

Traumatic occlusion caused by prosthetic restoration

Traumatická oklúzia spôsobená protetickou náhradou

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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 after placement of a metal ceramic crown. As a result, increased mobility and fremitus were seen. Patient was treated with occlusal adjustment.

Key words: periodontium, traumatic occlusion, periodontal ligament, occlusal forces, increased mobility, occlusal adjustment.

Abstrakt

Traumatická oklúzia je definovaná ako poškodenie, ktoré vedie k zmenám na tkanivách následkom okluzálnych síl. Môže byť klasifikovaná ako primárna a sekundárna okluzálna trauma. V parodontológii sa na etiológii okluzálnej traumy môže podieľať viacero faktorov. Na stanovenie diagnózy sa využívajú klinické a diagnostické metódy. Liečba môže pozostávať z úpravy oklúzie, identifikácie a odstránenia zlovykov, dlahovania, úpravy oklúzie, extrakcií a ortodontickej liečby. V tomto článku sa popisuje prípad pacientky s traumatickou oklúziou, ktorá vznikla po nasadení kovokeramickej korunky, po určitom čase sa objavila viditeľná zvýšená kývavosť zuba a fremitus. U pacientky bola vykonaná úprava oklúzie s cieľom upraviť vzniknutý patologický stav.

Kľúčové slová: parodont, traumatická oklúzia, periodontálne ligamenty, okluzálne 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. There are many factors involved in etiology of occlusion. They can be divided into precipitating factors that are destructive occlusal forces and

predisposing factors which contribute to development of trauma from occlusion.

As already stated, **precipitating factors** are associated with destructive occlusal forces. When forces are within normal range, can be adapted. But if the forces are excessive, pathological conditions may happen. These forces are described as magnitude of occlusal forces, direction (periodontal ligament fibers play important role), duration and frequency of force application [7].

The various forces according to magnitude, direction, duration and frequency can be divided to:

