Review Article

New Insights about Tooth Erosion Diagnosis

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Abstract

Nowadays, an increase in the prevalence of tooth erosion has been observed due to a frequent exposure to acids from diet and gastric juice. The aim of this Editorial was to give some new insights about the definition and diagnosis of this condition. Tooth erosion is complex condition dependent on the interaction of chemical, biological and behavior factors. The diagnosis is generally performed by the analysis of the clinical appearance and localization of the lesions in combination with the patient's history. However, in most of cases the clinicians do not know how to detect the condition early, so that preventive measures cannot be applied before the lesions substantially progress. Future researches should give advances in early detection by using new methodologies, so that preventive measures can be applied appropriately.

Keywords: Diagnosis; Epidemiology; Tooth erosion; Tooth wear

Introduction

Tooth erosion is a lesion related to a chronic exposure to non-bacterial acids, which has been received attention from researchers and clinicians by its increasing prevalence and clinical report [1-3]. Even Erosion is considered a new "hot topic"; we have to take in mind that other tooth lesions can occur simultaneously to Erosion. Attrition is defined as the wear from direct contact tooth-to-tooth, while abrasion occurs due to the friction of particles during brushing, for example [4]. Abfraction is a shaped depression caused by flexural forces at the margin between enamel and cement, leading to fracture [5]. When tooth lesion involves two or more of these conditions, then it is better defined as "Tooth wear".

Tooth erosion is caused by extrinsic and/or intrinsic acids. It has a multifactorial etiology involving chemical, biological and behavioral factors [6]. The extrinsic acids, derived from the diet, are becoming the most important source of erosive attacks due to increasing consumption of acidic drinks [7]. On the other hand, intrinsic erosion is caused by frequent episodes of regurgitation or reflux and psychosomatic disorders [8].

The biological factor involves mainly saliva properties. Low salivary flow and buffer capacity may be enrolled in high risk for erosion [9,10]. Furthermore, 2h-salivary pellicle has shown reduce the erosion development and progression [10-12]. Behavior factors include the frequency and the way that the patients are exposed to the different acids sources, bulimic practices and toothbrushing habits, such as time of brushing after meals, toothpaste`s abrasivity and applied force [13].

Nowadays, high prevalence of tooth erosion, especially in children and adolescents, is being reported [1,3]. Few studies have been done with adults. However, the prevalence of tooth erosion varies significantly among the studies [1,3]. Furthermore, it is not clear if the prevalence of tooth erosion is truly increasing or if the improvement of its understanding has as consequence a more precise diagnosis. Therefore, the aim of this Editorial was to give some new insights about the diagnosis of this condition.

Diagnosis and Risk Factors

A correct and early diagnosis of erosive or/and tooth wear is essential for developing effective preventive and therapeutic strategies. First of all, the dentists must to be aware what physiological or pathological wear is. In principle, abrasion and attrition may be considered as physiological wear along with the advance in age [14]. However, there is still no consensus about what it is physiological and pathological; but some points should be taken in mind during the diagnosis, to determine the needs of interventions: 1) age of the patient/tooth; 2) the severity of wear; 3) and the presence of pain, discoloration or/and loss of function. The definition of pathological is also given upon the prediction if the tooth will survive the rate of wear. Therefore, the decision is based on the concepts of health and disease [14].

To make an appropriate diagnosis, the dentist should combine an adequate patient interview and a clinical examination. Questions should include the following points: general health, medicine intake (vitamin C, aspirin and anticholinergic drugs), drugs (ecstasy), past and present acidic diet (soft drink, citric fruits, alcoholic drink, vinegar), environmental acids exposure (occupational information), the presence of gastro-esophageal reflux disease, vomiting or bulimia/anorexia, toothbrushing habit and bruxism. Assessment of saliva flow rates and buffer capacity, whenever possible, may help in the diagnosis.

The clinical examination must be done on cleaned and dried teeth using an artificial light. However, the clinicians have some difficulties on the detection of early stage (involving enamel only), in which there are few signs and no symptoms as well as in differentiating erosive wear from tooth wear.

