

# Unusual Mechanical Defects of Dental Hard Tissues as a Result of Nutritional Habits in Our Population

Atipični mehanički defekti tvrdih zubnih tkiva uzrokovani prehranbenim navikama u našoj populaciji

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## Abstract

*This paper describes cases of severe tooth wear, caused by a strong abrasive component in bread (stone particles), and loss of enamel and dentine of the "pressure-chipping" type, as a consequence of grinding a mineralized substance (shrimps legs), which is a little known type of tooth wear in primitive Inuits of Alaska, Canada and Greenland.*

Key words: *tooth wear, nutritional habits*

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## Introduction

Attrition is a kind of wear of the teeth seen in all civilizations and it represents a continuous process in the function of each tooth (1). It is also called the occlusal-contact-area wear (2). Dental attrition occurs by the interaction of the external and internal factors, within the framework of the functional capabilities of the masticatory system. It is a combination of the attrition-abrasion-erosion action, which gradually leads to the loss of enamel and dentine, thus changing the morphology of the teeth. The process of tooth wear is influenced by the quantity and quality of the abrasives in the food, composition of saliva, age and sex of the subject, as well as his/her working environment (3,4,5,6,7).

Historically, dental attrition was much more commonly found than it is nowadays. Clinical and

experimental investigations have shown that the degree of dental attrition depends more on the abrasive properties of the food taken, than on its consistency (8,9).

Abrasion is defined as *pathologic wearing away of the dental hard tissue substance by friction of a foregoing body independently from occlusion* and it is a consequence of the living habits. Abrasion has been described in the primitive nations in Africa, Asia and the Americas as the consequence of rites and rituals, as well as their respective habits. In the so-called civilized world, it is associated with holding a pipe, a pencil, or some similar object, between the teeth, or biting seeds, and similar behaviour. Also, it may be *occupational*/i.e. related with various professions: cases of abrasion have been described in musicians playing various wind instruments (e.g. clarinet), in glass-blowers, tailors, hair-

-dressers, and similar (10,11,12,13). The worn-out portion of the tooth may take different shapes. It depends on the type of object by which it was inflicted; the duration of time the tooth was exposed to it, and the angle at which the force was acting upon enamel (14)

Pindborg described a little-known type of tooth wear ("pressure-chipping"), spotted in the primitive Eskimos (N.B. authentically called Inuit) of Alaska, Canada and Greenland. It is characterized by severe crushing and flaking of the crown surface which occurs in meat consuming populations as a result of chewing bones (1).

### A Case Report

Found in a male subject ID, aged 74, was a very clearly pronounced case of the attrition-abrasion tooth wear in both maxillary and mandibular teeth, which was caused by the functional activity of the masticatory system. Besides the loss of tooth tissue otherwise normal for that age - in the medial upper incisors, spotted chipped-off portions of the teeth were found. The medical history revealed that the patient lives in a Mediterranean area which makes it quite habitual and frequent for him to eat small shrimps (*NEPHROPS NORVEGICUS*), the legs which he usually crushed with his anterior teeth. The loss of portions of the teeth was not a sudden, one-time action; it rather has occurred as the result of a gradual process. On the basis of medical history and the shape of defect, it can be concluded that a type of tooth damage has occurred, etiologically similar to that previously described by Pindborg (1) as "pressure-chipping". The damage site in the area of the anterior incisors is a direct consequence of the use of the anterior teeth for grinding shrimp legs (Figures 1 and 2)

Another example of tooth wear, which is no longer found today, was described by Dolinac (15). In his research, carried out in the area of the Kupres Heights in Bosnia, found in a part of the elderly population was extensive attrition of all teeth (Figure 3).

However, similar tooth wear was not found in the younger population. Having analyzed the nutritional habits, he had concluded that the elderly people in the community ate - when they were young - bre-

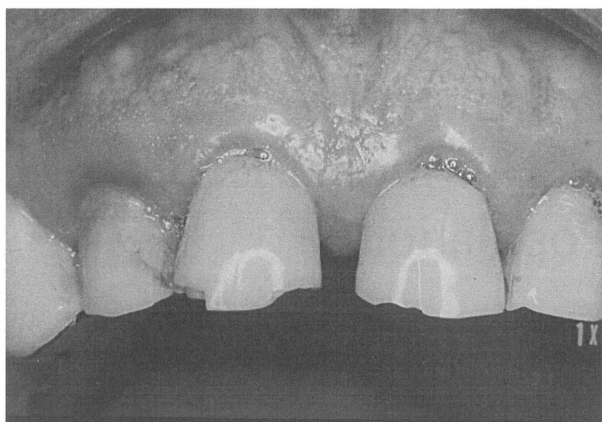


Figure 1. Vestibular view of tooth wear find in patient I.D.  
Slika 1. Abrazivne promjene zuba - vestibularna strana

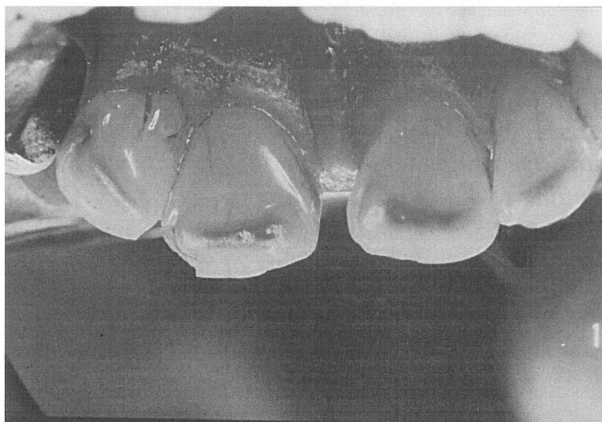


Figure 2. Oral view of tooth wear find in patient I.D.  
Slika 2. Abrazivne promjene zuba - oralna strana

