NQ Surgical Dentistry

Tooth Wear

Teeth are hard calcified tissues but they can be damaged in several ways. A fall can result in trauma and a fracture of a tooth. However, teeth can be damaged in other ways that may take place within the mouth described as tooth wear.

Tooth wear can be a result of **erosion**, **attrition** or **abrasion** or a **combination** of more than one of these primary causes.

Erosion

Erosion describes the dissolution of the mineralised structure of the tooth by acid. The acid may be either endogenous, entering the mouth from the stomach or exogenous, entering the mouth as food or beverage. The result of the contact between acid and tooth substance is softening of the surface and loss of mineral density in the surfacer and subsurface layers. Further details on the acid content of food and beverages can be found later in this article.

Attrition

Attrition describes the process of tooth wear resulting from tooth to tooth contact in a hard rubbing movement. It is the result of tooth grinding or possibly clenching to a lesser extent and tends to affect only the biting surfaces of posterior teeth or the incisal edges of the front teeth including the canines and incisors. This is often seen in the front of the mouth in people who grind their teeth in their sleep. The edges of the enamel can become very sharp and often lead to trauma to the soft tissues of the cheeks and tongue that can result in a white thickening of the soft tissues at the level of the occlusal plane of the teeth, referred to as *frictional keratosis*.

Abrasion

Abrasion is the process where a foreign body rubs off tooth structure. In the past dentists used to refer to *toothbrush abrasion*. However research has shown that simply brushing the tooth surface in a hard scrubbing motion with a firm toothbrush alone removes almost no tooth structure. Therefore this mechanism could not possibly result in the degree of tooth wear often attributed to this cause.

Combination cause

It is now understood that most people who suffer from tooth wear have more than one of the above three mechanisms at work. The most commonly involved mechanism is erosion. This is the first stage in the wear process. The introduction of acid to the tooth surface leads to a reduction in the density of mineral on the surface of the tooth with consequential softening of the tooth surface.

Once the tooth surface is softened even if this only affects a depth of 10 microns (one micron equals 1/1000 of a millimetre), then attrition may result when the teeth begin to grind against each other.

Night-time erosion

Often erosion takes place at night. In such cases the source of the acid is the stomach. There may be a loose sphincter muscle at the point where the oesophagus (*the tube from the mouth to the stomach through which food travels when swallowed*) meets the stomach and when lying down, this allows reflux of the acidic stomach contents into the oesophagus and up the oesophagus to the mouth.

Gastro-oesophageal Reflux Disease

The stomach contents that flows up to the mouth is extremely acidic being Hydrochloric acid. This is a not uncommon problem and is frequently seen in obese people due to the weight of the fat distributed around the middle of the torso raising the pressure of the abdominal contents. In conjunction with a weak stomach sphincter the result is referred to as Gastro-oesophageal Reflux Disease (GORD).

NQ Surgical Dentistry

Diagnosis of GORD

While patients with GORD may present to their GP suffering from stomach or chest pain or indigestion often referred to as "heart-burn", another way in which such patients can be diagnosed is through a dental examination.

Observation of the teeth will reveal the loss of enamel. This may affect a number of different areas of the teeth. Some loss of enamel on the front of the upper front teeth is often dietary in nature, while the loss of enamel on the lower posterior teeth is more commonly the result of GORD.

Some patients who primarily sleep on one side and who suffer from GORD and who grind their teeth may suffer from greater tooth wear on the side on which they sleep as the acid enters the mouth and due to gravity will pool on the lower side of the mouth. This then remains in place dissolving the tooth surfaces and the attrition (tooth on tooth wear) on this side becomes more severe.

GORD patients need medical investigation and treatment

It is important to identify those patients who suffer GORD and advise them that they should seek the advice of their medical practitioner. In some cases the most appropriate management will involve the referral of the patient to a Gastroenterologist. They may advise that the patient be investigated further by a gastroscopy/endoscopy. This involves the observation of the stomach lining and the small intestine lining using a small camera inserted through the mouth. This is performed under intravenous sedation and is important to identify any other possible serious complications that may result from GORD and the high degree of acid production in the stomach.

