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Review Article

Trauma from Occlusion: Understanding

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Abstract

Occlusal force which goes beyond the adaptive capacity of our periodontium causes injury to periodontal structures and the resultant trauma is called trauma from occlusion (TFO). Several schools of thoughts are there, some do not consider TFO as an etiological factor while others consider it as a cofactor for the occurrence of periodontal diseases. This narrative review determines the effects of occlusal trauma and excessive occlusal forces on the periodontium, including the initiation and progression of periodontitis, its historical background, etiological factors, relevant terminologies, signs symptoms, and advanced diagnostic methods.

Keywords: *Trauma from Occlusion; Occlusal Trauma and Excessive Occlusal Forces*

Introduction

When occlusal force exceeds the adaptive capacity of periodontium, it causes injury to the periodontal tissues and the resultant trauma is called trauma from occlusion [1].

The tooth itself the supporting structures inside and around the tooth's immediate structures, the entire articulating system, which includes the neuromuscular system the temporomandibular joints as well as other system like hearing or vision impairment and numerous peripheral condition other can all be impacted by trauma resulting from occlusion and restorative concerns [2].

In patients with periodontitis, tooth movement is linked to a risk factor for greater attachment loss and increased bone loss. Occlusal therapy hay the ability to decrease tooth movement. clinical preliminaries including patients with periodontitis obviously lay out that a superior clinical periodontal connection level reaction to treatment is gotten when occlusal change is incorporated as a component of the treatment plan. Patients with cutting edge periodontal association benefit from occlusal treatment concerning expanded soundness for the teeth and furthermore regarding oral solace [3].

The job of occlusal Injury in the commencement and movement of periodontitis stays a questionable Subject in periodontology. Since occlusal injury must be affirmed histologically, ifs clinical determination relies upon clinical and radiographic substitute pointer which make clinical preliminaries troublesome [1].

Adaptive capacity of periodontium to occlusal

The periodontium attempts to accommodate the forces exerted on the crown. This adaptive capacity varies in different persons and in the same person at different times. The effect of occlusal forces on the periodontium is influenced by the magnitude, direction, duration and frequency of forces [4].

Magnitude: If the magnitude of occlusal force is increased the periodontium answers with an extending of the periodontal ligament space an expansion in the number and width of periodontal tendon filament and the expansion in the thickness of alveolar bone [5].

Direction: Redirecting occlusal power causes a reorientation of the burdens and strains inside the periodontium. The key filament of the periodontal fibers and organized so they best accommodate occlusal powers along the long pivot of tooth. Lateral (horizontal) and torque (rotational) likely to injure the periodontium forces are more likely to injure the periodontium [1].

Duration: Constant force on the bone is more damaging the discontinuous powers.

Frequency: The more frequent is the use of discontinuous force the more harmful is the force to periodontium [5].

Definition

Stillman (1917): Trauma from occlusion as a condition where injury results to the supporting structures of the teeth by the act of bringing the jaws into a closed position [6].

WHO (1978): Defined it as damage in the periodontium caused by stress on the teeth produced directly or indirectly by the teeth of the opposing jaw [7].

Glickman (1974): As the injury that results when the occlusal forces exceed the adaptive capacity of the tissues [8].

Lindhe, Nyman, Ericsson (1978): "Pathologic alteration or adaptive changes which develop in the periodontium as a result of undue forces produced by masticatory muscles" [9].

"Glossary of periodontics terms": Occlusion trauma and defined it as "An injury to the attachment apparatus as a result of excessive occlusion forces".

Concept

Glickman's concept

Glickman (1965, 67) claimed that the pathway of spread of plaque- associated gingival lesion can be changed if forces of an abnormal magnitude are acting on teeth harbouring sub gingival plaque.

Based on this concept, the periodontal structures can be divided into two zones:

1. Zone of irritation
2. Zone of co-destruction

Zone of irritation: The zone of irritation includes the marginal and interdental papilla. The gingival lesion at a non-traumatized tooth propagates in the apical direction by first involving the alveolar bone and later the periodontal ligament area. It results in even bone loss.

Zone of co-destruction: It includes the root cementum, periodontal ligament and the alveolar bone. Inflammatory process not affected by the occlusal forces.

When the inflammation extends from the gingiva into the supporting periodontal tissues, plaque associated inflammation enters the zone influenced by occlusion [7].

Waerhaug's concept (1979)

Loss of periodontium was the result of inflammatory lesions associated with sub gingival plaque.

- Angular defects occur when sub gingival plaque of one tooth has reached more apical level than microbiota on neighboring tooth and when volume of alveolar bone surrounding roots is comparatively large. He measured in the distance between the sub gingival plaque and 1. The periphery of the associated inflammatory cell infiltrate in the gingiva. 2. The surface of the adjacent alveolar bone.
- He concluded that angular defects and infra bony pockets occur equally frequently in teeth with trauma from occlusion and teeth without trauma from occlusion [10].

Classification of trauma from occlusion

Based on duration

Acute trauma from occlusion

It happens when the occlusal force changes suddenly, like when you bite something hard. Acute trauma can also be caused by restorations and prosthetics that disrupt or change the direction of occlusal forces exerted on the teeth.

Chronic trauma from occlusion

It may result from gradual changes like tooth wear drift or extrusion or from parafunctional habits like clenching or bruxism [11].

