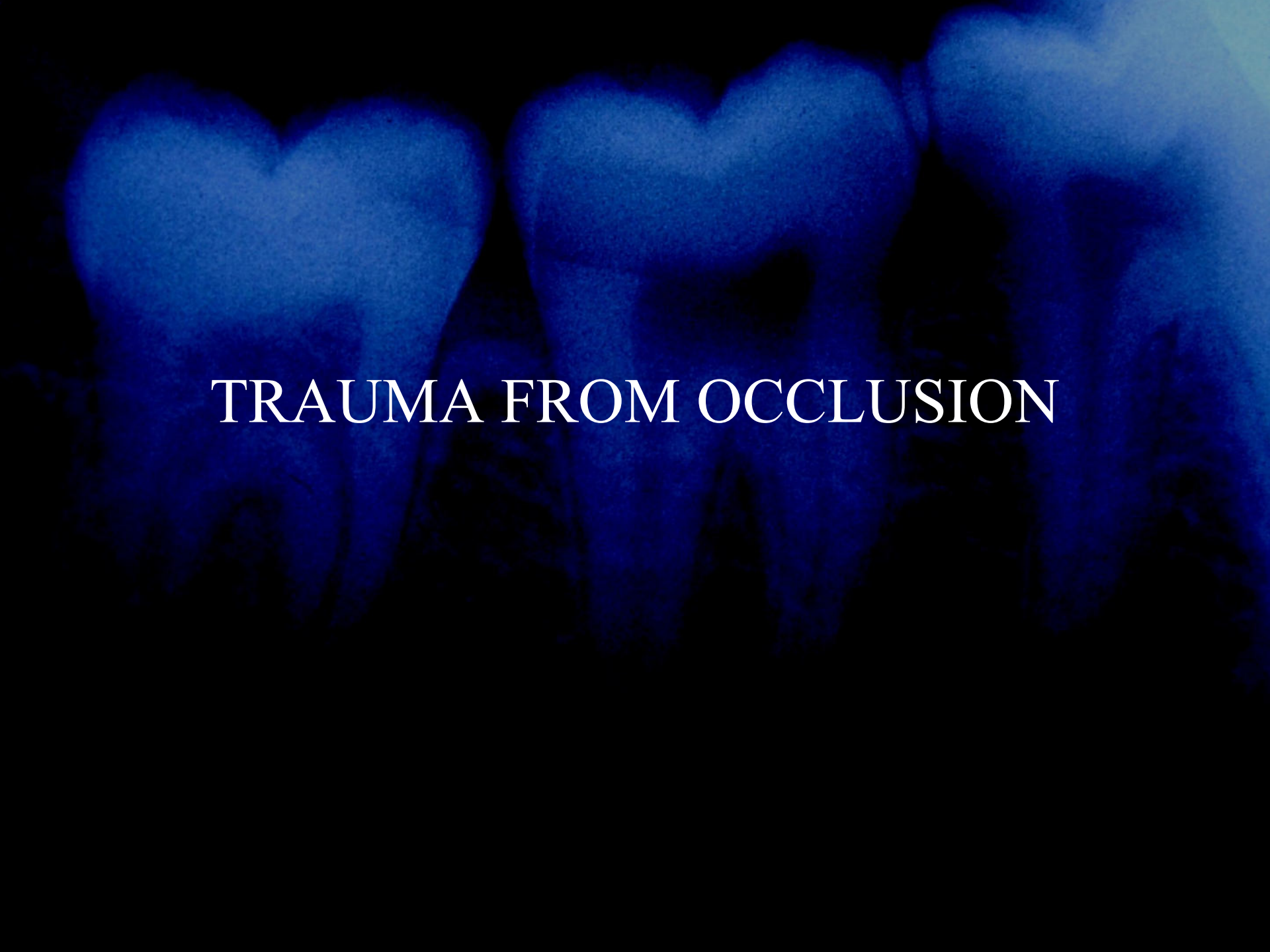

TRAUMA FROM OCCLUSION

INDEX

- Trauma from occlusion
- Stages of tissue response
- Effects of insufficient occlusal forces
- Influence of TFO on progression of PDL disease
- Pathologic tooth migration

Adaptive Capacity of Periodontium on Occlusal Forces

- Magnitude
- Direction
- Duration
- Frequency.

- When a thing ceases to be a matter of controversy, it ceases to be a matter of interest.

