Relationship between occlusal wear of the teeth and periodontal health

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ABSTRACT – The study was undertaken in order to examine the relationship between occlusal wear and periodontal health in the maxillary and mandibular anterior, premolar and molar regions of the human dentition. The occurrence and degree of attrition was recorded for the 4,316 fully erupted teeth of 154 males aged 19–22 years. The mandibular central incisors and the canines of both jaws were found most often to show attrition. In general, occlusal wear was found to be associated with improved cleanliness, and thus, in most areas of the dentition, also with improved periodontal conditions. At the openings of the major salivary glands, however, more calculus was found on attrited than intact teeth, and consequently, no improvement of the periodontal status was found in mandibular anterior teeth and maxillary molars. As the degree of attrition was not influenced by the frequency of tooth-brushing, it seems evident that the masticatory function which results in occlusal wear of the teeth, has an effect per se on periodontal health.

Among the great majority of dental practitioners, occlusal wear of the teeth is still looked upon mainly as an undesirable, mechanical loss of tooth substance, probably caused by a “non-functional” nocturnal grinding of the teeth, also called bruxism, which may lead to the destruction of the periodontal tissues. The worn teeth are consequently often restored with onlays, or the expected further attrition of the teeth is prevented by means of nightguards or other appliances. There seems, however, to be no scientific evidence to encourage such treatment.

Nocturnal grinding as well as gnashing and clenching of the teeth during the daytime are subconscious habits associated with nervous tension or aggression (Beltting & Gupta 1961, Ramfjord & Ash 1966). However, neither emotional stress nor anxiety (Beltting & Gupta 1961), nor the amount of already manifested occlusal wear (Baer, Kakehashi, Little-тон, White & Lieberman 1963) seem to be connected with an increased severity of periodontal disease in man. It has, on the contrary, been suggested that the attrition of both human and other mammalian teeth may represent an important, often indispensable occurrence in the development and maintenance of a properly functioning masticatory organ (Sicher 1953, Ramfjord & Ash 1966, Ainamo 1971).

It was pointed out earlier that mean index values of individual dentitions may not, because of a wide intraoral variation, represent adequate criteria for the establishment of mutual correlations between various pathological findings of the dentition (Ainamo 1970). In the present study, therefore, the relation between occlusal wear and different periodontal parameters was determined separately for different groups of teeth.
Material and methods

The dentitions of 154 army recruits aged 19–22 years were subjected to a thorough clinical and radiographic examination. The anamnestic data and general dental conditions of the subjects have been previously reported (Ainamo 1970).

The occurrence and degree of attrition of the incisal edge or the occlusal surface of each one of the total of 4,316 fully erupted teeth was scored according to the Attrition Index (Ramfjord 1959). The Plaque Index (Silness & Löe 1964), Gingival Index (Löe & Silness 1963) and Retentive Calculus Index (Björby & Löe 1967, Ainamo 1970) scores were determined clinically and the amount of lost tooth attachment (LA), in millimeters (Glaivind & Löe 1967), was determined clinically and radiographically as described earlier (Ainamo 1970, 1972), for each of the four smooth tooth surfaces.

Automatic data processing was used for calculation of the respective mean index scores for each tooth. The teeth were bilaterally pooled and grouped into maxillary and mandibular anterior teeth, premolars and molars. Analysis of variance and Scheffe’s method for multiple comparisons were applied separately for each group of teeth in order to determine whether the recorded mean index score varied at different degrees of occlusal wear.

Results

The numbers of individual teeth studied and their respective scores for attrition are shown in Table 1. Occlusal wear was found to occur most often in anterior teeth. In particular, the incisal edges of maxillary and mandibular central incisors and canines were often worn (Table 1).

Less plaque was found around worn than intact teeth in all groups except mandibular canines and incisors where no difference was found (Table 2). This negative relation, i.e. better cleanliness with increasing attrition, was especially evident in the premolar regions of both jaws and around mandibular molars.