Based on tissue reaction

Primary trauma from occlusion

Injury resulting from excessive occlusal force applied to a teeth or tooth with normal support. E.g. High restoration, bruxism, drifting or extrusion into edentulous spaces and orthodontic movement. The amount of connective tissue attachment is not altered by original trauma and there is no pocket formation

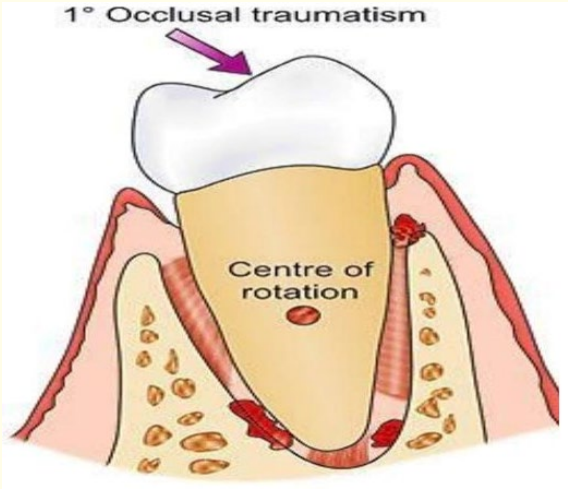

Figure 1

Secondary trauma from occlusion

Occurs when the adaptive capacity of the tissues to withstand occlusal forces is impaired by bone loss resulting from marginal inflammation. This reduces the periodontal attachment area and alters the leverage on the remaining tissues. The periodontium becomes more vulnerable to injury, and previously well-tolerated occlusal forces become traumatic.

Three different situations on which excessive force can be superimposed:

A. Normal periodontium with normal bone height

B. Normal periodontium with reduced bone height

C. Marginal periodontium with reduced bone height [1].

Figure 2

Stages of tissue response

Tissue response occur in three stages.

Stage 1: Injury

- Caused by excessive occlusal forces, under the forces of occlusion or tooth rotates around a fulcrum which creates pressure and tension on opposite sides of fulcrum. Slightly excessive pressure stimulates resorption of alveolar bone, with compression of PDL, fibers.
- Slightly excessive tension causes elongation of PDL fibers and apposition of alveolar bone. In areas of increased pressure, the blood vessels are numerous and reduced in size and in increased tension they are enlarged [3].

Stage 2: Repair

In healthy periodontium, repair is always taking place, and occlusion-related trauma encourages more reparative activity. In an effort to repair the periodontium, the damaged tissues are taken out and new connective tissue cells and fibers, bone, and cementum are made. Forces remain traumatizing as long as the amount of damage they cause exceeds the tissues' capacity for repair [12].

When bone is replaced by excessive occlusal forces the body attempt to reinforce the thinned bony trabeculae with new bone. This attempt to compensate for bone loss is called buttressing bone formation. The buttressing bone formation takes place both centrally and peripherally. It does not alter the bone's gross morphology when it occurs centrally, within the jaw, along the endosteal surfaces of the trabeculae. "Lipping" refers to a prominent ridge at the cervical bone margin or a bulbous contour in the buccal or lingual plate when buttressing bone formation occurs peripherally, on the external surface [5].

Stage 3: Adaptive remodeling of periodontium

If the repair process cannot keep pace with the destruction caused by excessive occlusal forces, adaptive remodelling of the periodontium occurs. In this process of remodelling, a structural relationship is established in such a way that the occlusal forces are no longer harmful to the periodontium [13]. This results in a widened periodontal ligament, which is funnel shaped at the crest and angular defects in the bone, with no pocket formation.

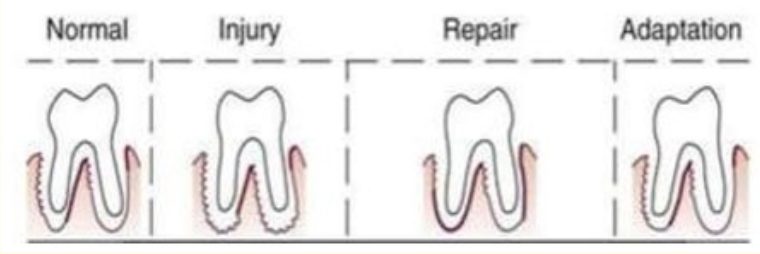

Figure 3

Clinical features [9]

- Progressive tooth mobility
- Fremitus
- Pain on chewing or percussion
- Tooth migration
- Chipped or fractured tooth
- Thermal sensitivity
- Occlusal wear facets
- Attrition.

Radiographic signs

- Increased width of periodontal ligament space
- Vertical rather than horizontal destruction of interdental septum
- Radiolucency and destruction of alveolar bone
- Root resorption [14].

Diagnosis

Assessment of tooth mobility constitute a basic part of the comprehensive periodontal examination. The mobility status of dentition has traditionally been evaluated by

- Visual assessment
- Periotest
- Fremitus test.

Fremitus test is the measurement of vibratory pattern of the teeth when teeth are placed in contacting position and movements. It is done using a wet ungloved finger and placing it on the cervical part of the tooth if vibrations are felt the test is considered to be positive:

- Grade 1: Mild vibration or movements detected
- Grade 2: Easily palpable vibration but no visible movement
- Grade 3: Movement visible with naked eyes [15].

Treatment plan

The ultimate goal of dental treatment should be to provide optimum oral health.

Finding all factors that contribute in any way to deterioration of oral health Determining the best method of eliminating each factors of deterioration.

The goal of periodontal therapy in treatment of occlusal traumatism should be to maintain the periodontium in comfort and function [16]:

- Occlusal adjustment
- Orthodontic tooth movement
- Occlusal reconstruction
- Management of parafunctional habits
- Extraction of selected teeth
- Stabilization of mobile teeth with fixed or removable appliances.

Conclusion

Based on the survey the following conclusion can be drawn that occlusal trauma does not initiate periodontitis and gingivitis and there is a weak evidence that it alters the progression of disease. Teeth and their surroundings supporting structures can well withstand the normal occlusal forces. Reduction of tooth mobility may enhance the effect of periodontal therapy.

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