William Hazlitt 1778 - 1830

HISTORICAL PERSPECTIVE

- the hundred year old contoversy

- In 1917 and 1926, Stillman stated that excessive occlusal forces were the *primary* cause of periodontal disease and that occlusal therapy was *mandatory* for control of periodontal disease.

- Orban and Weinman 1933:

  They concluded that there was no indication that occlusal forces played a part in periodontal destruction.

- At the end of the 1930s it was still felt that excessive occlusal forces were a major cause of periodontal disease.

- In fact McCall in 1939 went as far as to state that occlusal discrepancies should be *prophylactically* treated to prevent disease.

DEFINITIONS

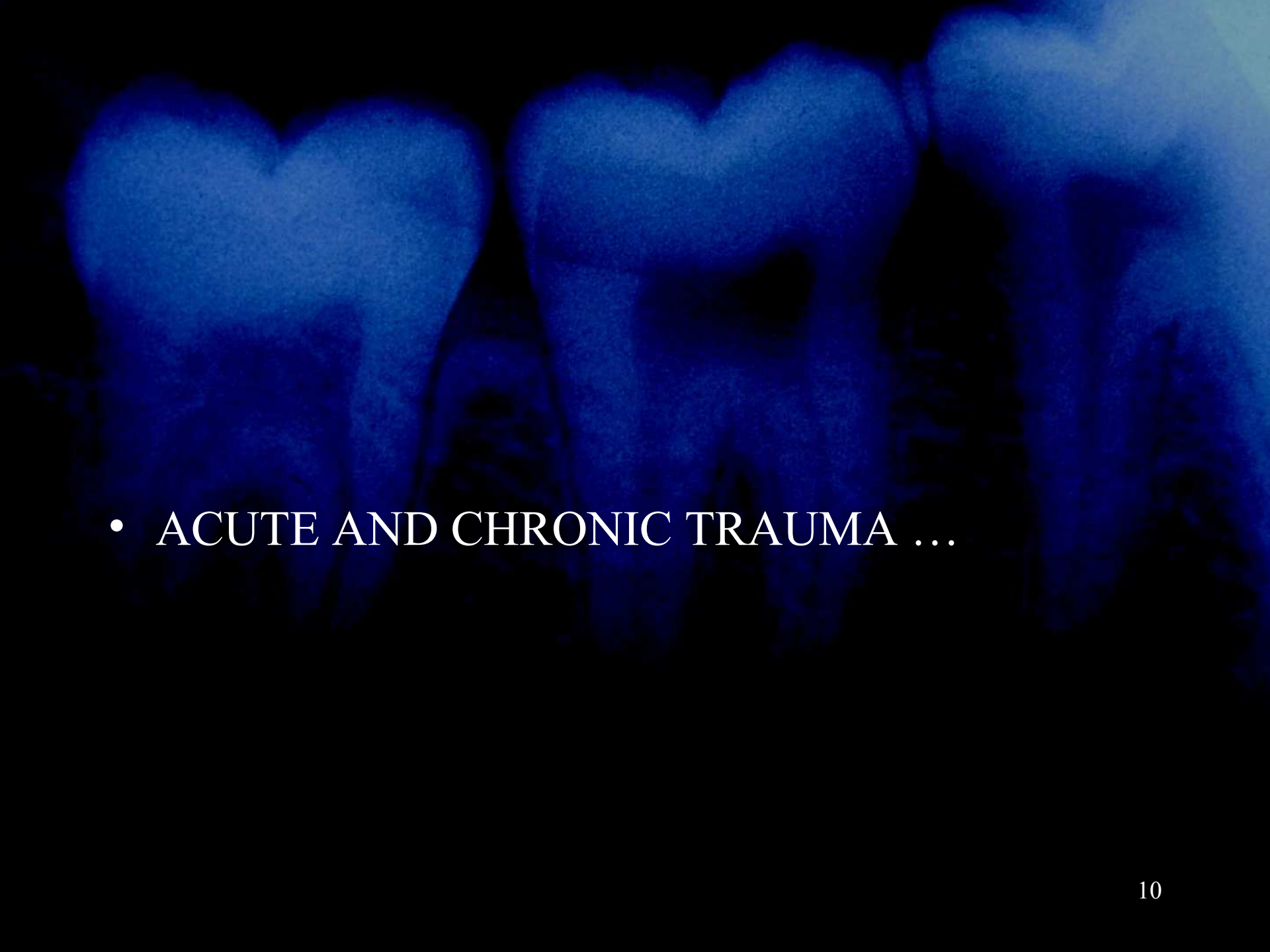
- WHO 1978: Damage in the periodontium caused by stress on the teeth produced directly or indirectly by the teeth of the opposing jaw.

