Approaches for Prevention & Control of Dental Erosion

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Bennett T. Amauci, USA

In light of increasing reports of the incidence and prevalence of dental erosion, it is now necessary that dental practitioners are familiar with the etiological and predisposing factors of dental erosion as well as the possible ways of its prevention and control.

It may be easier to gain patients’ compliance with the advice of administering a remineralizing agent immediately following an acidic challenge to enhance rapid remineralization of the softened tooth surface as well as serve as a mouth refresher, or alternatively, a neutralizing solution to buffer the acidic oral environment. Effective counseling on erosion prevention regimens should involve all healthcare personnel, dentists, doctors, pharmacists, nurses/hygienists and clinical psychologists.

Dental erosion, otherwise known as erosive tooth wear, is the loss of dental hard tissue either through natural wear or under solution by acids of non-bacterial origin or by chelation. The incidence and prevalence of dental erosion is increasingly being reported.2 This is evident from prevalence studies conducted in different parts of the world, which showed the percentage of individuals affected by erosion (Table 1) among various age groups.3–5 This has prompted a series of research on the possible approach for prevention and control of dental erosion,6 while its management is now an area of clinical practice that is undoubtedly expanding.7

This article describes an overview of the up-to-date information on the factors that predispose individuals to the risk of dental erosion, and the possible strategies to prevent and control the development of this disorder.

Predisposing Conditions

An important step towards prevention of dental erosion should be the identification of those individuals who are at risk of dental erosion. Evidence based on case reports, clinical trials, epidemiological, cohort, animal, in vitro and in vivo studies have described such acids that could cause dental erosion or chelating agents that could cause dental erosion as originating from gastric, dietary or environmental sources. Based on this fact, certain factors, classified as either intrinsic or extrinsic, have been identified as the predictors of susceptibility to dental erosion.

Dental erosion due to intrinsic factors is caused by gastric acid reaching the oral cavity and the teeth, and acting regularly on the dental hard tissue over a period of several years. This may be the result of chronic vomiting, persistent regurgitation or rumination. The acidity of the gastric juice ranges from pH 1 to 3, so it is conceivable that regurgitation or vomiting into the mouth might result in marked tooth destruction in the form of erosion.

Conditions that are associated with chronic vomiting or regurgitation and therefore can predispose an individual to the risk of erosion are: 1) certain medical conditions such as bulimia nervosa, gastro-esophageal reflux disease (GERD), cyclic vomiting syndrome (CVS), psychogenic vomiting syndrome, pregnancy-induced vomiting, and life styles such as chronic alcoholism and binge drinking.

Extrinsic factors that can predispose an individual to the risk of dental erosion have been grouped under the headings of dietary, occupational, medications and lifestyle.

Misuse of acidic dietary products: Acidic fruits, fruit juices, drinks and beverages have been shown to have a very high level of titratable acids (high H+) and low pH, which is detrimental to the teeth. Frequent and prolonged ingestion of these food substances—in as the case with habitual drinker and fruit juice fans—is a risk for dental erosion. Occasional and prolonged exposure of the teeth to a prolonged period of acidic challenge with acid-induced dental erosion.

Frequent and prolonged ingestion of dietary acidic acids that may have erosive potential: ascorbic acid (vitamin C), ascorbyl-6-sulfonic acid (aspirin), liquid hydrochloric acid, iron tonics, acidic saliva stimulants/substitutes, and products with calcium-chelating properties.

Use of acidic medicaments: These medications, when prescribed for frequent use over a long period of time, predispose to dental erosion.8–10 The following acidic medicaments may have erosive potential: aspirin, salicylic acid (aspirin), liquid hydrochloric acid, iron tonics, acidic saliva stimulants/substitutes, and products with calcium-chelating properties.

