Traumatic occlusion caused by deep bite

Traumatická oklúzia spôsobená hlbokým zhryzom

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Abstract

Traumatic occlusion is defined as an injury resulting in tissue changes as a result of occlusal forces. Can be classified as primary and secondary occlusal trauma. There are many factors involved in etiology of occlusal trauma in periodontology. In establishing the diagnosis there are clinical and radiographic methods. Treatment can be done by occlusal adjustment, management of parafunctional habits, splinting, occlusal reconstruction, extraction and orthodontic tooth movement. This clinical report describes the patient with traumatic occlusion due to deep bite. As a result chronic pain during mastication, increased mobility and fremitus were seen. Patient was treated with occlusal adjustment. Deep bite correction should be done as future treatment.

Key words: traumatic occlusion, deep bite, occlusal forces, increased mobility, occlusal adjustment.

Abstrakt

Traumatický zhryz je definovaný ako poškodenie, ktoré vedie k zmenám na tkanivách následkom okluzálnych síl. Môže byť klasifikovaný ako primárna a sekundárna okluzálna trauma. V parodontológii sa na vzniku okluzálnej traumy môže podieľať viacero faktorov. Na stanovenie diagnózy sa používajú klinické a diagnostické metódy. Liečba môže pozostávať z úpravy oklúzie, identifikácie a odstránenia zlozvykov, z dlahovania, úpravy oklúzie, extrakcií a ortodontickej liečby. V tomto článku popisujeme prípad pacientky s traumatickou oklúziou spôsobenou hlbokým zhryzom, u ktorej bola klinicky pozorovaná zvýšená pohyblivosť zubov a fremitus. U pacientky bola vykonaná úprava oklúzie. Korekcia hlbokého zhryzu bude vykonaná počas nasledujúceho ošetrenia.

Kľúčové slová: traumatická oklúzia, hlboký zhryz, oklúzne sily, kývavosť zubov, úprava oklúzie.

Introduction

Occlusal trauma is defined as an injury resulting in tissue changes within the attachment apparatus (cementum, periodontal ligament, alveolar bone) as a result of occlusal forces. The periodontal attachment apparatus is the target for occlusal trauma and manifests clinical, radiographic and histologic changes when excessive occlusal loads are placed on the attachment apparatus. Tooth mobility is a clinical hallmark of occlusal trauma. Clinical signs of occlusal trauma are:

- Tenderness of mastication muscles and TMJ dysfunction,
- Tooth pain on percussion or chewing,
- Root fractures [10],
- Mobility,
- Fremitus,
- Persistent discomfort on eating.

Trauma from occlusion is associated by changes within attachment apparatus caused by occlusal force and can be classified as acute and chronic or primary and secondary occlusal trauma. Primary is associated with tissue changes that results from excessive occlusal forces applied to one tooth or teeth with normal periodontal support. Secondary occlusal trauma is result of excessive forces applied to a tooth with reduce support and occurs in presence of bone and attachment loss. These forces are called traumatogenic forces and the occlusion traumatogenic occlusion. Distinction between primary and secondary occlusal trauma

serves no purpose since alternations in periodontium as a consequence of trauma from occlusion are independent of height of target tissue (periodontium). However, teeth with primary occlusal trauma may reach a state of stability in which mobility is no longer increasing and the clinical, radiographic, and histologic changes do not worsen over time. Teeth with secondary occlusal trauma may occur with active periodontitis or may persist after the inflammatory periodontitis has been resolved. We can also mention combined occlusal trauma, which is injury from an excessive occlusal force on a diseased periodontium. In this case, there is gingival inflammation, pocket formation, and the excessive occlusal forces are from parafunctional movement [7, 3].

Lemmerman in 1976 described the importance of the clinician to identify whether the drifting of teeth is a result of primary occlusal trauma and secondary occlusal trauma. In primary occlusal trauma, the periodontium is intact and not reduced, thus the drifting of the teeth is due to an excessive, continuous force from an occlusal disharmony. Elimination of this interference will provide permanent relief from drifting and sometimes completely reverse if diagnosed early. In secondary occlusal trauma periodontium is reduced and the teeth lost support. Splinting during or after periodontal treatment is often aimed to achieve reduction of mobility to improved comfort and function [5].

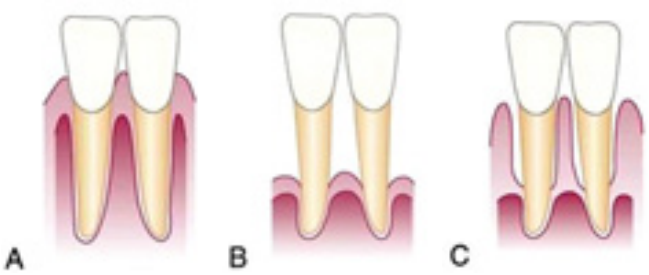

Fig. 1. *Traumatic forces can occur on A) normal periodontium with normal height of bone B) normal periodontium with reduced height C) marginal periodontitis with reduced height [7].*

