Tooth wear – considerations and challenges for patients and clinicians

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1. *Considerations*

In the latest Delivering Better Oral Health evidence-based toolkit [1], tooth wear (fig. 1) is included for the first time alongside dental caries, periodontal diseases, oral cancer and behaviour change. In this essential guidance document, tooth wear is defined as the cumulative loss of mineralised tooth tissue due to chemical and / or mechanical factors with plaque not being involved in the aetiology.

In the earliest stages of tooth wear, enamel remineralisation may be possible. Once tissue has been lost from a tooth, leading to a change in its shape or form, tooth wear becomes irreversible. Multiple widely accepted descriptors of tooth wear have been used in recent years and include chronological, non-age-related, pathological and accelerated tooth wear. The use of the term *'Tooth Surface Loss'*, has been superseded by *'Tooth Wear'* which is now internationally recognised.

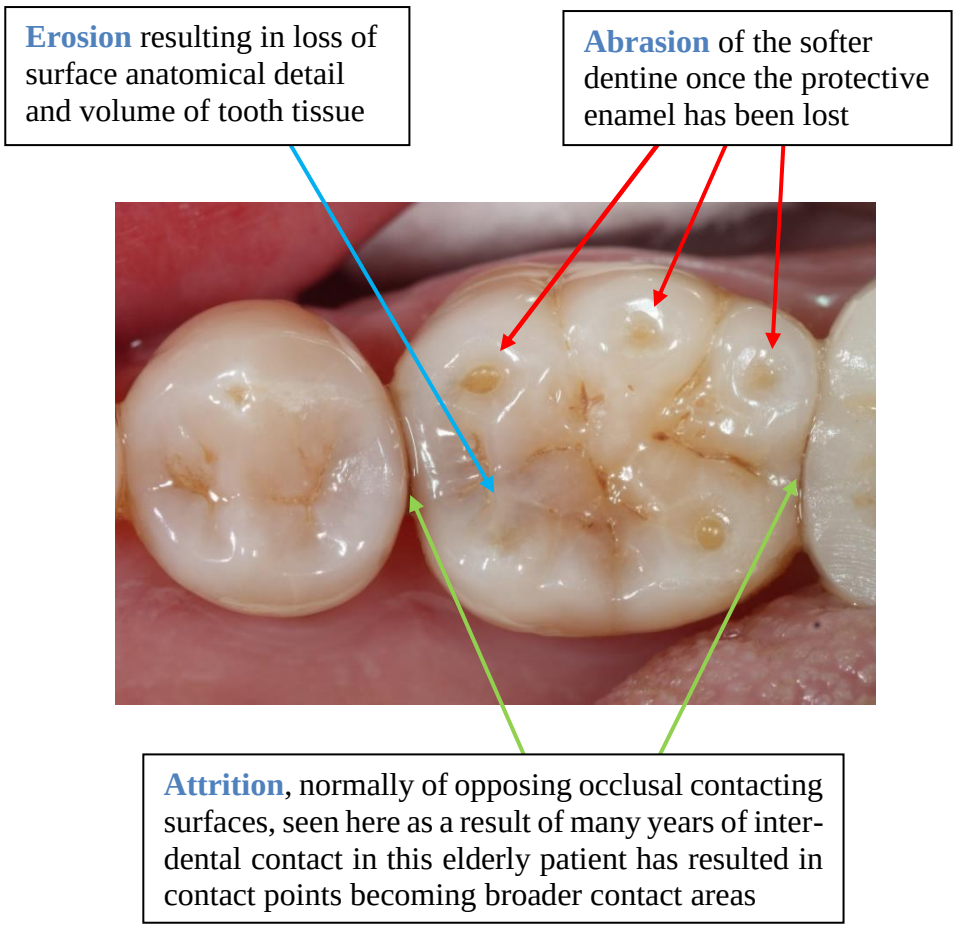


Figure 1: Common presentations of tooth wear

As described by Loomans et al in the European Consensus Statement of 2017 [2], the age of a patient and the amount of tooth tissue lost together define the tooth wear status of any particular patient. With progression over time, tooth wear may become severe resulting in a substantial loss of tooth structure, dentine exposure and significant loss (≥1/3) of the clinical crown. Tooth wear which is atypical for the age of the patient has been described as pathological tooth wear and can cause pain or discomfort, functional problems or deterioration of the appearance which, if it progresses, may give rise to undesirable complications of increasing complexity.

Tooth wear (fig. 2) has become a key feature of national dental surveys in England [3, 4]. Within each of the aetiological factors of erosion, attrition and abrasion, there will be a wide range of possible causes. Most challenging is that these processes are rarely seen in isolation and identifying the individual causes within a multi-factorial aetiology is essential if care strategies are to be successful (fig. 3). Commonly, one of the aetiological factors will be dominant (fig. 4).

Figure 2: 56-year-old male with tooth wear due to erosion, attrition and abrasion.

Figure 3: 78-year-old female with tooth wear of multi-factorial aetiology.

Figure 4: 71-year-old male with attrition as the dominant tooth wear aetiology.

2. Challenges

Patients will most commonly present with problems of altered function or a compromised appearance, but these may be quite late presentations with symptoms of sensitivity and sharpness of teeth developing sooner. At the more advanced stages of wear, quality of life may also be negatively impacted and how this can be improved should be considered as an essential aspect of planning care.

