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Toothwear and the Older Patient

Abstract: Toothwear is commonly observed in dentate older patients and may be physiological or pathological in nature. Toothwear can be caused by abrasion, attrition, erosion or a combination of aetiologies. Where treatment is required, a number of options exist, including the use of adhesive materials and fixed and removable prosthodontics.

Clinical Relevance: With patients retaining natural teeth into old age, physiological and pathological toothwear amongst dentate older patients is an increasingly common presentation.

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Toothwear is the gradual loss of tooth substance due to repetitive physical contacts or chemical dissolution. It can be caused by abrasion, attrition or erosion. The most common type of toothwear in older patients is physiological.

All dentate older patients will manifest some degree of toothwear. Whether this toothwear is of any clinical consequence and what the treatment need is are some of the issues which will be covered in this paper.

Types of toothwear

There are four types of toothwear:

- *Physiological* toothwear is the loss of tooth structure associated with ageing with no associated pathology.
- *Abrasion* is due to extrinsic physical forces.
- *Attrition* is due to intrinsic physical forces.
- *Erosion* is due to acid which can be either extrinsic or intrinsic.

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Figure 1. Patient who regurgitated food and held it in her buccal pouch prior to re-ingestion.

Aetiology

A list of the causes of toothwear is shown in Table 1.

While it may appear excessive to cite aetiological factors such as pregnancy in an article about older people, it should be pointed out that what is seen in an older mouth is a culmination of a lifetime's experience.

Clinical presentation

A combination of signs and symptoms are used to diagnose toothwear.

Symptoms

Patients may present with tooth sensitivity, sharp edges to teeth (Figure 1), soft tissue trauma or pulpitis. Given that there is an increased amount of dentine and reduced nerve supply[1] associated with ageing, pronounced sensitivity in an older patient would be indicative that the aetiology, usually erosive, is in an active phase. Aesthetic concerns can manifest as shortened teeth, altered tooth shape or reduced lower face height (Figure 2). The major function affected by toothwear is mastication, with patients presenting with reduced masticatory function or altered diet selection.

Figure 2. Profile view of patient with reduced lower face height associated with toothwear.

Signs

Attrition classically manifests as loss of tooth structure on the occlusal

Causes of Toothwear	
Abrasion	Toothbrushing Toothpaste Toothpowder Dust Abrasive foods Nail chewing Iatrogenic – unglazed porcelain
Attrition	Bruxism
Erosion Extrinsic	Citrus fruits Fruit juices Vinegar Sports drinks Alcopops Industrial exposure
Intrinsic	Eating disorders Alcoholism Morning sickness Gastric regurgitation Gastro-Oesophageal Reflux Disorder (GORD) Hiatus Hernia Ruminant eating (Figure 1)

Table 1. Causes of toothwear.

Figure 3. Patient with a history of bulimia presenting with cigarette staining of her teeth indicating that they were no longer exposed to acid.

Figure 4. Patient with toothwear of combined aetiology: erosion and abrasion.

and incisal surfaces, leaving a flattened surface. There may also be concomitant hypertrophy of the masseters and loss of lower face height.

Abrasion usually appears as a notching on the cervical areas of the teeth. It may also occur as cupping on the occlusal or incisal surfaces if there has been prior occlusal or incisal exposure of dentine. The edges of enamel tend to be rough or sharp.

Erosion can appear as loss of tooth structure on the labial or palatal surfaces. Usually, if the source of erosion is extrinsic, the toothwear will appear on the labial surface. Erosion appears on the palatal surface if the source of acid is intrinsic or if there is a distinct pattern of consumption of extrinsic acids. Erosion is characterized by a shiny, glassy appearance with rounded edges, in contrast to the sharp edges associated with abrasion.

While tooth tissue may be lost, existing restorations, such as amalgam, are unaffected so that they may project from the surface of the tooth. There may also be a reduced vertical dimension or absence of staining on the teeth, which would occur due to the cleaning effect of the acid (Figure 3).

Quite often the patient may present with a combination of forms of toothwear; Figure 4 shows a patient with a combination of erosion and abrasion.

Physiological vs pathological

With increasing age, levels of toothwear increase.[2] Toothwear is a reflection of a lifetime's exposure to physiological and pathological influences.

Physiological toothwear is the normal toothwear which is associated with normal day-to-day functioning. Toothwear can be described as pathological if the remaining tooth structure or pulpal health is compromised, or when the rate of toothwear is in excess of what would be expected for that age. Toothwear can also be considered to be pathological if the patient experiences a deficit as a result of the toothwear in terms of aesthetics or masticatory ability.

To put matters in perspective, many older people have significant toothwear but may not have felt the need for treatment.

When to treat toothwear?

Most older dentate patients have toothwear but there is not a compelling need to treat all toothwear. Treatment is justified if the patient has symptoms such as sensitivity, pulpitis, or sharp edges of tooth tissue are traumatizing the soft tissues. Treatment is also warranted when the toothwear has compromised the remaining tooth, so that further loss of tooth tissue would lead to weakening and undermining of the tooth. Another condition demanding treatment is when the patient has a functional deficit – the extent of toothwear is such that the patient has difficulty masticating or he/she has concerns about the aesthetic appearance of his/her teeth. It is not uncommon for family members to encourage older patients with toothwear

Figure 5. Patient encouraged to attend by his daughter for treatment of toothwear prior to her wedding.

Figure 6. Patient who attended seeking treatment prior to his golden wedding anniversary.

Figure 7. Toothpaste targeted at tooth wear.

to seek treatment for aesthetic reasons (Figure 5, 6).

