



## Dental erosion caused by gastroesophageal reflux disease: A case report

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### Abstract

**Introduction:** In individuals with gastroesophageal reflux disease, chronic gastric acid regurgitation can induce dental erosion, which, when combined with attrition or bruxism, can result in a significant destruction of coronal tooth structure.

**Case presentation:** this case report, a male patient, 54, with gastroesophageal reflux disease is treated for significant tooth wear. After receiving medical care, it was discovered that he had severe tooth wear, bruxism, and diminished vertical dimensions. The maxillary and mandibular front and posterior teeth were prepped for metal-ceramic fillings once the vertical dimension had been restored. Although all teeth were splinted, full mouth restorations for both the maxillary and mandibular arches were created using metal-ceramic fixed partial dentures. For his experience of bruxism, a maxillary stabilising splint was then created.

**Conclusion:** Coronal tooth structure degradation that is significant must be taken into account. The loss could be brought on by gastroesophageal reflux illness alone or in conjunction with attrition, abrasion, or bruxism. The medical and dental repercussions of the issue require a thorough diagnostic assessment.

**Keywords:** dental, erosion, gastroesophageal, disease

### Introduction

The condition known as gastroesophageal reflux disease (GERD) is characterised by the upper esophageal sphincter's muscles relaxing without conscious control, allowing stomach acid to reflux into the oral cavity <sup>[1]</sup>. Dental erosion has been linked to various population prevalences and may be as high as 42% <sup>[2]</sup>. GERD affects adults very frequently, with prevalence rates varying from 21 to 56 percent worldwide <sup>[3]</sup>. Due to the varied indicators employed in the various research as well as the variety of teeth examined in the sample, it is challenging to compare prevalent studies <sup>[4]</sup>. It was reported that GERD was diagnosed by endoscopy, where visual identification of mucosal inflammation and oesophagitis was used to identify the existence of GERD <sup>[5]</sup>.

The incidence and volume of regurgitation, as well as the length of time the condition has been present, will all affect how much erosion has occurred. Dietary acids are one more source of erosion that needs to be taken into account <sup>[6]</sup>. Enamel erosion is known to be caused by a number of reasons. It happens at a pH of roughly 5.5, which is on the acidic side of the neutral point, and may change based on the amounts of calcium and phosphate ions present in the saliva <sup>[7]</sup>. When erosion and wear from other sources, like as attrition, coexist, the wear on the teeth will be enhanced <sup>[8]</sup>.

Synergistic combinations of erosion, attrition, and abrasion may be to blame for the lost dental tissues <sup>[9]</sup>. The many subtypes of tooth wear can have a variety of clinical appearances. Flattened occlusal surfaces that virtually give the impression that someone has filled the teeth with sandpaper are indicative of attrition in its pure state. Additional indicator of the effects of bruxism is the existence of hypertrophy masseter muscles. Smooth lesions are caused by erosion from dietary or stomach acids, and they typically have cupped occlusal/incisal and concave buccal/facial surfaces.

The buccal and lingual surfaces of the upper incisors appear smooth and shiny with a generalised loss of structure when erosion is the predominant culprit. The outer layer of enamel or dentine is partially dissolved by the acid, causing the tooth surface to vary over time and make it more vulnerable to abrasion or attrition <sup>[10]</sup>.

Refluxed acid is known to target the palatal aspects of the upper incisor teeth first. If the situation persists, erosion of the posterior teeth's occlusal surfaces in both arches as well as the labial or buccal surfaces occurs over time <sup>[11, 12]</sup>. It is hypothesised that the gastric fluid is propelled forward and initially damages the palatal surfaces of the maxillary teeth by the force of the regurgitation as it passes from the pharynx into the mouth. The palatal aspects of the teeth are also somewhat far from the major salivary glands, and the tongue may be implicated by ensuring that stomach fluid remains in contact with the palatal surfaces of the teeth. Early on, the lower teeth are not impacted since the tongue offers some protection <sup>[13]</sup>. However, in more extreme situations, the tongue's protective function is overpowered, and the erosion pattern may be more widespread, typically starting with the lower teeth's occlusal and buccal aspects <sup>[11]</sup>.

A simplified wear index has been proposed to define wear on four levels; no wear, enamel exposure, mild and severe dentine exposure. The classification is not only dependent upon the severity of the wear but also the age of the patient [14].

The researchers came to the conclusion that people with GERD had a high risk of getting dental erosion. The stimulated saliva from the control subjects had much more buffering power than the saliva from GERD patients [15]. Additionally, when compared to control subjects, GERD patients had significantly higher tooth wear index ratings [2, 15]. Gastroesophageal reflux has been highlighted as the most likely reason for tooth wear in a number of case reports [3, 16-18]. Contrary to what was previously believed, it was demonstrated that there was no correlation between GERD and clinical parameters [19, 20]; however, morphometric analysis of the palatal epithelium in GERD patients revealed a statistically significant difference from the survey's healthy control group [19]. According to the findings of the morphometric study, there were significant differences between the groups in terms of the luminal and basal surface ratio, epithelial thickness, and the number of fibroblasts/mm<sup>3</sup>.

The more aggressiveness the epithelium experiences, the less the value of the connection between the basal surface and the exterior surface. Through deepening the epithelial crests in the connective tissue and the connective papillae in the epithelium, the values obtained represent an irritation of the palatal epithelium. The epithelium is more severely damaged in people with more severe reflux [19].

