

# Tooth wear

## physiological or pathological?

Tooth wear has been part of the human experience for about two million years, according to anthropological experts. Indeed, anthropologist John Kaidonis offered his view that tooth wear is a normal physiological 'phenomenon, where teeth, although worn, remain functional throughout life.'<sup>1</sup>

Modern-day clinicians, however, are increasingly witnessing a type of tooth wear that affects both the form and function of the dentition; so, what has changed and how can one differentiate between physiological and pathological tooth wear, and act accordingly both to prevent further harm and to restore teeth that have been permanently damaged?



**Professor Andrew Eder** explores the difference between physiological or pathological tooth wear, and considers why being able to differentiate between the two is so important for the long-term care of patients.

### The evolution of wear

The anthropological view of tooth wear is that it is the result of an 'interplay between genes and environment.' Essentially, genetic factors influence tooth morphology and occlusion, and the occlusion and food consistency affect mastication. Mastication results in tooth wear, which then alters the form of the dentition, then the occlusion, bringing this process full circle and ready to start again. Over time, because of attrition, abrasion and adaption, teeth become more worn – resulting in physiological wear.<sup>1</sup>

That is not to say that erosion has not played its part, too, however it does seem to be more of a modern-day problem. Although our ancestors gathered foodstuffs like fruits, exposure to their acids were seasonal, and so their effect short-lived and possibly reparable via remineralisation.

Research has previously identified that: *'tooth wear, or non-carious wear is considered a natural physiological process. However, its intensity can vary. For mild tooth wear, the resulting reduction of occlusal vertical dimension is compensated or adapted through associated structures. However, changes in individual lifestyles and a boom in the consumption of acidic beverages in recent decades have raised concerns on tooth wear. Moreover, symptoms linked to increased stress, including gastroesophageal reflux disease and bruxism, are also potential hazards to teeth. Additionally, increased lifespans make it more challenging for teeth to survive without severe tooth wear.'*<sup>2</sup>

Given all of this, it can be difficult to differentiate between physiological and pathological tooth wear, however, Smith and Knight's definition of the latter may be helpful in this regard: 'The teeth become so worn that they do not function effectively or seriously mar appearance before they are lost through other causes or the patient dies. The distinction between acceptable and pathological tooth wear at a given age is based on the prediction of whether the tooth will survive the rate of wear.'<sup>2</sup>



It has been suggested that different teeth wear at different rates.<sup>3</sup> Merging the available data on physiological wear, previous research shows that over a 60-year period, molars showed 1740 µm of wear, mandibular incisor wear was 1460 µm, maxillary incisors were recorded at 1010 µm and premolars at 900 µm.<sup>4</sup>

### Preventive solutions

For dental professionals, the signs that indicate pathological tooth wear is occurring and action may be needed include:

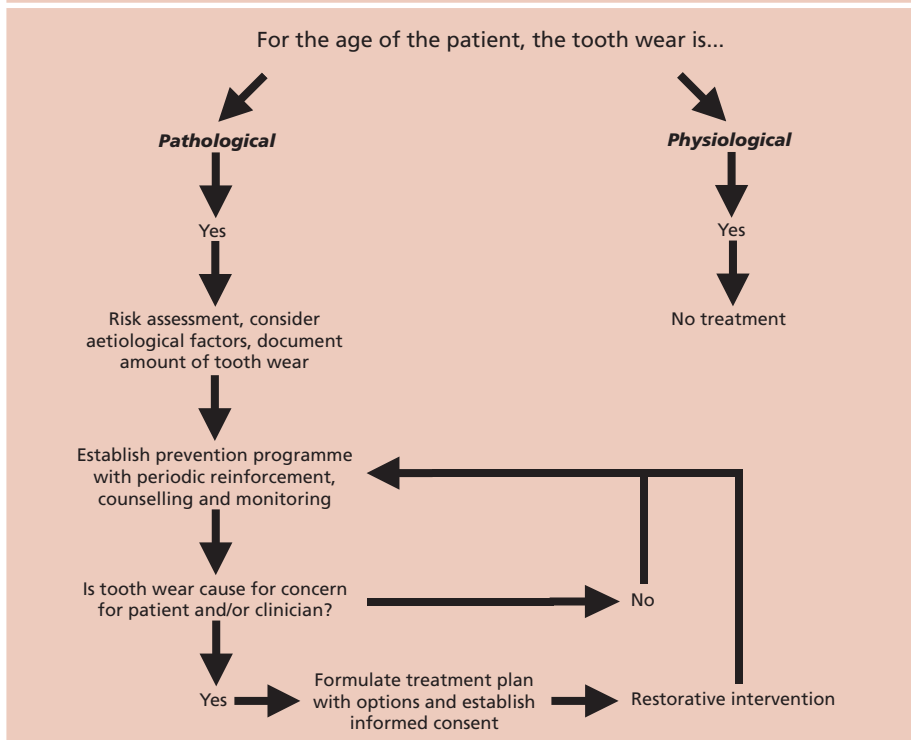
- Sensitive teeth
- Discolouration, including yellowing and loss of shine (where some of the outer enamel layer has been lost)
- Sharp or chipped anterior teeth
- Occlusal surfaces wearing flat and taking on a shiny, pitted appearance
- Altered occlusion as vertical height changes
- Restorations standing proud of the teeth
- Abfraction lesions developing cervically
- V-shaped notches or shallower cupping present cervically.