In maxillary anterior teeth the mean GI score was highly significantly \((P<0.001)\) lower around worn than around intact teeth (Table 2). Similar trends could be observed in the areas of maxillary premolars and mandibular premolars and molars. Practically no fluctuation could be observed in the mean GI scores for max-

<table>
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<th>Tooth</th>
<th>Total no.</th>
<th>Degree of attrition</th>
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Total 2,186 1,274 736 176 Total 2,130 1,165 661 304
Table 2
The negative, positive and indifferent relations between the degree of attrition and the amounts of plaque, gingivitis, dental calculus and loss of tooth attachment in different areas of the dentition

<table>
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<th>Mandible</th>
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<td></td>
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<td>—⁺</td>
<td>—</td>
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<tr>
<td>RC</td>
<td>±</td>
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<tr>
<td>LA</td>
<td>±</td>
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αP < 0.001  βP < 0.01  γP < 0.05

illary molars and mandibular anterior teeth for the various degrees of attrition (Fig. 1).

The mean scores for Retentive Calculus were found to decrease with increasing degrees of attrition in the areas of mandibular and maxillary premolars (P<0.05–0.01). A similar trend of a negative relationship, though not statistically significant, was found in the region of maxillary anterior teeth (Table 2, Fig. 2). In mandibular canines and incisors the situation was the

Fig. 1. The mean Gingival Index (GI) scores for maxillary and mandibular anterior teeth, premolars and molars at increasing scores of attrition (A). For numbers of observations see Table 1.

Fig. 2. The mean Retentive Calculus (RC) scores for maxillary and mandibular anterior teeth, premolars and molars at increasing scores of attrition (A). For numbers of observations see Table 1.
reverse, i.e. more dental calculus occurred with increased attrition \((P<0.01)\). A trend of a similar positive relationship between the two parameters was observed also in the region of maxillary molars (Table 2, Fig. 2).

Decreasing amounts of periodontal breakdown were recorded with increasing occlusal wear in the areas of maxillary anterior teeth and maxillary and mandibular premolars \((P<0.05)\). There was no difference in the amount of loss of tooth attachment at various degrees of attrition of mandibular canines and incisors, while a trend towards more bone loss with attrition was observed in maxillary molars.

**Discussion**

Due to the young age of the examinees only first and second degree attrition was scored, i.e. attrition confined to the enamel and attrition extending into the dentin of the tooth (Table 1). Furthermore, the minute amounts of attrition in the molar areas somewhat hampered the performance of the statistical analyses. On the other hand, the young age of the subjects precluded a number of misleading factors related to age itself, and thus added to the reliability of the results.

The frequent finding of second degree attrition in the canine and incisor areas (Table 1) strongly suggests that some function other than that represented by chewing of food had been involved in the wear of the teeth. The negative association between occlusal wear and gingivitis in all areas except those of supragingival calculus formation (Table 2, Fig. 1), indicates that this so-called hyperfunction may have had a stimulative and favorable effect on the periodontal tissues. The finding of less dental calculus in these same regions (Table 2, Fig. 2) corroborates the view that subgingival calculus formation is closely associated with the increased flow of gingival fluid in connection with gingivitis (Brill & Krasse 1958, Löe, Mann, Weinstein & Egelberg 1968, Alexander 1969, Ainamo 1970). In the areas of mandibular incisors and maxillary molars more calculus was found on worn than on intact teeth (Table 2, Fig. 2). This finding apparently results from an increased excretion of saliva during heavy masticatory function, and it also explains the exceptional behavior of the mean Gingival Index scores in these areas (Fig. 1).

So far no direct evidence has been presented to show that attrition of the teeth would be beneficial for the periodontal health in man. However, there seems in earlier literature to exist circumstantial evidence in favor of this view. For example, in a group of 200 patients, more gingivitis, subgingival calculus and stainable bacterial plaque were found in non-functional than in functional areas of the dentition (Alexander 1970). Also, less calculus was scored in the subgingival and more calculus in the supragingival calculus formation areas in Navajo children with heavy dental attrition when compared with Alabama children with little wear of the teeth (Parfitt 1959).

The main conclusion of the present findings is, that masticatory activity in man, either functional or “non-functional,” seems to decrease the accumulation of soft deposits and subgingival calculus and to improve the gingival and periodontal conditions in all areas of the dentition except those of supragingival calculus formation. The observation that variations and even direct antagonisms occur within the individual dentition, should also discourage the use of individual mean index scores in future attempts to further clarify the relation between occlusal wear and periodontal health.
References


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