Obr. 1. *Traumatické sily sa môžu vyskytnúť: A) na normálnom parodonte s normálnou výškou kosti; B) na normálnom parodonte so zníženou výškou kosti; C) pri marginálnej parodontitíde so zníženou výškou kosti [7].*

Generally, when increased occlusal forces take place, the periodontium is physiological adapting with widening of periodontal ligament spaces and socket allowing movement of tooth against trauma. This results in accommodation of tooth, apparatus and adaptation to a chronic occlusal stress. Within the periodontal ligament space, zones of pressure and tension are created. Alternations in pressure zone can be compensated by tension zone in order to maintain the normal width of periodontal ligament in this area. This tissue reaction to pressure and tension zone make tooth hypermobile. The hypermobile condition finishes when tooth moves to a condition where both forces are nullified and healing of periodontal tissues occurs [11]. If the degree or duration of occlusal forces is greater than adaptive capacity of the periodontium, necrosis of periodontal ligament tissue, decomposition of vessels cells matrix and fibers (hyalinization) happen.

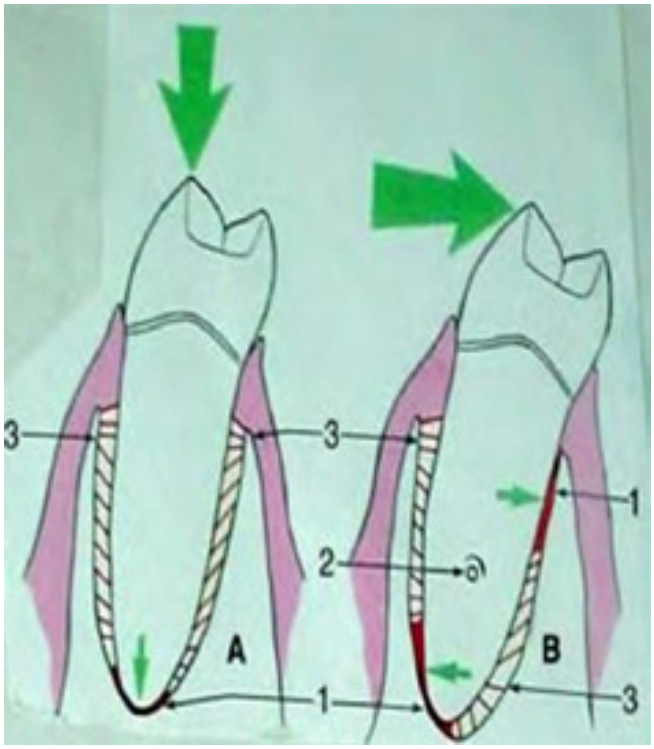

Fig. 2. *Diagram of effects of occlusal forces. A, The tooth with vertical occlusal forces has a small area of periodontal ligament pressure (1) and an increased area of periodontal ligament tension (3). B, Horizontal occlusal force causes the tooth to rotate about an axis (2) and demonstrates an increase in area of periodontal ligament pressure (1) and a reduced area of ligament tension (3). Horizontal occlusal force causes a tipping motion and rotation around the rotational axis, with increased tension forces at the apex on the side opposite the force and at the crestal region on the same side as the force. The horizontal force causes periodontal ligament pressure at the crest on the side opposite the force and at the apex on the same side as the force [6].*

Obr. 2. *Schéma účinkov okluzálnych síl. A) Parodontálny väz tlačí zvisle okluzálnou silou na malú plochu zuba (1) čo spôsobuje väčšie napätie v parodontálnom väze (3). B) Horizontálna*

okluzálna sila spôsobuje, že sa zub otáča okolo osi (2) a spôsobuje väčší tlak na parodontálny väz (1) a znižuje plochu napätia väzu (3). Horizontálna okluzálna sila spôsobuje vyklápací pohyb a rotáciu v smere osi otáčania so zvýšenou napínacou silou na vrchole na opačnej strane pôsobenia sily a v hrebeňovej oblasti na tej istej strane, ako pôsobí sila. Horizontálna sila spôsobuje tlak na parodontálny väz v oblasti hrebeňa na opačnej strane pôsobenia sily a na vrchole na tej istej strane, ako pôsobí sila [6].

Symptoms from traumatic occlusion such as pain on mastication, cold sensitivity may develop only when the magnitude of the load elicited by occlusion is so high that periodontium around the tooth cannot properly withstand and distribute the resulting force. Clinical signs and symptoms may be reversible if the forces that caused them remove. Otherwise periodontal injury may worsen and necrosis and abscess may develop [6, 8].

