osseointegrated implants.

After endodontic treatment of the upper remaining teeth (Figure 6), the cast metal cores were made and cemented (Figure 7). The provisional prosthesis and occlusal splint were made (Figure 8).

After installation of the cast metal cores, the metal copings of the individual metal-ceramic prostheses were made (Figure 9), followed by the application of ceramic, after adequate color selection (Figure 10).



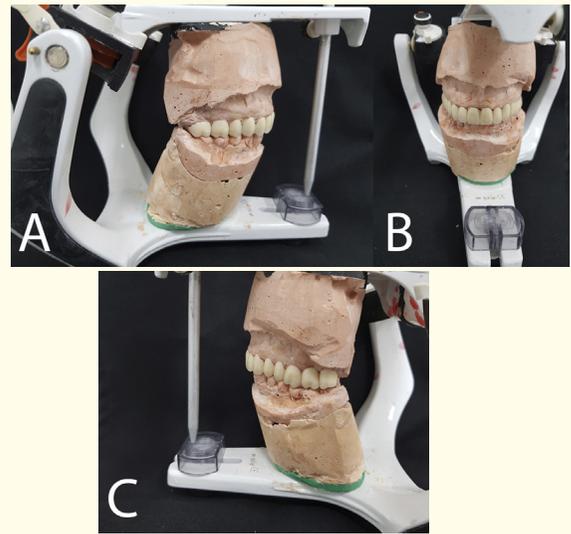
**Figure 6:** Endodontic treatment of the remaining upper teeth.



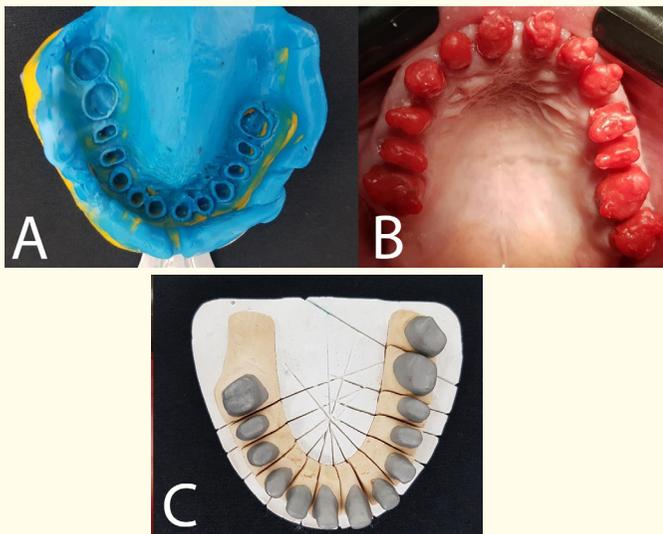
**Figure 7:** Cemented cast metal cores - frontal view (A); maxillary occlusal view (B).



**Figure 8:** Temporary prosthesis and making the occlusal splint.



**Figure 10:** Ceramic application on the work models.

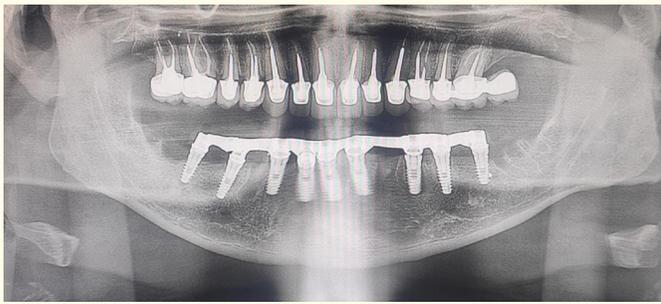


**Figure 9:** Impression (A), fabrication (B) and casting (C) of the copings.

In the maxilla, the individual prostheses were adjusted and cemented. In the mandible, the osseointegrated implants were installed, followed by the Branemark protocol prosthesis (Figures 11 and 12). The patient was again instructed in oral hygiene procedures.



**Figure 11:** Adjusted and cemented upper prosthesis and lower Branemark protocol prosthesis - frontal view (A); maxillary occlusal view (B).