- GLOSSARY OF PERIODONTIC TERMS (AAP 1986): Occlusal Trauma was defined as 'an injury to the attachment apparatus as a result of excessive occlusal force.'

TRAUMATIC OCCLUSION

- An occlusion that produces such an injury is termed as a traumatic occlusion.

- STILLMAN (1917): Abnormal stress capable of producing injury to the dental or periodontal tissues.



- ACUTE AND CHRONIC TRAUMA …

ACUTE TRAUMA FROM OCCLUSION

The trauma from occlusion that results from sudden or an abrupt change in occlusal force is acute trauma from occlusion.

Eg. Biting on a hard object, restoration or prosthetic appliances that alter the direction of occlusal forces

- Acute trauma results in :

Pain
sensitivity to percussion
mobility.

CHRONIC TRAUMA FROM OCCLUSION

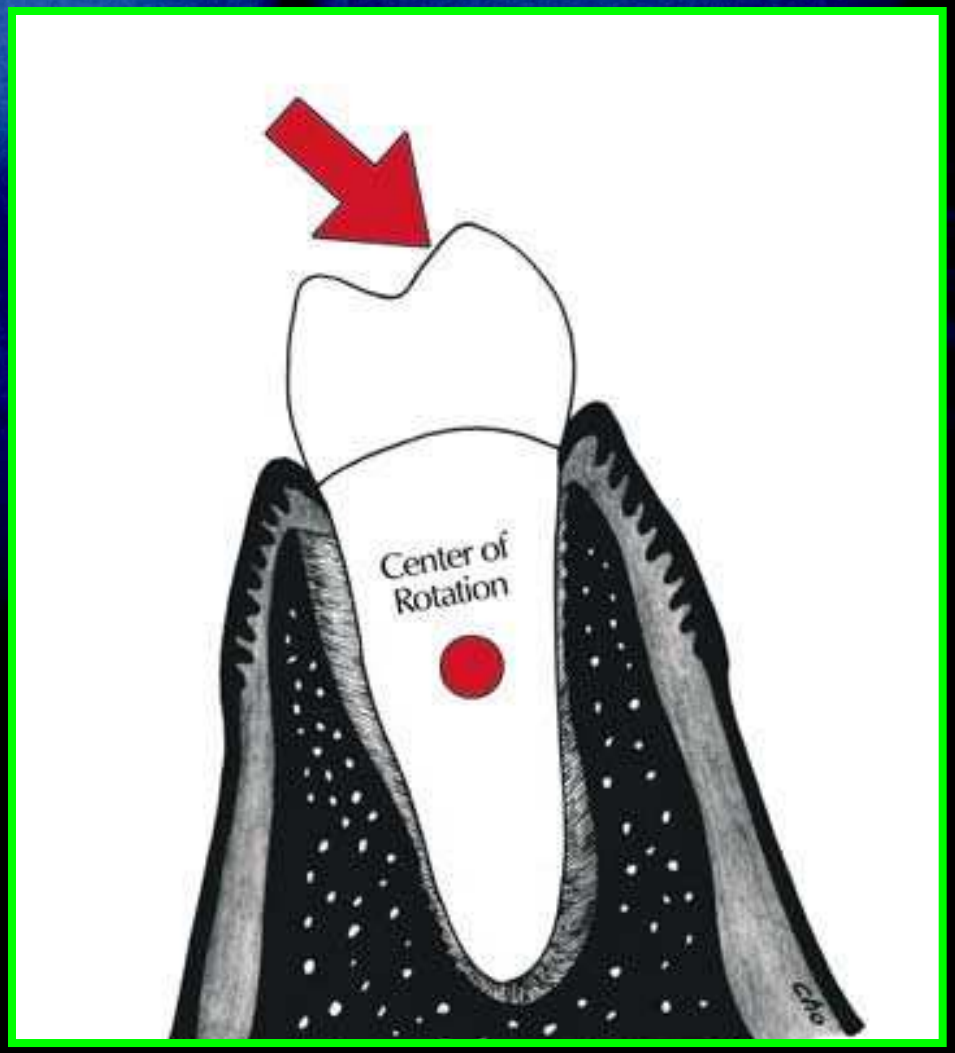
1. More common
2. Greater clinical significance
3. Develops from gradual changes in the occlusion produced by tooth wear, drifting movement, and extrusion combined with Para functional habits such as bruxism and clenching.

