

PROSTHODONTIC TREATMENT OF EROSIVE-ABRASIVE DEFECTS OF TEETH.

CASE REPORT

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Abstract

The authors describe an unusual case of an abrasively erosive tooth defect, a pathological condition whose increased prevalence has recently become a serious problem. A 55-year-old female patient presented with extensively devastated teeth in her upper jaw. The patient had atopic eczema and bulimia recorded in her medical history. Halitosis, which is associated with alcohol consumption, was repeatedly noted and the patient confessed of having drinking problems. She underwent surgical and endodontic treatment in our department with a subsequent prosthetic reconstruction with a fixed bridge. The extracted teeth were processed to be examined by scanning electron microscopy (SEM). Both the SEM examination and medical history data indicated that the presence of erosive defects was a consequence of bulimia and alcohol abuse. Because the therapy of such extensive defects is difficult, time consuming and expensive, dentists should place emphasis on their prevention.

Key words

Erosion, Abrasion, Attrition, Bulimia, Defects of teeth

INTRODUCTION

In both primary and permanent dentitions, dental tissues are subjected to various chronic or acute traumata and damage caused by chemicals and caries development. Pathological tooth wear, an increasing problem in modern society, is caused by various factors, one of which is usually predominant. This is mainly because people nowadays have their permanent dentition much longer than before and, therefore, the time for wear to occur has increased. However, this condition has also been found in children and adolescents.

Attrition is the process of wearing away of enamel, which occurs physiologically as a consequence of mastication. This process is very slow and results in a gradual loss of enamel. *Pindborg* distinguished three types of attrition: physiological, excessive and pathological (3). The dental pulp cavity is usually not open due to attrition.

Abrasion is defined as a defect of hard dental tissues caused by the mechanical action of abrasives on the tooth surface (3, 4, 7). It is found most frequently in the region of the tooth cervix as a wedge-shaped defect. The loss of both dentin and enamel is present. These wedge-shaped defects can lead to the denudation of dental pulp. At the beginning, the smooth walls of the defect are very sensitive to various (mechanical, chemical or physical) stimuli but later this sensitivity decreases.

Erosion is the destruction of enamel and dentine by chemical substances without the presence of microorganisms. Erosions, mostly located to the vestibular surfaces of teeth, are commonly associated with the action of acids on the tooth surface. *Epstein* refers to a possible action of pyrophosphate and citrate, as chelation agents, in saliva (1). Hydrochloric acid, an endogenous source, regurgitates into the oral cavity in digestive troubles. Teeth also come into contact with hydrochloric acid from the digestive tract in patients with pathological conditions such as bulimia nervosa or anorexia mentalis (4, 6, 7). In these cases, most damage is seen on the oral surfaces of teeth. Regurgitated acid is caught among the papillae of the tongue that rubs against teeth. *Pindborg* describes this phenomenon as perimyololysis. The development of erosions may also be due to the action of citric acid present in citrus fruit and some soft drinks. Acid vapours of hydrochloric, picric, formic, sulphuric and other acids, which are responsible for industrial erosion, may also be involved in dental erosion and then the incisal half of vestibular surfaces of incisors is affected most frequently; the other teeth are eroded less frequently (4).

When attrition, abrasion and erosion occur at the same time, a mixed lesion develops; its appearance is related to the involvement of each aetiological factor

CASE REPORT

A 55-year-old female patient came to the Department of Stomatology of St. Anne Teaching Hospital in Brno with a request for the treatment and reconstruction of her defective teeth. Her medical history showed that she had had atopic eczema since childhood, bulimia was diagnosed at 25 years and hypertension appeared at her middle age. The patient was a heavy smoker (20 to 30 cigarettes/day); her drinking problem was also recorded. She had not seen her dentist for many years and had neglected her oral hygiene.

A vast destruction of the upper jaw teeth was obvious at first sight (*Figs 1, 2*). Poor oral hygiene was evident and a strong fetor ex ore was noticed during examination. Abrasion of the frontal teeth and premolars on both sides up to the marginal gingiva was visible in the upper jaw. In the mandible, tooth 46 was lost but the other teeth were either intact or treated with amalgam fillings.

