



MANAGING DENTAL EROSION

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Dental erosion is on the increase

There is common awareness within the dental profession that dental erosion is on the increase. What is causing this increase and what can be done to prevent this irreversible destruction? This article will explore the aetiology, risk factors, diagnosis and clinical features of dental erosion. It will also suggest practical tools for passive and active roles in the prevention and management of dental erosion.

Introduction

In the last decade tooth erosion has drawn increasing attention as a risk factor for enamel wear. There is evidence that its prevalence is growing steadily and there has been a gradual realisation that the younger population are being increasingly affected.¹

Dental erosion is the irreversible loss of hard dental tissue due to a chemical process of acid dissolution but not involving bacterial plaque acid, and not directly associated with mechanical or traumatic factors, or with dental caries.² Although similar, the caries process begins as a sub-surface enamel lesion that is

conductive to remineralisation, whereas erosion is a surface-softening lesion that is susceptible to wear and resistant to remineralisation by conventional therapies.

Aetiology

Erosion is usually multifactorial and often co-exists with other non-carious tooth surface loss such as abrasion, attrition and abfraction. Over time the interaction of all these factors may lead to the progressive loss of tooth tissue and there are often overlapping factors that may play a role.

The chemical process of dental erosion is the

same as dental caries where there is dissolution of hydroxyapatite crystals; however, the clinical manifestation is fundamentally different because the erosive process does not contain bacteria. Instead erosion results from exposure to non-bacterial acids of either an extrinsic or intrinsic origin.³ It is caused by sustained direct contact between tooth surfaces and acid substances, essentially, whatever causes the oral pH to drop below the critical point of 5.5. Clearance of the acids is often down to the salivary flow rate and the buffering capacity.

Risk factors

There are three different risk factors: intrinsic sources, extrinsic sources and predisposing factors.

1. Intrinsic acid sources are of gastric origin and enter the mouth from the stomach. Examples of sources are listed in Table 1. Intrinsic acid is heavily associated with

significant palatal wear of the maxillary teeth. A thorough medical/dental history can establish any underlying issues the patient may have.

2. Extrinsic acid sources are substances taken into the oral cavity. There has been much scientific research into the habits of dietary practices especially with the emphasis on healthy food and drink. A trend towards an increased number of eating occasions has been observed, **and** if the increased number of occasions are accompanied by the inclusion of acidic foods or drinks at each occasion, then this could heighten the risk for erosive damage.^{4,5} With a healthy lifestyle comes frequent exercise which can also potentially lead to frequent intake of acidic sports beverages. Certain occupations and lifestyle choices can also make patients more vulnerable.^{6,7}
3. Salivary flow and buffering capacity can have a big impact on clearance of acidic substances. Saliva contains bicarbonate and urea and rapidly neutralises the acid remnants and returns the pH to normal.⁸ If a person has low saliva rates and poor buffering capacity they are much more likely to suffer with erosion.

Benefits of chewing

Whether the acid attack is caused by extrinsic, intrinsic or predisposing factors, the pH of saliva can be modified by chewing sugar free gum for 20 minutes after acid exposure. The increased levels of bicarbonate and calcium ions assist in a more rapid remineralisation of the tooth surface.⁹ Many studies show that if saliva is stimulated through chewing gum plaque acid is neutralised more quickly than if gum is not used. Also, chewing sugar-free gum is shown to help remove up to 95% of residual food debris within just a few minutes.^{10,11}

Diagnosis

Accurate diagnosis of erosion begins with assessment of risk factors and relevant medical/dental histories and visual examination. If it is detected in the early stages appropriate steps can be taken to halt its progression. Erosion often presents on the palatal surface of the maxillary teeth, and the occlusal surface of the mandibular first molars. It can also be seen on the buccal surfaces of maxillary and mandibular canines and premolars, and occlusally on the maxillary and mandibular canines and molars.¹² Early signs include smooth flat facets on buccal or palatal surfaces, and shallow, localised dimpling on the occlusal surfaces.¹³ Since hard tissue loss is irreversible, worn dentition is a great challenge for clinicians and their patients, making it

Table 1 Examples of extrinsic and intrinsic acid sources

Acid Type	Risk factor	Example
Extrinsic		
	Dietary	Fruit Fruit juice Sports/energy drinks Fruit smoothies Carbonated beverages (diet) Wine
	Occupational	Wine taster Metal sheet worker
	Environmental	Swimmer Athlete
	Medication	Vitamin C Aspirin
	Lifestyle	Ecstasy Frothing/swishing drinks
Intrinsic		
	Medication	Antihistamines Antidepressants Antipsychotics
	Illness	GORD (reflux) Bulimia Frequent vomiting (pregnancy)
	Lifestyle	Rumination

imperative to recognise the signs of erosion to facilitate early intervention before significant hard tissue is lost. Once suspicion is raised, it is essential to record accurately the severity and extent in order to establish a baseline for future observations.