PRIMARY TRAUMA FROM OCCLUSION

- 1. When trauma from occlusion is the result of alterations in occlusal forces, it is called *primary trauma from occlusion.*

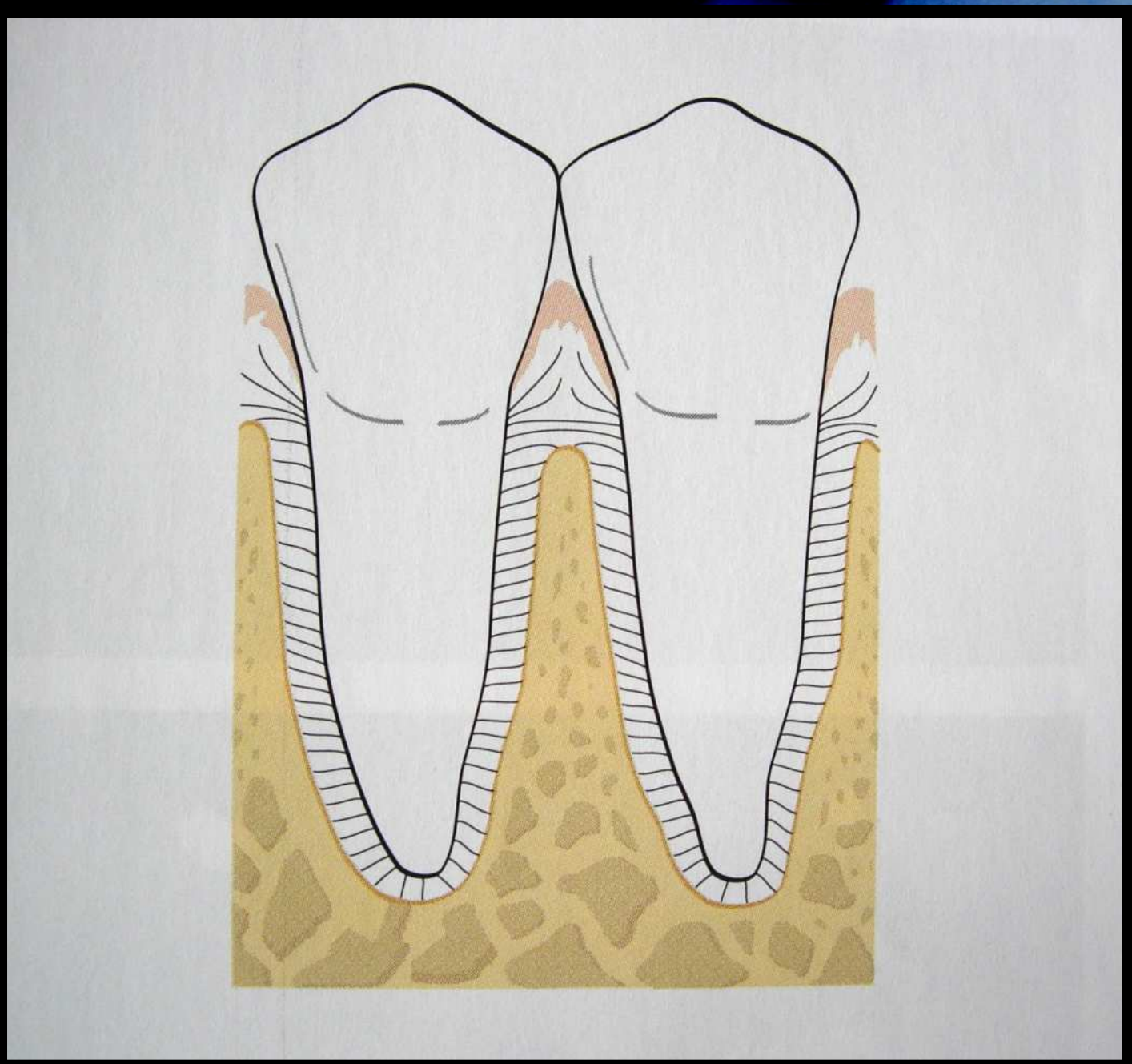
- 2. It occurs when the trauma from occlusion is considered the primary etiologic factor in periodontal destruction and if the only local alteration to which the tooth is subjected is from occlusion.