Burning mouth syndrome, tooth sensitivity, loss of vertical dimension, and cosmetic issues are oral symptoms of GERD [18]. The process of wearing teeth is multi-factorial. Although it can be slow, the effects of wear are typically progressive. The wear shortens clinical crowns and makes therapy more challenging when combined with alveolar compensation [10]. The clinical observations, diagnosis, and medical and dental rehabilitation of a patient with significant tooth erosion due to GERD are presented in this case analysis.

### Case Presentation

A 54-year-old man who had unattractive and dysfunctional teeth visited our Department of Public Health Dentistry at the Institute of Dental Sciences in Bareilly. During his oral examination, it was discovered that he had a history of gastric reflux disease that he had been unaware of for roughly 4–5 years due to no noticeable symptoms. Additionally, the habit of brushing one time each day and a history of bruxism were both evident. In his clinical examination, occlusal and buccal aspects of the mandibular teeth, as well as cervical lesions, were all damaged by generalised dental erosion, including loss of dentin (Figures 1, 2, and 3; Smith and Knight Wear Index, Scores 3-4).

The patient's likely exposure to etiologic variables linked to tooth erosion, such as consumption of citrus fruits, vinegar, and carbonated beverages, was described in the questionnaire. The patient denied consuming a lot of acidic meals and beverages. The type V dental stone was used to pour the irreversible hydrocolloid impressions of both arches. There was a decreased vertical dimension after measuring the occlusal vertical dimension using mounted diagnostic casts and facial dimensions. On a semi-adjustable articulator, diagnostic castings were mounted employing a face-bow transfer and centric relation records.

Initially, a gastroenterologist was recommended for the patient. The endoscopic investigation demonstrates esophageal epithelial irritation, and the findings supported GERD. The right pharmaceutical treatment has been recommended, and GERD has been managed. A maxillary acrylic resin splint with a flat occlusal plan was made after the medical treatment to enhance vertical height and protect the teeth from future stomach acid and bruxism. Over the course of 30 days, acrylic resin was added in 1 mm and 2 mm increments to the occlusal surface of the splint to create a 3 mm rise in occlusal vertical dimension (OVD).

Well after increase in OVD, no symptoms of muscle pain or discomfort or functional problems appeared. Maxillary and mandibular anterior and posterior teeth that had resin-based composite restorations were prepared for metal-ceramic restorations once the vertical dimension had been restored. Laboratory-processed provisional restorations were made at the new OVD and cemented using zinc-oxide eugenol.



**Fig 1:** Pre-op intraoral front view in occlusion



**Fig 2:** Pre-op intraoral occlusal view of upper arch



**Fig 3:** Pre-op intraoral occlusal view of lower arch

Upon that mounted casts, a thorough contoured wax-up allowed for the evaluation of tooth proportions for the best possible aesthetics. Using polysiloxane impression material, precise impressions of the cleaned maxillary and mandibular teeth were made. Type IV die stone was used to create working casts, which were then mounted utilising interocclusal records in the articulator. The shade was determined. Because all teeth were splinted, intra-oral evaluations were performed, and adjustments were made, metal-ceramic fixed partial dentures were created as complete mouth restorations for both the maxillary and mandibular arches (Figures 4, 5, 6, 7 and 8). The patient's history of daytime and nighttime bruxism makes it possible that teeth with crowns could shift. To provide each tooth extra support, the nearby crowns were splinted. Contrarily, by paying closer attention and employing proximal brushes and dental floss, the patient was clearly aware of the significance of maintaining good oral hygiene. Group discclusion was established for lateral movements so that the restored teeth would receive an even distribution of masticatory loads. Glass-ionomer cement was used to fix the restorations throughout the entire mouth. Additionally, a lab-processed maxillary stabilizing splint that was recommended for usage at night was made, modified, and put in for bruxism history (Figure 9). Two years of patient monitoring went by with no complaints. Both the patient's requirements for function and aesthetics were met.



**Fig 4:** Post-op intraoral front view in occlusion **Fig 5:** Post-op intraoral right lateral view in occlusion



**Fig 6:** Post-op intraoral left lateral view in occlusion **Fig 7:** Post-op intraoral occlusal view of upper arch



**Fig 8:** Post-op intraoral occlusal view of lower arch **Fig 9:** Post-op frontal view with stabilization splint

### Discussion

There are numerous treatment options available in modern dentistry for tooth loss, ranging from conservative to invasive: direct resin composite restorations, laboratory-made adhesive restorations (resin composite, all-ceramic, and metal alloys), and laboratory-made full crown restorations (metal, metal-ceramics and all ceramics). Dental hard tissue is less soluble in an acidic environment. Regurgitation can severely demineralize tooth structure and restorative materials since gastric contents may have an acidity below pH 1<sup>[21]</sup>. According to a research, surface alterations induced by exposure to simulated gastric juice had an impact on the posterior composite and poly-acid modified composite<sup>[22]</sup>. In oral circumstances, chemical reactions or dissolution can result in an increase in surface roughness in the absence of mechanical forces. The chemical deterioration of the surface and subsurface, which may affect the resin matrix, the filler, or the interface between the matrix and the filler, has been linked to these unfavorable effects<sup>[23]</sup>. Due to these circumstances, our patient was fitted with metal-ceramic fixed partial dentures. Due to any symptoms that were disrupting his life, he had not paid attention to his anamnesis. However, his endoscopic examination revealed esophageal epithelial irritation, which was verified as silent GERD. Gastric reflux without symptoms such as belching, an apparent sour taste, or heartburn is known as silent GERD<sup>[17]</sup>. Our patient has long-standing GERD, which may stop causing symptoms yet still exist.

### Conclusion

This case report details the dental care provided to a patient with GERD after his medical diagnosis and treatment, which involved creating metal-ceramic fixed partial dentures.

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