Table 1: Summary of prevalence studies of dental erosion.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>% affected</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–4</td>
<td>20</td>
<td>UK Toddlers Survey, 1994</td>
</tr>
<tr>
<td>4–5</td>
<td>58</td>
<td>Millward et al. 19941</td>
</tr>
<tr>
<td>5–6</td>
<td>52</td>
<td>UK Child Dental Health Survey, 1993</td>
</tr>
<tr>
<td>11</td>
<td>25</td>
<td>UK Child Dental Health Survey, 1993</td>
</tr>
<tr>
<td>11–14</td>
<td>57</td>
<td>Bartlett et al. 19985</td>
</tr>
<tr>
<td>26–50</td>
<td>50</td>
<td>Lussi et al. 1994</td>
</tr>
<tr>
<td>45–50</td>
<td>42.6</td>
<td>Lussi et al. 1994</td>
</tr>
</tbody>
</table>

Dental erosion has been reported to be common among lacto-vegetarians due to the associated hypocalcification and high consumption of low-pH foods combined with the abrasive effect of the coarse fresh food.11 Frequent tooth brushing with abrasive dentifrice as practiced by some health aesthetic-conscious individuals may render the tooth surface more susceptible to erosion due to its effect of removing the more protective highly mineralized outer layer of enamel surface.12

Guidelines for Prevention & Control

The conditions discussed above as predisposing individuals to the risk of dental erosion highlight the fact that individuals who are susceptible to dental erosion have either psychological or habitual or professional inclination to the factors predisposing them to the disorder. This would obviously pose difficulty in obtaining full compliance with preventive advice, even when the causative factor is identified. However, if implemented, the following steps may prevent occurrence, limit the damage, modify habit or protect the remaining tooth tissue.

Fig. 1: Facial erosion with smooth and shiny appearance. Courtesy: Adrian Lussi, UZH, Bern, Switzerland.

Step 1: Early diagnosis

Patients can barely detect early enamel erosion due to its smooth and shiny appearance (Fig. 1). Even when detected they rarely seek treatment until it gets to an advanced stage, when it either becomes symptomatic (sensitivity) or affects the aesthetics of their teeth. The responsibility of early detection and treatment therefore falls on dental professionals.

Once dental erosion is detected, there is a need for a full case history, which should include dietary history, medical history, dental hygiene habits, and aesthetic history. This would establish the etiological factor and help in development of individualized counseling. Following diagnosis of an early lesion or the patient's susceptibility, the following recommendations may be considered as a “damage-limiting” policy as well as a preventive policy.

Step 2: Record the clinical situation

The severity and extent of the wear must be recorded to establish the clinical baseline so that progression can be detected, and the effects of preventive measures assessed. For this, the following techniques are useful.

• The Silicone Index, described by Shaw et al.13 in which a silicone putty impression of the teeth is taken in a sectional tray, is one of the easiest and most useful methods of monitoring tooth wear.

• The Tooth Wear Index of Smith and Knight14, which records the degree of wear on all tooth surfaces, allows monitoring of the effectiveness of preventive measures.

• Serial (reference) impression casts or study models recommended by Wicksen's can be used at follow-up visits for macroscopic comparison with the teeth to monitor wear.

• Clinical photographs are obviously useful for monitoring wear, but the dexterity of the photographer and ambient conditions such as light reflections affect the quality of the product.

Step 3: Treatment of the underlying medical disorders and diseases

Some patients may not be aware of their underlying medical condition, but in search of treatment for the deteriorating condition of their teeth, the dentist may be the first healthcare personnel to observe the underlying medical disorder.15 Others may not recognize their condition as a disorder, especially with anorexia/ bulimia.16,17 Patients may not seek medical attention until it starts affecting the aesthetics, function or comfort of their teeth.

Patients should be referred to the appropriate specialist (doctor or
Clinical psychologist) for proper treatment of the condition.

**Step 4. Preventive measures**

A. Use of remineralizing agent or neutralizing agent.

It is a common practice among individuals suffering from GERD to neutralize softening erosive agent—e.g., sugar-free antacid tablets or a pinch of sodium bicarbonate or baking soda dissolved in some water may be used to neutralize the acidic oral fluid immediately following exposure to acidic challenge.


The temperature of an acidic and erosive agent will potentially reduce its erosive effect.**15**

The drink should be swallowed quickly and not sipped slowly or “swished” around the mouth.

c. Use of operative devices.