Treatment

Prevention

Prevention of toothwear in older patients begins when the teeth first erupt and continues throughout life. Prevention should focus on targeting the aetiological agents in Table 1 and minimizing their impact. While some aspects of prevention are fairly straightforward, such as the recommendation of medication for heartburn, others are more difficult to achieve. The control of excessive and inappropriate consumption of alcohol or eating disorders are infinitely more difficult to achieve.

It is noteworthy that toothpastes targeted at toothwear have recently emerged (Figure 7). It is too early to state conclusively whether they have a significant impact. It is a measure of the prevalence and impact of toothwear that such toothpastes are now being developed and marketed.

Adhesive materials

The advent and continued development of adhesive dentistry has been responsible for a paradigm shift in the operative management of toothwear. At its simplest level adhesive restorations, especially composite, are appropriate for the restoration of cervical lesions. Unlike amalgam they are aesthetic and they do not require creation of mechanical retentive features which result in the loss of sound tooth tissue. If the cervical lesions are as a result of over-vigorous toothbrushing, the greater abrasion resistance of composite makes it a more appropriate restorative material than glass ionomer cement.

Given that dentine in older patients is more sclerotic, modification of the etching time or roughening of the surface of the dentine may be required to enhance retention.[1] However, resin composite materials can be used successfully to restore worn teeth with minimal preparation and predictable outcomes (Figure 8). Unlike fixed prosthodontic approaches, adhesive restorations also provide retrievable and repairable results at a low biological price.

The Dahl Concept

Restoration of loss of teeth structure, especially anterior tooth structure, represents a considerable clinical challenge. The principal challenge is the lack of space vertically and antero-posteriorly to restore the lost tooth structure. Formerly, this was managed by reorganizing the occlusion via an extensive fixed prosthodontic approach.[3,4] A profound change in the management of toothwear resulted from the introduction of the 'Dahl Concept'. This entails the selective provision of restorations in supraocclusion with the remaining teeth out of occlusion. Over a period of time, the teeth which are out of occlusion will erupt into occlusion, thus creating space for the restoration of anterior teeth.[5] This technique has evolved from the placement of a removable orthodontic appliance to create the space vertically for the direct placement of composites.

Fixed prosthodontics

Utilization of the Dahl approach has provided a greater amount of room for the provision of fixed restorations. While adhesive restorations would be the first choice in some circumstances, there may still be a role for fixed restorations (Figures 9, 10, 11).

Figure 8. Worn lower incisor teeth restored using resin composite.

Figure 9. Patient with toothwear.

Figure 10. Labial view of same patient as Figure 9 restored using fixed prostheses.

Removable prosthodontics

Removable prostheses can be used to replace missing teeth, lost tooth

Figure 11. Palatal view of same patient as Figure 9 restored using fixed prostheses. Note metal occluding surfaces.

Figure 12. Toothwear patient prior to the provision of an overdenture. Extra-oral profile is in Figure 2.

Figure 13. Same patient as Figure 12 three months after provision of an overdenture. Demineralization of enamel and soft tissue hyperplasia are evident.

tissue and also to restore the vertical dimension. This can be accomplished by the use of overdentures and partial dentures. In some circumstances, where the toothwear is very severe, the denture can cover the teeth which have been worn down to the gingival level. In other clinical situations, a chrome onlay type prosthesis can be used to provide and maintain lost vertical dimension. It seems that patients have few problems in accommodating to an increased vertical dimension.

Maintenance

Should fixed or removable prostheses be provided for toothwear, it should in some respects be regarded as the beginning of patient care rather than the end. By their nature, patients affected by toothwear are more susceptible to disease. This may be compounded in older patients who may have reduced manual dexterity or be on xerostomic medication. Figures 12 and 13 show the effects of a poorly maintained prosthesis for toothwear on oral health. There is a strong case for increased frequency of recall and maintenance of this group, as suggested by current NICE guidelines.[6]

Denture toothwear

The acrylic teeth on dentures will wear over a period of time (Figure 14). This may result in aesthetic changes, loss of vertical dimension and altered chewing function. Amazingly, in some cases the patients can function perfectly satisfactorily with such wear. The need for treatment in these cases would be, as with the natural dentition, very much patient driven.

Impact of toothwear in the young

When caring for the dentition of an older patient, the clinician is in effect managing the effects of a lifetime of function and possible pathology on the patient. Figure 15 shows the dentition of a 14-year-old who has pronounced erosion from his diet. He is about to embark on a restorative cycle which seeks to maintain his dentition for the next 60 years at least. It is difficult to speculate as to what his teeth will be like in his mid-seventies, but this case does reinforce the concept that care for the older patient and, especially prevention, begins as soon as the teeth erupt.

Conclusions

- Toothwear increases with age;
- Toothwear is a reflection of a lifetime's dental experience;
- It is important to discriminate between physiological and pathological toothwear;
- Only pathological toothwear requires active treatment;
- Whatever restorative treatment is provided for toothwear requires long-term maintenance.

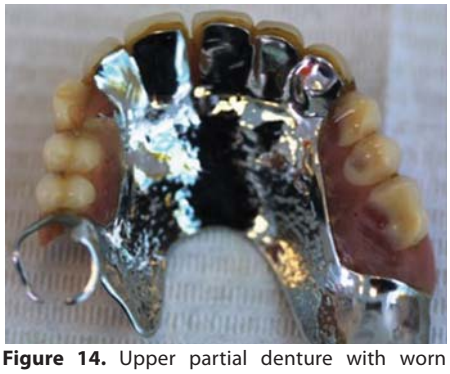

Figure 14. Upper partial denture with worn denture teeth.

Figure 15. Fourteen-year-old patient with erosive toothwear leading to loss of enamel and dentine.

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