In the first stage, we removed dental calculus and the patient was instructed and trained to be able to maintain good oral hygiene.

In the second stage, X-ray examination (orthopantomogram) revealed periapical lesions in teeth 14 and 24 (*Fig. 3*) and these teeth were extracted. Teeth 12 and 22 were also recommended for extraction because of root canal obliteration.

Endodontic treatment was carried out on teeth 13, 11, 23 and 25. These were filled with AH 26-plus root paste with a gutta-percha cone, and then silver-palladium alloy root inlays were made (*Fig. 4*). Teeth 16, 15 and 26 remained vital. A temporary resin bridge for a period of four months was made and, finally, a Palliag alloy permanent bridge with facets made from the composite Chromazit was fixed (*Figs 5, 6*).



Fig. 1

Erosive-abrasive defect in the upper jaw involving all teeth except for tooth 16.



Fig. 2

View of an oral cavity with the teeth of the maxilla and mandible in mutual contact.



Fig. 3

Panoramic X-ray image of the maxilla. Periapical radiolucency in teeth 14, 24.



Fig. 4

Restoration of the coronal parts of teeth with root inlays after devitalisation.
Teeth 14, 12, 22 and 24 were extracted.



Fig. 5

Try-in of a metal framework (Palliag).



Fig. 6

Reconstruction of the teeth with a fixed bridge, composite material Chromazit.

The two extracted premolars, 14 and 24, were treated with 5% sodium hypochlorite to remove organic coatings and fixed in 10% neutral formalin. For examination of their coronal parts by scanning electron microscopy (SEM), routine procedures and a Tesla BS 300 electron microscope were used.

A complete loss of enamel on the occlusal surface of extracted premolars was detected by SEM examination. The erosive defect extended into the dental pulp cavity (*Fig. 7, 8*). Numerous openings of dental tubules were visible at a higher magnification. Deposits of calcified tissue occluded, either totally or partly, many of the dentinal tubules. These findings confirm that the dental pulp, still vital, intensively formed sclerotic dentine in order to prevent its exposure. Later, when the vitality was lost, the central parts of dentinal tubules (*Figs 9–12*), remained open and only peripheral areas were calcified. These deposits of mineralised tissue, obviously more resistant to erosive-abrasive forces, protruded above the intertubular dentine level. On the surface of denuded dentine, minute defects caused by abrasive materials were visible in the form of trenches (*Figs 13, 14*). Erosive forces formed shallow cavities of irregular outlines spreading into the surrounding dentine.

DISCUSSION

This case demonstrated that the availability of complete medical history is important for good management of pathological tooth wear. The patient was not aware of the relation between her repeated vomiting during adolescence and adulthood and the state of her dentition.

The loss of hard tissue caused by erosion, abrasion and attrition is a common and unpleasant consequence of bulimia. The underlying disease may be cured but the loss of dental hard tissue remains. Any severe erosion is difficult to treat adequately, and the treatment is expensive.

It is obvious that the main factor leading to erosion among patients suffering from bulimia is repeated vomiting. Gastric content, with acidity close to pH 1.0, severely affects tooth surfaces. According to various studies, not all individuals who vomited daily have erosion (5). In patients with bulimia, factors that are associated with the occurrence and severity of erosion include the duration of disease, frequency of vomiting and amount of saliva. It has been proved that, in subjects with low salivary secretion, acidity remains high, especially on the surface of the tongue and, therefore, tooth erosion is most marked on the palatal surfaces of the incisors touched by the tongue (5).

In addition to a direct dissolution of enamel, the material softened by acids is more susceptible to mechanical wear (6). Vigorous tooth brushing immediately after vomiting enlarges defects that appear on the tooth surfaces. However, patients with bulimia are very rarely aware of dental problems related to their underlying disease until the loss of dental hard tissue is extensive and the state of their dentition begins to influence their appearance.

The dentist should carefully consider the cause of erosion. If this is really associated with dietary factors or exposure to gastric contents due to frequent vomiting, the patient should be referred to a psychiatrist for confirmation of the bulimia diagnosis and subsequent treatment.