Insertion of a close-fitting occlusal guard at high risk times (e.g., during the night (for GERD patients), swimming in poorly maintained swimming pool (for professional swimmers) or voluntary vomiting (for anorexia/bulimia patients) may be considered. Application of an acidic agent such as milk of magnesia, to the fitting surface of the guard to neutralize any acid pooling underneath the appliance or a neutral fluoride gel, can be well used for this purpose.

d. Use of modified dietary and medicinal products.

The foods and beverages that determine their erosive potential includes pH, titratable acid (total acid level), type of acid (pka), calcium, phosphate and fluoride content, calcium chelating properties, adherence to tooth surface and saliva solubility of the enamel surface. While the application of sodium fluoride gel immediately before tooth brushing significantly reduced erosion of desensitized dentine.**9**

The remineralization would go further to confer a greater resistance to subsequent acid attack of the affected surfaces.**12**

It has been reported that highly concentrated fluoride application is able to increase abrasion resistance and decrease the development of erosion in enamel in dentin.**13,14** Hence, application of a remineralizing agent can be achieved by the following means.

The use of fluoride mouth rinses, fluoride tablets and fluoride lozenges is particularly useful for populations at risk of dental erosion and for consumption of acid-rich foods and beverages.**15**

### Step 5. Health education

Dental professionals should be as proactive as they are with dental caries in health education relating to the prevention of dental erosion. Patients and parents should be informed of the dental implications of the predisposing factors discussed above: how to prevent or minimize the problems and the importance of full compliance with the preventive advice. In addition, patients should be advised on how to prevent or minimize the problems and the importance of full compliance with preventive policies.

There is a need for the dental profession to liaise closely with medical colleagues to alert them to the dental consequences of certain medical conditions, and how to minimize them.**16**

This would enable the information of preventive regimes to be passed to the patients at an early stage, before the damage is done.

**Step 7. Establish continued care**

In order to ensure that the preventive measures adopted by the patient may result in a relapse of the condition, therefore it is essential that the patient is continually monitored by all the healthcare personnel involved in their management (doctor, clinical psychologist, nurse, or technician) to visit their dentist for regular dental examinations. This would enable any erosion and appropriate management could be instituted immediately.

Counseling should be individualized and relate to the observed etiological factor. However, the following key points may be considered as a guideline.

- 141–152.
- 20. Scheutzel P. Etiology of dental erosion in four-year-old children and its relation to other dental conditions among German battery fac-
- 62–66.
- 10. Scheutzel P. Etiology of dental ero-
- 4. The presence of fluoride in food, such as milk of magnesia, to the fitting surface of the guard to neutralize any acid pooling underneath the appliance or a neutral fluoride gel, can be well used for this purpose.
- 10. Scheutzel P. Etiology of dental erosion: intrinsic and ex-
- 9. The use of fluoride mouth rinses, fluoride tablets and fluoride lozenges is particularly useful for populations at risk of dental erosion and for consumption of acid-rich foods and beverages.
Dental Tribune Middle East & Africa Edition

Self-Instruction Program

UK scientists find new oral species

LEIPZIG: According to a BBC report, researchers at the King’s College London have discovered a yet unknown bacteria in the oral cavity. The new species was found in healthy tissue as well as oral cancer cells and belongs to the Prevotella family which was previously linked to gum disease and infections in other parts of the human body. The study, published in the journal Nature, is designed to understand the changes in bacterial activity that lead to oral problems and give a broader picture of the causation of these, the report said.

The healthy human mouth is inhabited by 700–900 different species of bacteria. Tooth decay and gum disease are the most common bacterial oral diseases and scientists have linked them to changes in the micro- floral flora” found in the mouth. Other research states that they also promote a number of systemic diseases, such as low birth weight babies, diabetes, arterial sclerosis or pulmonary disease.

Infertility by gum disease

LEIPZIG: Infertile men are more likely to suffer from chronic gum infections than those with healthy sperm. After studying 56 men who came to a fertility lab for sperm analysis, Israeli researchers found that more than 80 per cent had some form of parodontitis.