In addition, the report on a recent European consensus statement regarding the management of severe tooth wear, provided a useful flowchart that may help a dentist to decide what form of treatment may be most appropriate.<sup>4</sup> (see overleaf)

Types of tooth wear are rarely seen in isolation, and so the management of a patient with hard tissue wear is likely to be similarly multifactorial. To prevent progression of wear, appropriate measures may include:<sup>5</sup>

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## Main types of tooth wear <sup>4</sup>



- Strengthening the enamel via remineralisation, applying fluoride in the form of, for example, toothpaste, mouthwash, or in-practice gels
- Making tooth-friendly food and drink choices, reducing the frequency and contact time of acidic beverages and comestibles. It may also be prudent to use a straw, drink such beverages cold, and to rinse with water, milk or a fluoridated mouthwash following consumption
- Adapt patients' at-home oral health regimen, so that they use a soft-bristled toothbrush and non-abrasive toothpaste and mouthwash. Their tooth brushing technique should also be adapted to ensure over-zealous brushing is not causing problems. In addition, it is important to recommend patients do not brush straight after consuming something acidic, instead rinsing with milk, water or mouthwash, as above
- Addressing hypersensitivity, helping to alleviate the pain using in-practice and/or at-home desensitisers.

### Restorative options

Definitive restorations are inappropriate while the problem is active, as, for example, composites and full veneer crowns do not prevent the process of wear. With this in mind and given our increasingly litigious society, as an aside, it is very important

that accurate record keeping is maintained, to include a description of the tooth wear severity, the results of an appropriate measurement index, shared decision-making, actions taken and follow-ups, to ward off any possible suggestion of 'supervised neglect'.<sup>4</sup>

If the dentist and patient agree that the time is right for restorative treatment, despite the lack of high-level scientific evidence, the authors of 'Severe tooth wear: European consensus statement on management guidelines' suggest the following principles:<sup>4</sup>

1. Restorative treatments should be as

- conservative as possible, involving the minimum number of teeth necessary to achieve a satisfactory clinical outcome
2. Wherever possible, preparations should be restricted to the creation of necessary features, including seats, bevels, or chamfers, to facilitate restoration placement
3. Assuming good oral hygiene maintenance, the selection of materials and technique should consider the expectations, aesthetic demands and risk profile of the patient, operator familiarity and skills, patient availability for recall, and any budgetary constraints.

### Long-term care

Patients suffering with tooth wear may complain about sensitivity, pain, poor aesthetics and/or functional impairment.<sup>6</sup> The physical and psychological effects of these signs and symptoms on patients should not be underestimated. It is therefore key that dentists can differentiate between pathological and physiological tooth wear, so that appropriate, long-term care can be provided. ♦

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5. Morozova S Y *et al.* Tooth wear – fundamental mechanisms and diagnosis. *Journal of Dental and Medical Sciences* 2016; **15**: 84-91.
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## Types of wear

### Erosion

Erosion is tooth wear resulting, for example, from the consumption of acidic food and drinks or stomach acid regurgitation, which is often found to be a result of conditions such as bulimia, pregnancy sickness or hiatus hernia.

### Attrition

Attrition is where there is contact between the teeth over and above what we would consider 'normal' use. In healthy people, wear of the enamel as a result of attrition alone is considered non-pathological. Patients exhibiting pathological attrition generally suffer from bruxism, which is often linked to a stressful lifestyle. It is worth noting that for patients with severe bruxism, the occlusal load can be 2 to 10 times higher than non-sufferers.<sup>2</sup>

### Abrasion

This is where excessive rubbing damages the enamel and dentine, for example over-zealous tooth brushing, porcelain crowns rubbing against the natural dentition, bad habits such as chewing pencils or biting of nails, or the consumption of a rough diet.