Individuals may develop tooth wear at any age. Younger patients may have grown up having significant quantities of fruit juice whilst adolescents may gravitate toward sweetened carbonated drinks, both on a far too frequent basis. Stomach acid reflux in various forms can present across a multitude of ages and our elderly, who are thankfully living longer and keeping their teeth longer, may simply see their teeth wearing out after decades of use.

As we, the dental profession, have become even more skilled at looking after patients with severe tooth wear, retaining and restoring severely worn teeth (figs. 5a and 5b) has become the treatment of choice wherever possible replacing extractions and removable overdentures.

Figure 5a: Frontal view showing worn anterior teeth as well as heavily restored and worn posterior teeth.

Figure 5b: Frontal view following crown lengthening and restorative care with the provision of core fillings for posterior teeth and crowns for all teeth increasing the occlusal vertical dimension and extending the lengths of the maxillary anterior teeth. A protective Michigan Splint was provided for night wear to help protect teeth and restorations from parafunction.

Over the past 15 - 20 years, adhesively retained ceramic and composite resin restorations have seen tremendous developments. As a result, and as shown in this next clinical example, patients with all levels of tooth wear can benefit. A 35-year-old male presented with localised wear of his maxillary anterior teeth caused by carbonated drinks and parafunctional activity (fig. 6a). Dento-alveolar compensation had clearly taken place to maintain anterior tooth contact with preferential wear of the maxillary left incisors resulting in disruption of the gingival margin height across the anterior teeth.

Figure 6a: Frontal view showing differential wear of anterior teeth also noting dento-alveolar compensation of the maxillary left incisors has occurred.

This patient was keen to achieve the most satisfactory aesthetic and functional outcome with a minimally invasive approach avoiding further removal of healthy tooth tissue (fig. 6b). It is only in the last 20 years or so that this has been possible, with control of the aetiology and instigation of preventive measures at the outset being critical. Whilst a Dahl approach might have been an option here, conventional orthodontics was preferred to first harmonise the gingival margin position due to a high smile line revealing the discrepancy.

Figure 6b: Frontal view following orthodontic treatment, home tooth whitening and restorative care with the addition of tooth coloured composite resin to extend the lengths of the maxillary anterior teeth and white gold adhesively retained palatal veneers by way of protection. A protective Michigan Splint was provided for night wear to reinforce orthodontic retention and help protect teeth and restorations from future parafunctional activity.

However, access to such complex and costly care is limited to specialist referral centres, such as dental schools, or where the combination of skill and experience can be delivered by general dental practitioners or specialists in the practice setting. Nonetheless, the challenge of deciding when to first intervene restoratively remains, as initiation of treatment inevitably leads to a lifetime of care.

A recent editorial by Burke in Dental Update [5] highlighted the growing volume of publications on tooth wear, some of which thankfully support a shift toward rather more minimally invasive approaches to care. In view of increasing numbers of patients requiring monitoring, prevention and care for their worn teeth, the editorial raises several of the challenging issues mentioned above.

These include: (1) where patients can be cared for (capacity), (2) by whom (capability) and (3) how care is to be funded (resource models). Moving forward, appropriate levels of training for all the dental team will need to be supported to ensure that care can be made available by general dental practitioners or specialists in the practice setting as the most cost-effective model.

3. *Summary*

A status update [table 1] and a care framework [table 2] are provided below to assist all dental professionals and students and to encourage a comprehensive, holistic and timely approach to caring for patients of all ages who may present with tooth wear.

Table 1: Tooth wear – status update

1. The majority of the population (76% adults, >50% children) have tooth wear
2. Management of dental caries and periodontal diseases is improving
3. As population age profiles increase, more teeth will be retained for longer
4. Tooth wear can impact negatively on aesthetics, function and quality of life
5. Management of severe wear creates a significant health and financial burden
6. Indices are available and useful but also recommend a risk assessment tool
7. Clinical studies should assess tooth wear markers and monitor interventions
8. Research should focus on stem cell technology and material developments

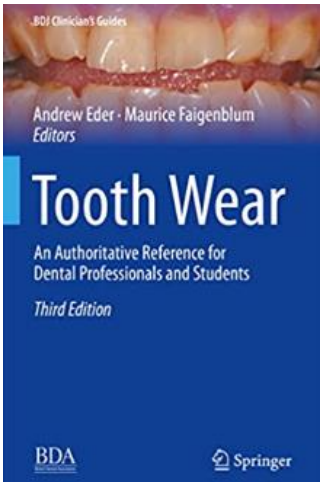
Table 2: Ten-point care framework for patients with tooth wear

1. **Early recognition is essential** - sites (teeth, surfaces) and extent (enamel, dentine)
2. **Share knowledge and experience** - based on opinion leaders and available dental literature
3. **Determine the aetiology(ies)** - abrasion, attrition, erosion, abfraction
4. **Identify the cause(s)** - normally multi-factorial, always think outside the box
5. **Adopt a holistic team approach** - lifestyle, diet, alcohol, stress, oral hygiene, parafunction
6. **SMART goals for change** - Specific, Measurable, Attainable, Realistic, Timely
7. **Monitor tooth wear** - casts, photographs, 3D imaging, chronological vs pathological, risks
8. **Know when to refer** - simple vs complex, occlusal changes, challenge of space and materials
9. **Care strategies -** minimally invasive, additive where possible, follows compliance and stability
10. **Consider wear as a lifelong challenge** - monitor lifestyle, wear, care

For more information

Please contact Professor Andrew Eder by email: andrew.eder@portmandental.co.uk

Or see:



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