- Normal physiological forces: Exerted on the

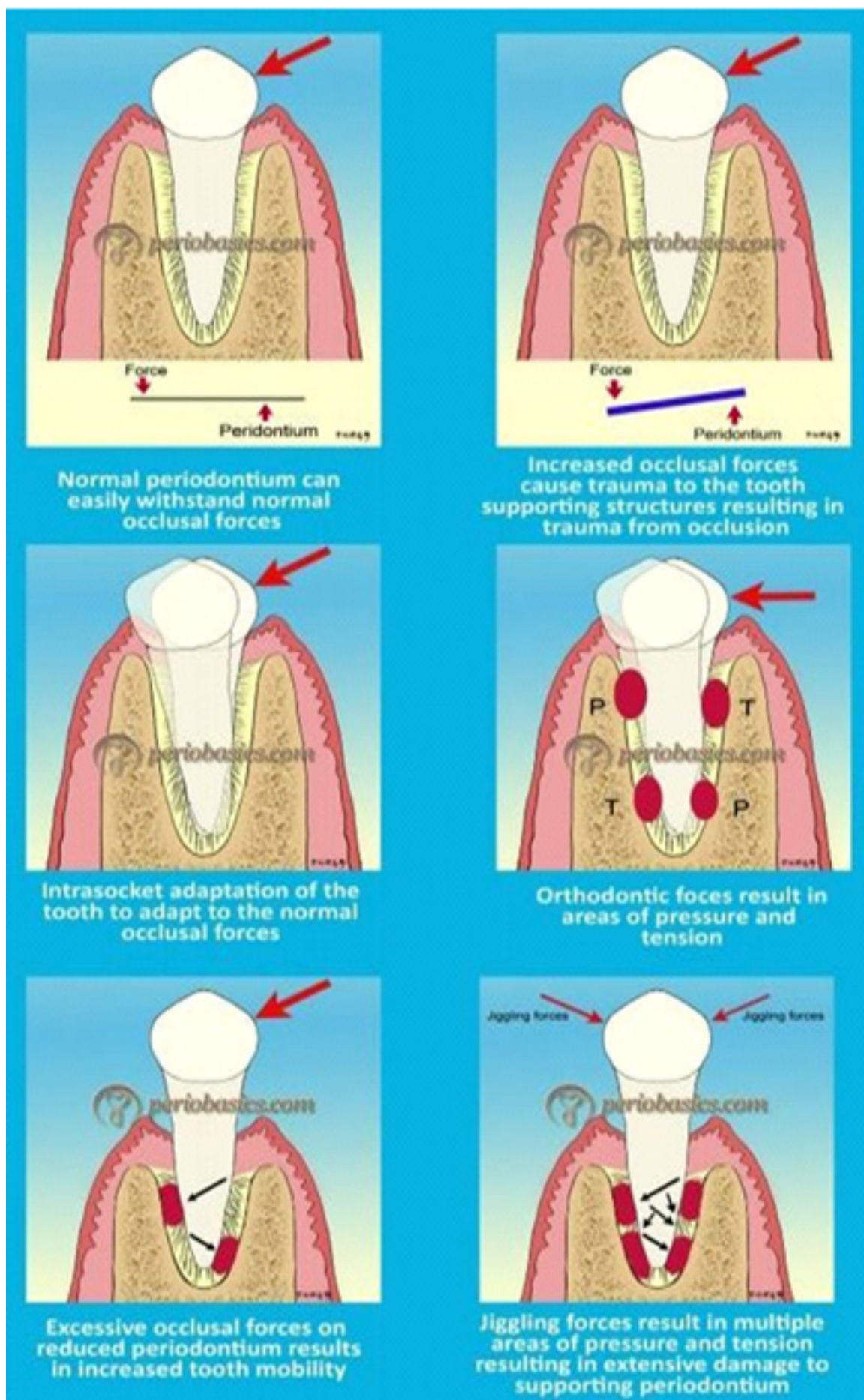


Fig. 1. Response of normal or reduced periodontium to normal and increased occlusal forces [7]

Obr. 1. Reakcia normálneho alebo zníženého parodontu na normálne a zvýšené okluzálne sily [7]

teeth during swallowing or moving and are 5 N. They are beneficial and healthy to periodontal structures and bone.

- Impact forces: Forces of high magnitude that exerted on teeth in short period of time. Periodontal ligament has viscoelastic properties to absorb the forces. If exceed the viscoelastic capacity, it results to injury.
- Continuous forces: Forces of low magnitude that exerted on teeth for long duration of time such as in orthodontic treatment. Resulting in remodeling of alveolar bone.
- Jiggling forces: Forces that applied on teeth in more than one direction in case of high fillings or crowns. They result in widening of alveolus (periodontal space) and increased mobility [4, 7].

Predisposing factors, which contribute to development of trauma from occlusion can be divided to extrinsic and intrinsic.

Intrinsic factors are:

- orientation of long axis of tooth in relation to forces,
- size, shape and number of roots are playing a role in absorbing forces,
- morphology of alveolar process.

Extrinsic factors are:

- plaque which predispose to alveolar bone loss,
- parafunctional habits,
- overloading from long term bridges,
- bone resection during periodontal surgical therapy [4].

Occlusal trauma 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 resulted 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 [5, 2].

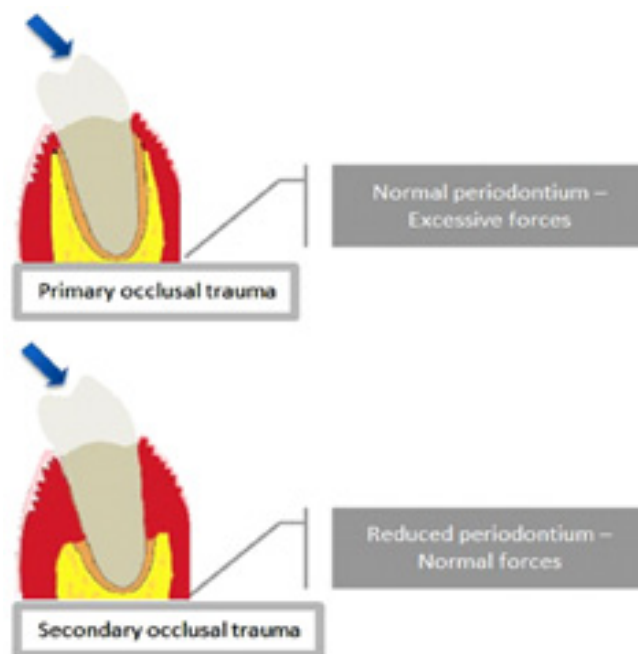


Fig. 2. Primary and secondary occlusal trauma [2]
Obz. 2. Primárna a sekundárna trauma [2]

Case report

41 years old woman visited the Department of periodontology LF UK and OUSA in Bratislava for first time in November 2014 for preventive check. Patient was complaining about increased mobility of tooth 21.

Clinical examination showed us complete dentition, teeth treated with fillings without secondary caries, with no new caries and normal occlusion. Tooth 21 with metal ceramic crown was done and placed to tooth 21 one year before visit. In medical history (not specified year) we found out that apicectomy (resection of apices) was done at tooth 21. X-ray was without any pathological findings and tooth 21 had slightly shortened root after apicectomy comparing to opposed tooth 11 with satisfactory endodontic filling and no widened periodontal space seen.

In addition, during examination we noticed increased mobility of tooth 21 – grade II, no periodontal pocket was present. The remaining teeth were with physiological mobility (grade 0), without periodontal pockets, without gingivitis or periodontitis. Dental hygiene was evaluated as very good, without presence of plaque.