Saliva play an important role in both non-cariogenic defects and caries development; therefore, examination of salivary secretion has been emphasised

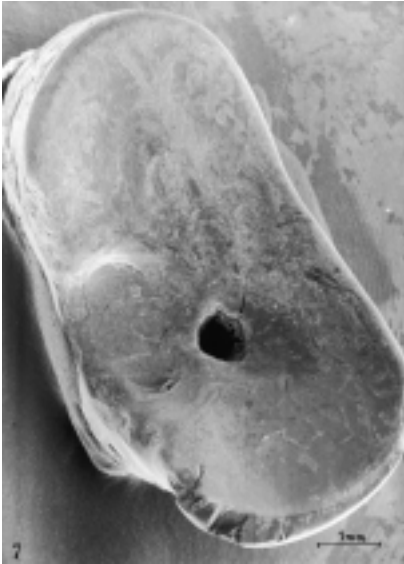


Fig. 7
 Extracted 24 with completely abraded enamel and dental pulp exposed.



Fig. 8
 Higher magnification of the tooth shown in Fig. 7. Dental pulp cavity with tertiary dentine deposits (TD), numerous dentinal tubules openings on the occlusal surface.

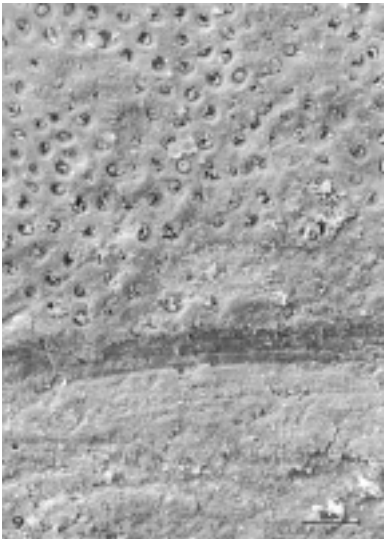


Fig. 9
 Sclerotic dentine. Dentinal tubules occluded by a calcified tissue. Scratches due to abrasive material on the occlusal surface.

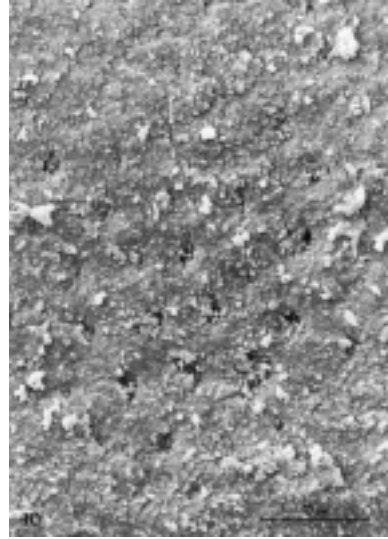


Fig. 10
 Sclerotic dentine. Dentinal tubules totally occluded.

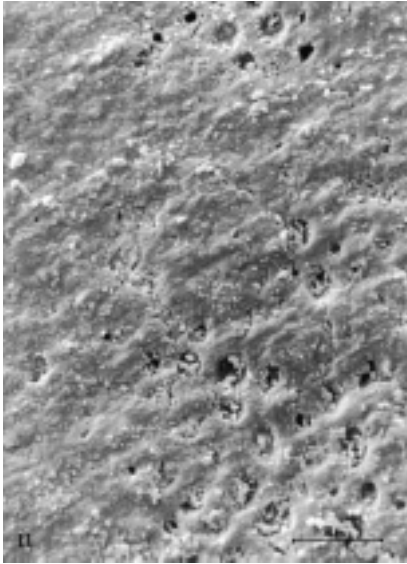


Fig. 11
Sclerotic dentine area with an irregular surface and totally occluded dentinal tubules.



Fig. 12
Sclerotic dentine area with both totally and partly occluded dentinal tubules and shallow erosive defects.