PRIMARY OCCLUSAL TRAUMA



- Eg. Injury in a *healthy periodontium* following

- The insertion of a high filling
- The insertion of a faulty prosthetic replacement
- Drifting of teeth
- Orthodontic movement of the teeth into unacceptable positions.



- Changes produced by the primary trauma *do not alter* the level of connective tissue attachment and do not initiate pocket formation.

- This is probably because the *supracrestal gingival fibers are not affected* and therefore prevent apical migration of the junctional epithelium.

SECONDARY TRAUMA FROM OCCLUSION

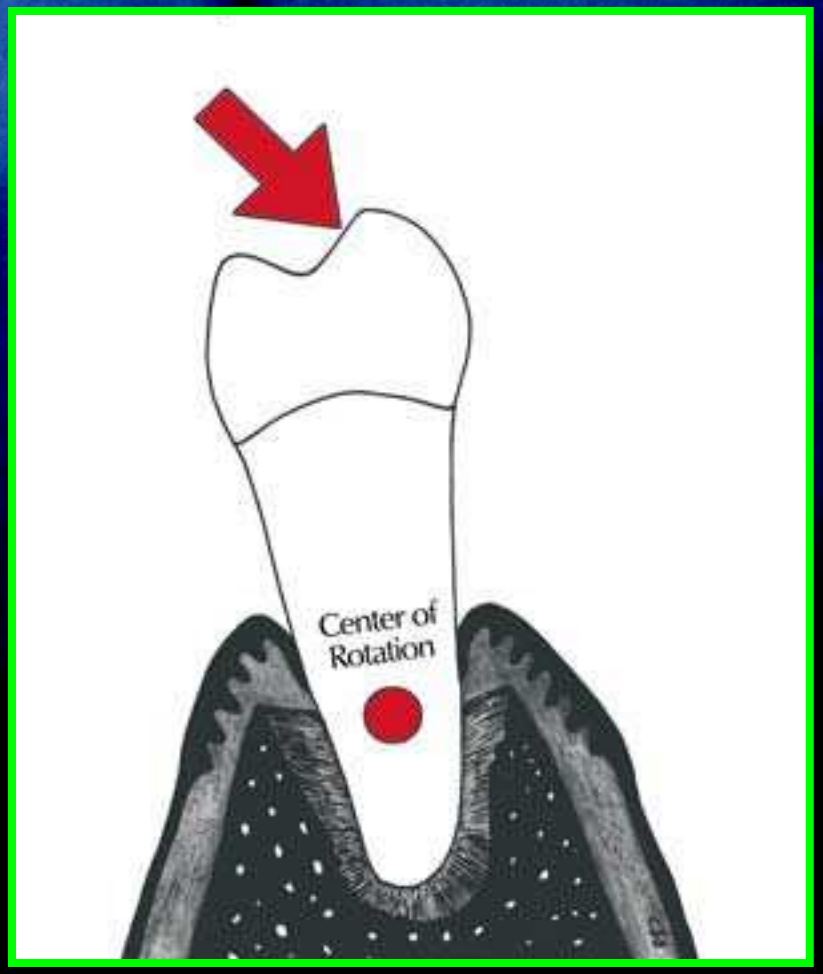
1. When the trauma from occlusion results from the reduced ability of the tissues to withstand the occlusal forces, it is known as secondary trauma from occlusion.

2. The adaptive capacity of the tissues is reduced by bone loss resulting from marginal inflammation.

3. This reduces the periodontal attachment area and alters the leverage of the remaining tissues.

4. The periodontium becomes more vulnerable to injury and previously well-tolerated forces become traumatic.

SECONDARY OCCLUSAL TRAUMA



LACK OF PERIODONTAL SUPPORT

- Periodontal disease
- Periodontal therapy or oral surgery
- Accidental trauma
- Excessive apical resorption associated with orthodontic or endodontic therapy.