We have checked fremitus (functional mobility). There was class III fremitus present at tooth 21.

Patient reported that increased mobility started after prosthetic restoration was done at tooth 21. Since no periodontal disease is present, increased mobility was concluded as a result of traumatic articulation. We explained patient the reason for increased mobility. She thought that increased mobility may be the consequence of apicectomy done in the past. We recommended to replace the prosthetic work, but she refused our proposal for financial issues. Therefore, we decided to grind the metal ceramic crown from the oral side. The patient was informed that with our intended intervention crown will be damaged. We grinded incisal edge of opposed tooth 31 too. Next visit was planned 3 month later. Patient was not presenting to dental office for check as agreed. Next visit was done again during preventive check in October 2015. Preventive check was with no any pathological findings and tooth 21 exhibited only mobility grade I. Functional mobility (fremitus) was evaluated as class II. We were performing grinding at oral side of crown 21 again. Next year the patient missed the preventive check and she came back the following year, in October 2017. Again, no pathological findings were encountered during the preventive check and tooth 21 exhibited only mobility degree I with class I fremitus. No intervention was done, the patient was satisfied.

Results

In our clinical case we noticed mobility – grade II at tooth 21 (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 tooth 21, and forces were applied in the buccolingual direction. Except of mobility, fremitus (functional mobility) – Class III (movement visible with the naked eye) was presented 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).

The patient didn't have gingival inflammation, periodontitis or periodontal pocket. In cases of trauma from occlusion and periodontitis is important to treat periodontal inflammation because it can inhibit the potential for alveolar bone regeneration. Burgett et al. reported that removal of occlusal interferences and the subsequent reduction in mobility without control of periodontal inflammation will not improve the level of attachment [6].

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 with occlusal adjustment (grinding). We performed grinding of metal ceramic crown from the oral side and opposite tooth 31 incisal edge and visualize the results for the next 2 years. During first year the condition improved with Grade I mobility but fremitus remained to Class II (easily palpable vibration but no visible movement) so we grinded metal ceramic crown again. During second year fremitus improved to Class I (mild vibration detected).

Discussion

Findings of the current study showed how a prosthetic restoration can create excessive forces between abutment and antagonistic tooth and result in occlusal trauma. 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 [8].

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 [9]. 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.

How much adjustment is required is determined by using computer-based occlusal analysis. The primary purpose of occlusion analysis is to reveal interferences in articulation which cannot be observed directly in the mouth. This detailed analysis is most often performed prior to the initiation of any prosthetic plan. 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 [3, 1]. In our case, possibly this detailed analysis didn't perform prior to initiation of metal ceramic crown thus resulted

in excessive forces to the crown and traumatic occlusion with mobility and fremitus.

Conclusion

Findings of this current study support that trauma from occlusion was likely to be the cause of increased mobility and fremitus of single tooth. Thus, proper correction of the metal ceramic crown with occlusal adjustment (grinding) reversed the condition of these clinical findings.

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.

References

1. BORGES, B., MORAIS, ARANTES, VIEIRA, DENISE, FERREIRA, AGUIRRE GUEDES, ORLANDO, ESTRELA, C.: Occlusal adjustment in the treatment of primary traumatic injury. Raulino Naves a Vol. 17, N° 33, July/Dec. 2011.
2. CAMPOS, A., PASSANEZI, SANT' A., PASSANEZI, E.: Trends in clinical periodontology and implant dentistry, periodontitis and trauma from occlusion. Elsevier publishers: Ryley, J., Flynn-Briggs.
3. DAVIES, S., J., GRAY, R., J., M., LINDEN, G., J. & JAMES, J., A.: Occlusal considerations in periodontics. British Dental Journal 191, 597 – 604 (2001), published online: 8 December 2001.
4. LINDHE, J., NIKLAUS, P., LAND, THORKILD KARRING: Clinical periodontology and implant dentistry. 5th edition, Wiley-Blackwell, 2008, 1448.
5. NEWMAN, M., G., TAKEI, H., H., KLOKKEVOLD, P., R., CARRANZA, F., A.: Carranza's clinical periodontology (11th ed.), (2012), St. Louis, Mo.: Elsevier/Saunders, pp. 111 – 126.
6. ROSE, F., LOUIS, M., L., BRIAN, G., J., ROBERT, COHEN, D., WALTER: Periodontics: Medicine, surgery, and implants., Elsevier Mosby, 2004; 990.
7. SAROCH, N.: Periobasics: A text book of periodontics and implantology. 1st edition; 1062.
8. SHALU, BATHLA: Text book of periodontics. Jaypee, 2017; 818.
9. WILSON, T., G., KORNMAN, S., KENNETH: Fundamentals of periodontics. Quintessence publishing company, 1996; 564.

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