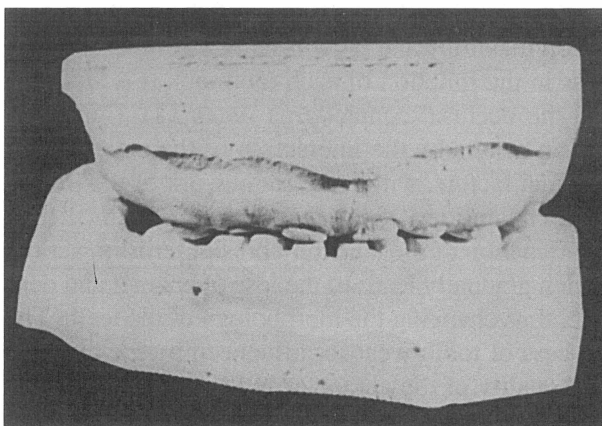


Figure 3. Tooth wear find in population of Kupres Heights  
Slika 3. Abrazivne promjene zuba pronađene kod populacije Kupreške visoravni



Figure 4. Water millstone

Slika 4. Mliniski kamen

ad made from the flour produced in grinding-stone mills of a rather primitive construction, where wheat was ground between two grinding-stone wheels - one moving, and the other stationary. In the process of grinding, the stone wheels would break off small stone particles which would end up in the flour, and later in the bread, as its strong abrasive component, leading to extensive dental attrition. After the 1950's such water-powered grinding-stone mills were no longer in wide use, which explains the absence of such significant occurrence of attrition in the younger population.

Interestingly enough, in the subjects who had developed a high level of attrition, a very low incidence of caries and extracted teeth was established compared with the young generation, where a high incidence of caries and tooth extraction was present, however not accompanied by attrition (15).

## Discussion

Traditionally, when referring to the continuous loss of hard dental tissue (not including caries), the words attrition-abrasion-erosion were used. However, with reference to research dealing with the lo-

ss of hard dental tissue induced by mechanical causes, attrition and abrasion - two separate phenomena - are terms progressively more seldom used, giving way to the term tooth wear. Attrition and abrasion combined and accompanying the teeth along the entire cycle of their physical existence, within the environment of the functional and parafunctional relations, governing the mandible and the masticatory system. The fact that attrition and abrasion are so entirely inter-linked makes it impossible today to distinguish which loss of tissue can be attributed to exclusively this or that type of damage. The Kupres type of tooth wear is a typical example of attrition caused by an abrasive component found in bread. Changing along with the food taking habits was also the tooth wear pattern. This type of attrition caused tooth wear can no longer be found, giving way to an increasing level of a new-type of acid-caused erosion.

In the aforementioned case - which we have described as a case of "pressure-chipping" - we are actually dealing with a phenomenon that also has to do with food and tooth wear, as a consequence of grinding mineralized substance(s), similarly to that described by Pindborg, referring to the Inuit population. Seen from that point of view, the case we have described can be classified as a modern variant of "pressure-chipping". In its essence, that which once was described by Pindborg (1), can be viewed as a *particular* type of tooth wear phenomenon, taking a *particular* shape at a *particular* civilizational stage, in direct connection with a *particular* set of food-taking habits, which - today - can only be encountered sporadically. Both types of tooth wear described here are neither typical of our time, nor of our cultural environment. This does not mean, however, that cases of extensive loss of tooth tissue are not found to-day, rather that they are due to neuro-muscular disharmony bruxism and bruxomania (16) than to the physiological activity of the masticatory system. Classical means of measurement no longer meet requirements for the study of tooth wear. Much more sophisticated equipment is needed and used. The physiological loss of teeth is today measured in  $\mu\text{m}$  (micrometers): tooth-wear rates are measured (17,18) and so too are dental wear facets (8). For the purpose of analysing dental microwear pattern, electronic microscope techniques (3) or computer-aided 3-D measuring techniques are used

(2). It is a matter of common knowledge today that the causes of the loss of tooth tissue are much more complex and are in a kind of relation with the modern-time way of life. They are continually interlining and superposing which produces an ever changing pattern of the missing portion of the tooth. Consequently, currently the term tooth wear has been increasingly used, because it encompasses a wide range of attrition-abrasion-type friction, (chipping, peeling, chopping and grinding) of the hard dental ti-

ssue in the present-day conditions of biological functions of the masticatory system, common habits and way of life.

Recently, a more specialized classification of tooth wear has appeared, combining present-day knowledge on the etiology and morphology of worn-out tissues with the biological status of the masticatory system in the environment as defined by the present-day standards of behaviour in our civilization circle (19).

#### ATIPičNI MEHANIČKI DEFEKTI TVRDIH ZUBNIH TKIVA UZROKOVANI PREHRAMBENIM NAVIKAMA U NAŠOJ POPULACIJI

##### Sažetak

*U radu su opisane opsežne abrazivne promjene cakline i dentina zuba uzrokovane neuobičajenim prehrambenim navikama netipičnim za današnjicu. Slične promjene tvrdih zubnih struktura nađene su u eskima sa Aljaske, Kanade i Grenlanda.*

**Ključne riječi:** trošenje zuba, prehrambene navike

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