**Figure 12:** Post-treatment radiographic aspects.

After restoring the worn and fractured crowns, besides the increase in vertical dimension (Figure 13), facial rejuvenation was also observed, achieving a satisfactory result between dental function and aesthetics (Figure 14). The patient has been followed up for 2 years with no signs of fractures or wear of the teeth and prostheses.



**Figure 14:** Extraoral aspects of the patient after oral rehabilitation.



**Figure 13:** Reestablishment and increase of vertical dimension using the Willis bite gauge.

**Discussion**

In multifactorial cases of tooth wear, a precise understanding of the etiological factors is necessary, as well as, when possible, its prevention, for a successful diagnosis, planning and management. Preventive guidance on habits of oral hygiene, diet and anti-smoking habits should be considered, initially by the dental surgeon, or additionally by other health professionals [3,6,7,13].

The changes can cause both major functional and esthetic alterations. Among the functional changes, there may be loss of vertical dimension of occlusion, with subsequent dentoalveolar compensation or increased interocclusal rest space; pulpal complications; tooth sensitivity; loss and fracture of restorations; increased incidence of cheek and tongue biting; loss of masticatory efficiency, with subsequent loss of quality of life. Dental aesthetic changes may include fractures and discoloration. On the facial aesthetic plane, loss of vertical dimension can cause reduction of the inverted lip third and profile, and facial aging [1,3,5-7,13].

To assist in the diagnosis, several types of analysis can be employed, with the use of calipers, Willis bite gauge, phonetic evaluation, facial soft tissue evaluation (of the lips), contour analysis, mandibular movements, among others. From the intraoral perspective, several methodologies can be used such as centric occlusion, intercuspatation, overbite, overjet, application of muscle deprogrammers for occlusal assessment (Lucia’s jig). Imaging exams (panoramic and periapical radiographs, cephalometric tracing, computed tomography and magnetic resonance imaging, intra

and extraoral photographs) can complement the case information, as well as study models and their respective assembly in semi-adjustable articulators. Diagnostic wax-ups and mock-ups help in the predictability of cases that will undergo extensive rehabilitation [2-7,13].

Generalized tooth wear is usually complex and there are several treatment options for its resolution. The complexity of each case depends on its severity. Simpler cases require only rehabilitative treatments based on more conservative restorative procedures, particularly with adhesive techniques, to preserve the remaining teeth. More complex cases may require from diagnostic wax-up, occlusal repositioning, increase of vertical dimension to the rehabilitation itself and case follow-up [1,2,5-7]. Endodontic and surgical periodontal treatments (clinical crown augmentation) may become necessary [3].

The bite lifting (increase in vertical dimension) can be performed with removable appliances or fixed prostheses, depending on the height to be raised. After this phase, the patient can be given fixed prostheses or overlays, with the use of various materials, such as direct or indirect composite resin, metal-plastic or metal-ceramic crowns, or more modern materials such as lithium disilicate or zirconia. Complementarily, the use of occlusal splint may be necessary [1,2,5-7]. Patient acceptance or adaptation with the removable method seems to be less predictable compared to the fixed method [1]. Depending on each case, it is possible to use telescopic crowns over dental or root remnants [4,5]. Replacing acrylic resin teeth or adding gold overlays has been reported to increase strength and reinforce the occlusal region in denture patients with significant occlusal wear. This may be an option for patients who are less demanding on aesthetics, or on cost, when compared to zirconia in cases of implant dentures [14].

Tooth wear caused by bruxism associated with gastroesophageal reflux disease has been reported in the literature [6,7]. It was observed, as in the present report, the severity of the dysfunctions presented by the patient, as well as the complexity of the proposed treatments.

Although there is no correlation between parafunctional habits and denture losses due to root or structural fractures (or porcelain chipping), bruxism can be determined as a risk factor for losses and failures of fixed prostheses on teeth or on implants [11,14].

## Conclusion

The association between bruxism and gastroesophageal reflux disease can bring several disorders to the stomatognathic system, particularly to the teeth, such as excessive tooth wear. Depending on the severity, several types of dental treatment may be necessary. The dental surgeon requires to be able to diagnose, plan and carry out the most adequate treatment. Since these are multifactorial etiologies, it is sometimes necessary for the dental surgeon to refer the patient to other professionals.

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