Case report

A 41 years old woman was referred to the Department of periodontology LF UK and OUSA in Bratislava, in September 2018 with request to perform periodontal splint due to increased mobility of teeth on upper left lateral side. In the medical history we found out that she was treated with soft laser (diode laser for treatment of periodontitis).
The patient complained of increased mobility of teeth, chronic pain during mastication and pain on the left temporal side of head.
Objective findings showed an intact dentition with no restorative works, tooth 26 was extracted and deep bite was present. Teeth problems resulting from pulpal conditions were ruled out. TMJ examination excluded any pathological findings.
No periodontal pockets were present and the gingiva was without any signs of inflammation, PBI = 0, CIP = 0 with very good oral hygiene, without presence of plaque.
Increased mobility of teeth was present at teeth 25, 24, 23, 22 – degree I – II. Fremitus degree II was found at teeth 24, 23, 22, while the right lateral side of teeth was without fremitus. Teeth in lower jaw were with physiological mobility, gingiva was without inflammation (PBI = 0) and no periodontal pocket was present (CPI = 0).
As deep bite was present, we explained to the patient that the therapy has to be focused to increase bite. She needed some time to decide about proposed treatment.
We explained that teeth with increased mobility are suffering from traumatic articulation and we proposed as first step to perform grinding of affected teeth. Patient agreed with this treatment plan. Articulation grinding was done at teeth 25, 24, 23 and 22. Next visit was planned one month later. During next visit she reported that pain of teeth was present only one time (one day), without any pain in TMJ area. Mobility of teeth 25 – 22 showed degree 0 up to I. Patient did not decide about treatment correction of deep bite. The patient is in dispensarisation with next visit planned in January 2019.

Results

In our clinical case we noticed mobility – grade II at teeth 25, 24, 23, 22 (movement of tooth in buccolingual or mesiodistal direction more than 1 mm without occlusoapical movement direction). We measured mobility by placing two dental instruments at the buccal and lingual height of contour of teeth, and forces were applied in the buccolingual direction. Except of mobility, fremitus (functional mobility) – Class II (easily palpable vibration but no visible movement) was presented at teeth 24, 23, 22 and measured with a finger that is placed buccal and lingual and patient approaches the teeth together in intercuspal position and examine grinding movements in all directions of mouth (lateral, protrusive, lateral protrusive).
In the past the patient was treated with soft laser because of periodontitis but during clinical examination we didn't notice any gingival inflammation, alveolar bone loss or periodontal pocket.
X-ray image didn't show any pathological findings that indicate traumatic occlusion such as increased periodontal space width or angular bone loss with radiolucent lamina dura.
We therefore speculate to treat mobility and fremitus with occlusal adjustment (grinding). As first step we performed grinding of 25, 24, 23, 22. One month later the condition improved with mobility grade 0 up to I and no pain on TMJ. The pain of teeth was improved too.

Discussion

The current study showed how deep bite can result in occlusal trauma with mobility and fremitus. When mobility and fremitus correlate in location and degree occlusal trauma presents. The tooth became mobile and is regarded as physiological adaptation to the altered functional demands. If fremitus doesn't correlate with mobility occlusal trauma is not present [10].
In cases of trauma from occlusion is important to treat periodontal inflammation because it can inhibit the potential for alveolar bone regeneration, and that connective tissue attachment levels will remain unchanged unless the plaque-induced

inflammatory lesion is treated. It is clear that alveolar bone regeneration and periodontal ligament correction can happen when both inflammatory condition and occlusal forces are controlled. The attachment cannot return back to its normal height. But the periodontal ligament space can return to normal position [8].

Teeth with previous periodontitis but without current inflammation respond similar to occlusal forces with physiological adaptation (widened periodontal ligament, mobility, bone loss) without attachment loss. Indeed, it has been estimated that the reduction of alveolar bone height may have little effect on the degree of periodontal ligament stress until as much as 60 % of the bone support has been lost [1]. Experiments in animals (Ericsson and Lindhe 1977) has shown that reduced height periodontium can adapt to occlusal forces similar with normal height periodontium [8].

In our clinical case occlusal adjustment (grinding) was the treatment of choice for mobility and fremitus. Is a procedure for reshaping of occlusal and incisal edges of teeth with grinding to develop and improve upon their harmonious relationships between each other [4, 2]. Reducing the occlusal interference on a tooth with normal bone support will normalize the width and height of the periodontal ligaments. Eliminating any occlusal interferences for a tooth which has a reduced bone height as a result of periodontal disease will result in bone formation and remodeling of the alveolus only to the pre-trauma level.

In cases of mobility with normal periodontal ligament width but reduction of alveolar bone height the occlusal adjustment is not effective. If does not interfere with mastication no treatment is required. But if the mobility is disturbing the patient splint can be used.

Conclusion

Findings of this current study support that occlusal adjustment (grinding) improved the condition of mobility and fremitus. It is important to evaluate how tooth mobility affects the patient. If there is discomfort when eating this will have a direct influence upon treatment [7].

However, management of deep bite with orthodontic treatment is mandatory for the future. We improved the condition with grinding but in our case, efficient treatment of trauma from occlusion can be done with correction of deep bite too.

We never recommend preventive occlusal adjustment in patients without periodontal trauma from occlusion for future prevention. Changing the occlusion to prevent periodontal damage in the future can create periodontal problem.

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