Passive management

The main thrust of prevention is to change lifestyle and to record and monitor the progression. If the patients have no complaints regarding pain and sensitivity a 'watch and wait' principle should be employed.¹⁴ There are several steps to follow before active management approaches should be undertaken:

1. Inform the patient of the problem and its causes, and provide appropriate literature

2. Ascertain underlying diseases or medications associated with the presence of intrinsic acids. It may be necessary to consult with the patient's doctor
3. Monitor progression with tooth wear indices, photos, study models, silicone impressions and splints¹⁵
4. Provide personalised dietary counselling, or refer patient to a dietitian where applicable. After completing a diet diary and personalised consultation, you may recommend:
 - a. Reducing the frequency and consumption of acidic foods and drinks where appropriate
 - b. Sugar-free alternatives where applicable
 - c. Avoid frothing and swishing especially with carbonated beverages

- d. Chew sugar-free gum for 20 minutes after the consumption of acidic foods, explaining the benefits outlined above
 - e. Do not brush for at least an hour after the consumption of acidic foods
 - f. Avoid occupational exposure with mouth guards, splints or neutralising agents
 - g. Use a high fluoride, low abrasive toothpaste, and a soft-medium bristled brush
5. Apply fluoride varnish to susceptible surfaces to provide a protective film and reduce direct contact between tooth surfaces and acid.¹

Active management

Invasive procedures should not commence until a period of monitoring has taken place and the erosive progression has halted. Assessment of space in the inter-cuspal

position is essential prior to treatment to assess the working space; possible procedures could be:

1. A Dahl appliance may be required if there is palatal erosion of the upper anterior teeth with no inter-occlusal space, as it will create an open bite and allow relative extrusion of the posterior teeth to later provide composite resin restorations¹⁷
2. In generalised erosion evaluation of the freeway space may lead to restoration by way of conventional crown work.¹⁸

Conclusion

Prolonged exposure from acids either intrinsic or extrinsic on the tooth surface will result in softening and dissolution of surface minerals. If it is not diagnosed and treated early it may cause irreversible loss of hard dental tissue. Early intervention is key to effective prevention by reducing direct contact with acids through

diet advice, increasing salivary flow to neutralise the acids by chewing sugar-free gum, and minimising toothbrush abrasion with personalised oral health education.

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CPD QUESTIONS

Test yourself on this article by answering the questions below, and include reading this article in your record as one hour of non-verifiable (general) CPD.

The answers will be published in the November issue of *BDJ Team*.

1. Dental erosion is:
 - A. due to eating a diet consisting of course food
 - B. the irreversible loss of hard tissue due to alkaline foods and drinks
 - C. the irreversible loss of hard tissue due to a chemical process of acid dissolution
 - D. caused by bacterial plaque
2. Which of the following describes the process of erosion?
 - A. it begins with bacteria which are sub-surface in dental hard tissues
 - B. it is a surface-softening lesion
 - C. it can be remineralised by conventional therapies
 - D. it is not susceptible to wear
3. The aetiology of erosion is:
 - A. caused by exposure to non-bacterial acids
 - B. mediated by the oral pH being above the critical point of 6.5
 - C. unaffected by the salivary flow rate
 - D. solely caused by extrinsic acids from foods taken into the oral cavity
4. Chewing sugar-free gum for 20 minutes after acid exposure:
 - A. removes only 45% of residual food debris
 - B. decreases levels of bicarbonate and calcium thereby lowering the pH of saliva
 - C. neutralises plaque acid more slowly
 - D. assists in a more rapid remineralisation of the tooth surface
5. Signs of erosion:
 - A. are usually in the form of jagged deep cavities
 - B. most frequently occur on the labial surfaces of upper incisors
 - C. include smooth, flat facets on the buccal or palatal tooth surfaces
 - D. may be detected early on the mesial and distal surfaces of first molars
6. In preventing erosion the main activity involves:
 - A. early extraction of all teeth involved
 - B. changing the patient's lifestyle, recording and monitoring progression
 - C. recommending twice-daily salt water mouthwashes
 - D. eating as many healthy acidic fruits as possible
7. Which of the following is **not** a recommended aspect of dietary counselling?
 - A. avoiding frothing and swishing of carbonated beverages
 - B. brushing immediately after acid exposure
 - C. using high fluoride toothpaste
 - D. chewing sugar-free gum
8. Active treatment:
 - A. should only commence after a period of monitoring and the erosive progression had halted
 - B. is unlikely to include crown work as there is insufficient tooth tissue remaining
 - C. can start without regard to the working space
 - D. may require composite resin build-up of the anterior teeth to create further space in the posterior quadrants

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