The smooth surfaces, when eroded, show the appearance of smooth silky-glazed, sometimes dull; the perikymata disappears but the enamel along the gingival margin is still present, due to the protection of the biofilm and/or gingival fluid [15]. As erosion progress, yellow dentin appears. In advanced phase, concavities wider than deeper and fractures of the incisal borders can be seen. In this stage, patients complain of poor aesthetics and pain.

Facial erosion should be distinguished from Abfraction, which is located apically to the enamel–cementum junction and is deeper than wider. The coronal part of wedge-shaped defects has a sharp margin and cuts at right angle into the enamel surface. Besides, the abfraction lesion often involves one tooth (superior pre-molar for example) [15,16]. On the other hand, it is more difficult to distinguish facial erosion from abrasion [14]. Abrasion also can affect facial surface of prominent teeth, but in this case the lesion is localized in cervical area, showing some gingival recession and worn lines corresponding to the brushing bristles.

In respect to the occlusal lesions, the first signals are similar to the smooth ones. In the advanced phases, small cups are formed and the edges of the restorations rise above of the tooth level. In severe cases, the whole occlusal morphology may be rubbed off [14-16]. To distingue erosion from attrition, one important clinical feature is that attrition involves a flat and gloss area, corresponding to the contact with antagonist teeth.

It is important to differentiate the type of lesion for better determining the preventive and restorative strategies. However, the differential diagnosis is a challenge once these lesions may occur simultaneously on the same tooth surface. Then, the dentist must apply a complete interview to determine which lesion is more prevalent.

Besides the challenge in the differential diagnosis, it is important the dentist determines parameters to monitor the activity and the progression of erosive and/or tooth wear overtime. In this regards, several indices have been developed for epidemiological and clinical purposes. Most old indices consider the presence or absence of dentin exposure as clinical criteria to determine erosion severity [17-21]. The scoring systems mainly differ among them in clinical criteria, scale and selected teeth. Most of them are not able to distinguish only erosive lesions neither.

Currently, a scoring system called the Basic Erosive Wear Examination (BEWE) was developed for use in general practice and to allow comparison with other indices [22]. This new index was created to reduce the overestimation of the prevalence, improving early detection and finally, linking the detection and severity with the therapy. Each sextant is scored independently, as follows: 0- no wear; 1- initial loss of surface texture; 2- distinct defect, hard tissue loss involving <50% of the surface area (dentin exposed in most cases); 3- hard tissue loss involving >50% of the surface area (dentin exposed in most cases). The highest score found for each sextant (the tooth that presents the worst case) is summed and the final number determines the therapies, according to the severity level: <2 none, 3-8 low, 9-13 medium and > 14 high. Despite the index is promising, there are some limitations about the classification of the severity according to the final sum. The researchers expect that this index will be adopted internationally to standardize the measurement of erosive wear and the comparison among the epidemiological studies.

There is also a need of testing the validity, sensibility, specificity and reliability of the indices in erosion diagnosis for research and clinical purposes [14,23]. Considering that surface loss, in most cases, progresses slowly, the clinical indices applied in diagnosis are still not enough sensitive to monitor the progression of erosive wear overtime.

Therefore, the dentist can use complementary methods to help in the control of the erosion progression by comparing clinical photographs of the tooth surfaces, study casts and dental radiography (bitewings may show molar mesialization due to occlusal wear) [15].

Nowadays, other techniques, involving optical properties changes in tooth, are being applied to detect erosive surface demineralization [24]. Currently, the two most promising methods for assessing enamel in vivo are Quantitative Light-induced Fluorescence (QLF) and Optical Coherence Tomography (OCT) [14]. There is a need of further studies to check if both technics are valid for erosion detection [25].

Other approach is the use of the indirect profilometry. For monitoring the lesion, there is a need of metal marker and impressions and/or study casts at baseline and at different follow-up intervals [14,26,27]. The limitations of all new approaches are the time-consuming and the cost. More studies are needed to check the sensitivity and validity of the methods and the cost-benefit of their application.

Conclusion

As there are signs that the prevalence of erosion is increasing in several countries, the dentist should have knowledge about its etiology and be prepared for early diagnosis. Therefore, future researches should give advances in early diagnosis and standardize index to monitor the lesion, so that preventive measures can be applied appropriately.

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