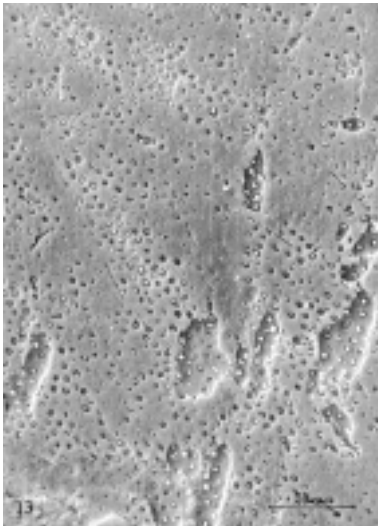


Fig. 13
Occlusal surface with partly occluded dentinal tubules, the central part remained open. Shallow erosive defects with prominent, more resistant peripheral parts of mineralized dentinal tubule walls. Scratches due to erosive material.

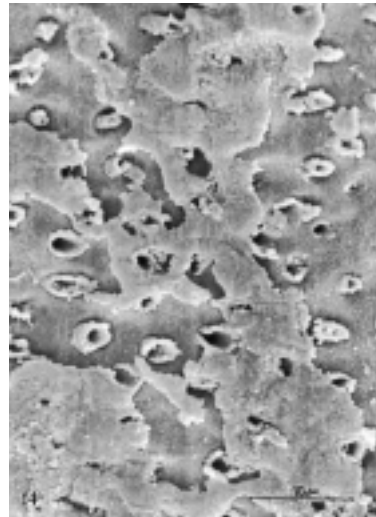


Fig. 14
Higher magnification of the tooth presented in Fig. 13. Erosive defects with more resistant deposits of mineralized tissue inside the dentinal tubules.

(2, 3). It has been reported that patients with bulimia have a notably low rate of non-stimulated salivary flow and complain of dryness in the mouth. About 30% of the patients admitted xerostomia when asked a direct question (1, 4, 9). The patient reported in this study also complained of this condition.

We did not find any reports on SEM investigation of eroded teeth. Our study revealed that a vital dental pulp was able to protect itself from damage by creating sclerotic dentine that closed the denuded tubules very fast. Once the dental pulp became necrotic, dentinal tubules remained open. Scratches due to abrasive material and shallow cavities of irregular outlines, which are caused by the action of acids, were well visible on the dentine surface. These facts showed that both erosion and abrasion participate in the process of wear.

Attention should be paid to dental health of patients suffering from bulimia and to workers in chemical industries or laboratories. Health education and preventive dental check-ups should be introduced in order to prevent the development of serious tooth defects.

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PROTETICKÉ OŠETŘENÍ EROZIVNĚ-ABRAZIVNÍHO DEFEKTU CHRUPU. KAZUISTIKA

S o u h r n

Autorky se zabývají neobvyklým případem erozivně-abrazivního defektu chrupu. Podobných případů v poslední době přibývá a stávají se tak závažným problémem ve stomatologii. Na Stomatologickou kliniku Fakultní nemocnice u svaté Anny v Brně se dostavila ke stomatologickému ošetření pacientka se značně devastovaným chrupem v horní čelisti. Při vyšetření dutiny ústní bylo okamžitě patrné, že nejde o kariézní defekty. V horní čelisti chyběly zuby 18, 17 a 27, ostatní zuby byly přítomny, ale jejich korunková část byla značně abradována. V anamnéze jsme zaznamenali z celkových chorob atopický ekzém a bulimii. Při dalších návštěvách byl opakovaně patrný foetor ex ore, charakteristický pro požívání alkoholu, které pacientka potvrdila. Byly extrahovány zuby 14, 12, 22, 24 a devitalizovány zuby 13, 11, 21, 23 a 25 s následným endodontickým ošetřením. Po zhotovení kořenových nástaveb na devitalizované zuby jsme proteticky rekonstruovali defekt chrupu pomocí fixního můstku. Extrahované zuby byly vyšetřeny pomocí rastrovacího elektronového mikroskopu. Na základě našeho vyšetření a anamnestických údajů jsme zjistili, že jde o erozivně-abrazivní defekt v důsledku bulimie, který byl potvrzen i vyšetřením v REM. Terapie těchto rozsáhlých defektů je náročná, zdlouhavá i finančně nákladná pro samotného pacienta. Je nutno se věnovat prevenci těchto stavů, poněvadž jejich frekvence dle literárních údajů v poslední době výrazně stoupá.

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