



# TRAUMA FROM OCCLUSION- A remediable trauma

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## ABSTRACT:

It was believed for many years that trauma from occlusion was a primary cause for periodontal disease and that; if it was present, periodontal disease would surely occur. Trauma from occlusion result in non-inflammatory change in the tissue of the periodontal attachment apparatus. Forces of pressure and tension elicit different cellular response within the periodontium pressure result in the resorption of bone and occasionally cementum, necrosis of periodontal fibers, hemorrhage and thrombosis of vessels.[1,2] This review addresses trauma from occlusion.

Keywords: Trauma, repair, injury, bone formation.

## INTRODUCTION

Occlusal trauma has been defined as injury to periodontium resulting from occlusal forces that exceeds the reparative capacity of the attachment apparatus. Trauma from occlusion refers to tissue injury due to distorted occlusion. An occlusion that produces such injury is called a traumatic occlusion. Acute trauma from occlusion can result from an abrupt occlusal impact on bitten objects, restorations or prosthetic appliances that interfere with or alter the occlusal forces on teeth. [1]

## ADAPTIVE CAPACITY OF THE PERIODONTIUM TO OCCLUSAL FORCES

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 periodontium is influenced by the magnitude, direction, duration and frequency of the forces.

**Magnitude** – If the magnitude of the occlusal forces is increased, the periodontium responds with a widening of the periodontal ligament space, an increase in the number and width of periodontal ligament fibers and the increase in the density of alveolar bone.

**Direction** – Changing the direction of the occlusal forces causes a reorientation of the stresses and strains within the periodontium. Lateral and torque forces are more likely to injure the periodontium.

**Duration** – Constant pressure on the bone is more injurious than intermittent forces.

Frequency – The more frequent the application of an intermittent force , the more injurious the force is to the periodontium.

## 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.(11)

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. (13)

GLICKMAN (1974)

As the injury that results when the occlusal forces exceed the adaptive capacity of the tissues. (14)

LINDHE, NYMAN, ERICSSON (1978)

Pathologic alteration or adaptive changes which develop in the periodontium as a result of undue forces produced by masticatory muscles. (15)

## GLOSSARY OF PERIODONTAL TERMS

An injury to the attachment apparatus as a result of excessive occlusion forces.

## 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 harboring subgingival plaque.

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

- Zone of irritation
- Zone of co -destruction

Zone of irritation: the zone of irritation includes the marginal and interdental papilla. The gingival lesion at a non-traumatised 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.

#### WAERHAUG’S CONCEPT (1979)

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

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

#### Classification of trauma from occlusion

Based on duration:

Acute trauma:

Results from an abrupt occlusal impact on bitten objects, restorations or prosthetic appliances that interfere with or alter the occlusal forces on teeth. It exhibits symptoms like tooth pain, sensitivity to percussion and increased tooth mobility. If left untreated may cause necrosis in tooth supporting structures, abscess formation and cementum tears due to high occlusal forces.

Chronic trauma:

Results due to tooth wear, increased duration of parafunctional habits like bruxism and clenching, restorations and tooth movements. It has greater significance and more commonly clinically observed. Clinically seen as tooth wear, tooth migration and extrusion. With time pathological changes are seen. [3]

Based on tissue reaction:

Primary trauma from occlusion:

Injury resulting from excessive occlusal forces applied to a tooth or teeth with normal support eg. High restorations, 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.

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.

- A. Normal periodontium with normal bone height
- B. Normal periodontium with reduced bone height
- C. Marginal periodontium with reduced bone height

Stages of tissue response to increased occlusal forces.

Tissue response occurs in three stages: injury, repair and adaptive remodeling of the periodontium.

Stage 1: Injury:

The immediate result of excessive occlusal forces is the soft tissue injury. The occlusal forces may vary in their magnitude, being slightly excessive, greater than slightly excessive or severely high. The center of rotation of single rooted teeth is located at the junction of middle third and apical third of the tooth, whereas the center of rotation of multi-rooted teeth lies near the furcation area. (16)

Stage 2: Repair:

Repair is a well-regulated mechanism in which the damaged tissues are replaced by new connective tissue and cells. The extracellular matrix and certain inflammatory mediators play critical regulatory functions, directly or indirectly, facilitating the healing process (17). Although the reparative activity is always going on in normal periodontium, it is increased during TFO.

To withstand the heavy occlusal forces, the body tries to reinforce the trabeculae within the new bone. This process is known as “buttressing bone formation”. In peripheral buttressing, shelflike thickening of the bone can be seen on the lingual or the buccal surface of the alveolar bone which is sometimes referred to as “lipping”. (18)

Buttressing bone formation occurs within the jaw (central buttressing) and on the bone surface (peripheral buttressing). During central buttressing, the endosteal cells deposit new bone which restores the bony trabeculae and reduces the size of marrow spaces. Peripheral buttressing occurs on the facial and lingual surface of the alveolar plate.

Stage 3: Adaptive remodeling of the periodontium.

If the repair process cannot keep pace with the destruction caused by excessive occlusal forces, adaptive remodeling of the periodontium occurs. In this process of remodeling, a structural relationship is established in such a way that the occlusal forces are no longer harmful to the periodontium. (19) This results in a widened periodontal ligament, which is funnel shaped at the crest and angular defects in the bone, with no pocket formation.

## Clinical and Radiographic features

### Clinical signs:

1. McCalls festoons
2. Stillman's cleft
3. Recession of gingiva, which may be asymmetrical, associated with resorption of the alveolar crest.
4. Traumatic crescent.

### Clinical features:

1. Sensitivity
2. Tooth mobility
3. Attrition
4. Occlusal wear facets
5. Pathologic migration.
6. Fractures of the enamel or restorations

### Radiographic signs:

- Widening of periodontal ligament, thickening of laminadura along lateral aspect of the root.
- Vertical destruction of interdental septum.
- Root resorption.
- Radiolucency and condensation of alveolar bone.[6]

## Diagnosis and Treatment plan

Trauma from occlusion can be diagnosed by fremitus test

### Fremitus test:

Fremitus test is done using a wet ungloved finger and placing it on the cervical part of the tooth. If vibrations are felt the fremitus test is considered to be positive:

Grade 1- Mild vibration

Grade 2- Moderate vibration

Grade 3- visible movement of the tooth

Treatment will be decided based on the type of trauma.

### Primary trauma:

It is treated by occlusal reconstruction.

- Occlusal adjustment
- Management of parafunctional habits like bruxism, clenching
- Orthodontic tooth movement

Secondary trauma:

It is corrected by the treatment of periodontium.

Coronoplasty:

It is defined as the selective reduction of occlusal areas with the primary purpose of influencing the mechanical contact conditions and the neural pattern of sensory output". It is the direct and irreversible change of occlusal scheme (Krogh-Poulsen, 1968). The principle behind performing coronoplasty is to remove the detrimental occlusal forces that cause tissue damage and tooth mobility and it should be done by mechanically eliminating all occlusal supra contacts which are in function and parafunction

## CONCLUSION

Trauma from occlusion does not initiate gingivitis or periodontal pocket formation. It may constitute as an additional risk factor for severity or progression of periodontal disease. Teeth and their surrounding supporting structures can well withstand the normal occlusal forces. However abnormal occlusal forces adversely affect periodontal health and hence the long term prognosis of the tooth.

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