Anorexia and Bulimia induced erosion

In the younger patient who is not over weight or may indeed be considered under weight, the acid may result from habitual vomiting to reduce or maintain weight or for psychological reasons as in *bulimia nervosa*. The regular presence of vomited acid in the mouth acts on the teeth and in this case we often see a preferential loss of tooth substance on the tongue side of the upper front teeth.

Historical tooth wear or ongoing tooth wear

It is difficult sometimes to distinguish between old and inactive tooth wear and tooth wear that is recent and ongoing. If the wear is the result of erosion with accompanying attrition or abrasion then old and inactive wear sites will have attracted some staining from coffee, tea, food pigments, smoking or red wine. If the site of tooth wear appears clean and even shiny, this is likely to be ongoing or current damage.

Dietary acid

Acid is consumed as part of our dietary intake. It is found primarily in fizzy drinks, even fizzy water where the pH (a measure of acidity) can be very significantly in the acid range. Fruits, juices, cordials, wine, pickles and other food items can all contribute to converting the oral cavity into an acidic environment. While a number of these acid food items may appear to be associated with a healthy diet, it is important to limit the frequency with which they are consumed to minimise the damage they cause to our teeth.

All things in moderation

Fruit, for example, should be included in a healthy diet but is best consumed in a single meal and not regularly throughout the day. It is a regular intake that is likely to lead to damage to the teeth from erosion as this causes the pH of the mouth to remain in the acid range for much of the day leading to constant tooth erosion taking place.

Don't brush after acidic food

Following any acidic food or drink, it is best to avoid immediately brushing your teeth. Brushing immediately after the acid has softened the tooth surfaces will promote tooth wear from all mechanical abrasion against those tooth

surfaces including tooth brushing. It is far better to wait until the acid has been neutralised before brushing to avoid the damage from abrasion

How to avoid erosion after acidic food

Fruit is best consumed after a meal and the damaging acid attack can be prevented by neutralising the acid afterwards. This can be best achieved by drinking milk, chewing cheese or by chewing sugar-free gum. Milk and cheese naturally equalises the pH returning it to a neutral value of around pH 7. The sugar-free gum works by stimulating the production of saliva increasing the chemical buffering effect of the saliva in the mouth helping to return the mouth to a neutral environment.

Saliva is very important

Salivary production in the mouth is an important protective factor in regulating the pH of the mouth. Without it, much of our protection against bacterial activity is lost due to a lack of enzyme activity that kills bacteria and maintains a balanced oral environment. In patients who suffer from a condition called Xerostomia (dry mouth) it is common to find extensive tooth decay and tooth wear. For those patients suffering from a dry mouth, it is advised they read the article on Xerostomia for more detailed information. This is found on our website in our patient information section.

Restoring worn teeth

Generally, teeth that are worn have suffered from a wearing away of the outer surface of the crown of the tooth made up of very hard enamel. This usually results in the exposure of the underlying softer dentine. Dentine has a nerve supply and consequently the wear can be accompanied by tooth sensitivity. This can be a problem for patients and generally needs to be treated.

The second problem associated with exposed dentine is that dentine is far softer than enamel. If the tooth is in contact with either an opposing tooth with in tact enamel, then the tooth suffering from lost enamel due to erosion and wear will suffer from an accelerated rate of tooth wear.

For both these reasons the worn dentine must be protected. This can be done in either of two ways. The first involves the application of an adhesive filling material and the second involves the provision of a crown or crowns to cover and protect the worn teeth.

Every patient's situation and wear pattern is different and therefore no single approach is best for all patients. Careful assessment of wear and the causative factors must be made in planning the most appropriate treatment for each patient