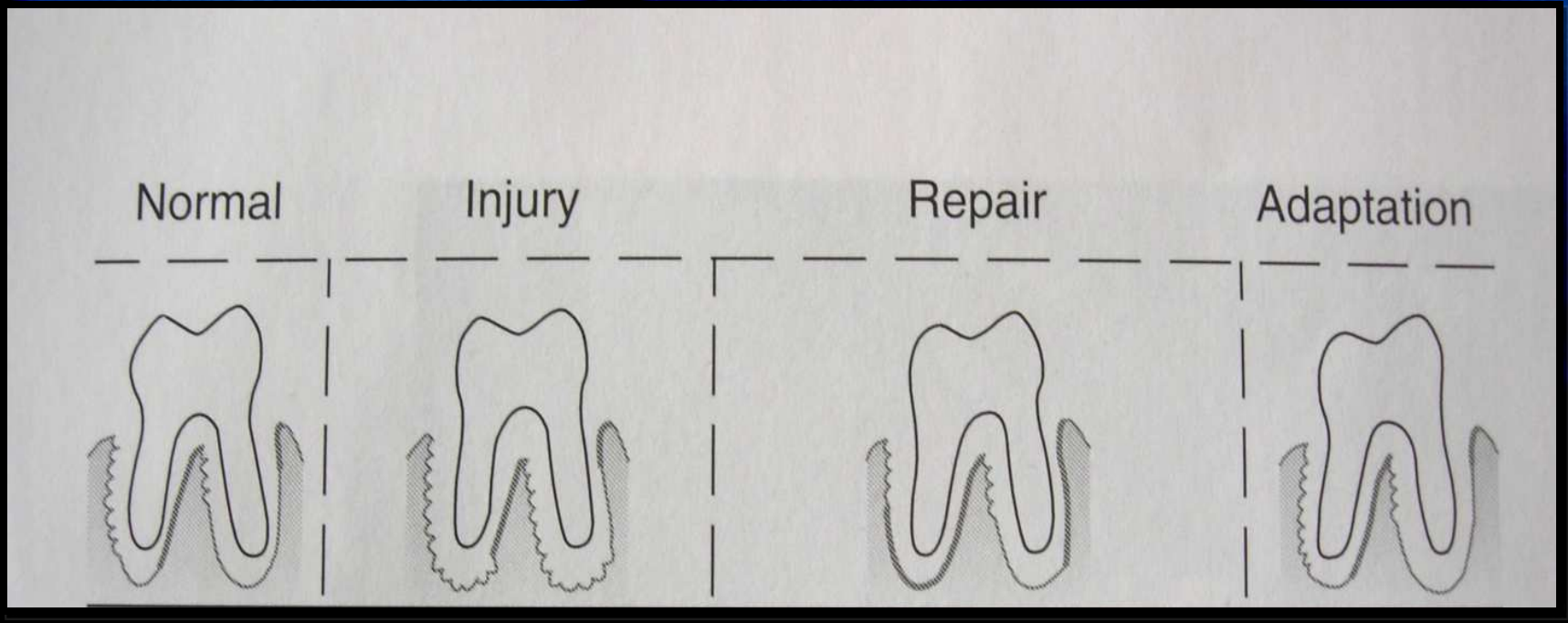
- LOSS OF TEETH : resulting in overloading of the other teeth. Eg posterior bite collapse.

- IATROGENICALLY CREATED FUNCTIONAL MALOCCLUSION.

STAGES OF TISSUE RESPONSE

Three stages :

1. Injury
2. Repair
3. Adaptive remodelling of the Periodontium


Normal
Injury
Repair
Adaptation

STAGE I : INJURY

- Produced by excessive occlusal forces

- Slightly excessive pressure :

  Resorption of bone and widening of periodontal ligament space.

- Slightly excessive tension :

  Elongation of periodontal ligament fibers and apposition of bone.

- Greater pressure :

  Increased resorption of bone and resorption of tooth surface.

- Severe Tension :

  Widening of PDL, thrombosis, hemorrhage, tearing of PDL and resorption of alveolar bone.

STAGE II : REPAIR

- TFO stimulates increased reparative capacity.
- Reinforce the thinned bony trabeculae with new bone - *Buttressing bone formation.*
- Peripheral and Central

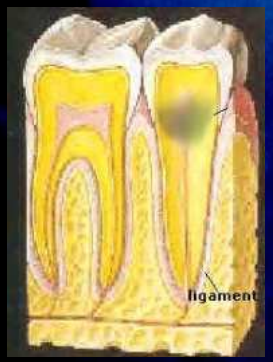
STAGE III : ADAPTIVE REMODELLING

- Effort to create a structural relationship in which the forces are no longer injurious.
  - thickened periodontal ligament –
  - funnel shaped at the crest,
  - angular bone defects and
  - no pocket formation.
  - Loose teeth and
  - increased vascularisation.

TISSUE CHANGES THAT OCCUR IN OCCLUSAL TRAUMA

PERIODONTAL LIGAMENT

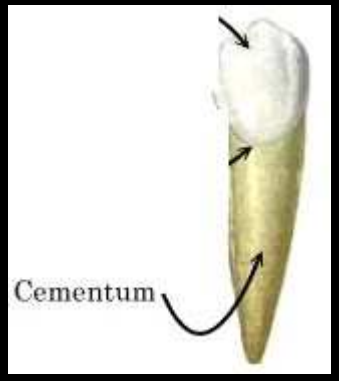
Acute phase



Compression on the pressure side of the PDL
Crushing, hemorrhage, thrombosis, and necrosis.

Stretching takes place on the tension side,
thrombosis of the blood vessels & tearing of the PDL.

Chronic phase



PDL becomes wider ;
reflected in clinical mobility.
hyalinization & formation of fibrocartilage or Ankylosis

CEMENTUM

Acute phase

cemental tears and fractures .

Chronic phase

cemental hyperplasia & cementum spurs.

cemental resorption or dentinal resorption

PULP :

The pulp chamber and canal

narrower

pulp stones

pulpitis and loss of Pulpal vitality

EFFECTS OF INSUFFICIENT FORCE

- Thinning of PDL
- Atrophy of the fibers
- Osteoporosis of the alveolar bone
- Reduction in bone height

CLINICAL SIGNS OF TRAUMA FROM OCCLUSION

- 1. Tooth mobility:

In the injury stage – mobility is due to the destruction of the periodontal fibers.

In the final stage –mobility is due to the widening of the periodontal ligament

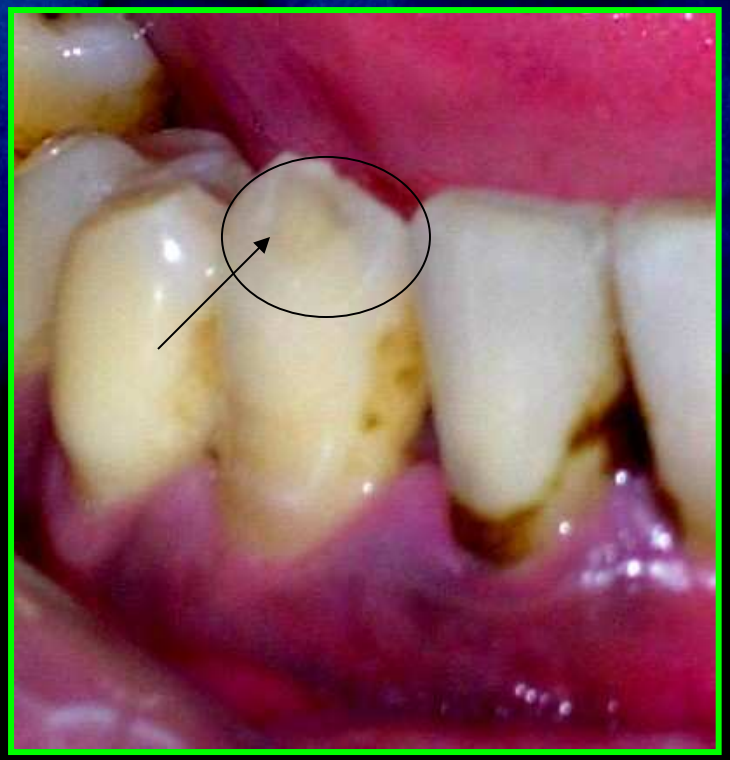
WAY TO ASSESS MOBILITY

2. Tooth migration.

3. Tooth pain or discomfort on chewing or percussion.

4. Tenderness of the muscles of mastication or other signs or symptoms of temporomandibular dysfunction.

Presence of wear facets beyond expected levels for the patient's age and diet consistency.



6. Chipped enamel or crown/root fractures.

7. Fremitus.

RADIOGRAPHIC SIGNS OF TRAUMA FROM OCCLUSION ALONE

1. Increased width of the periodontal ligament space often with the thickening of the lamina dura along the lateral aspect of the root, in the apical region and in the bifurcation area.

2. A ‘vertical’ rather than a ‘horizontal’ destruction of the interdental septum.

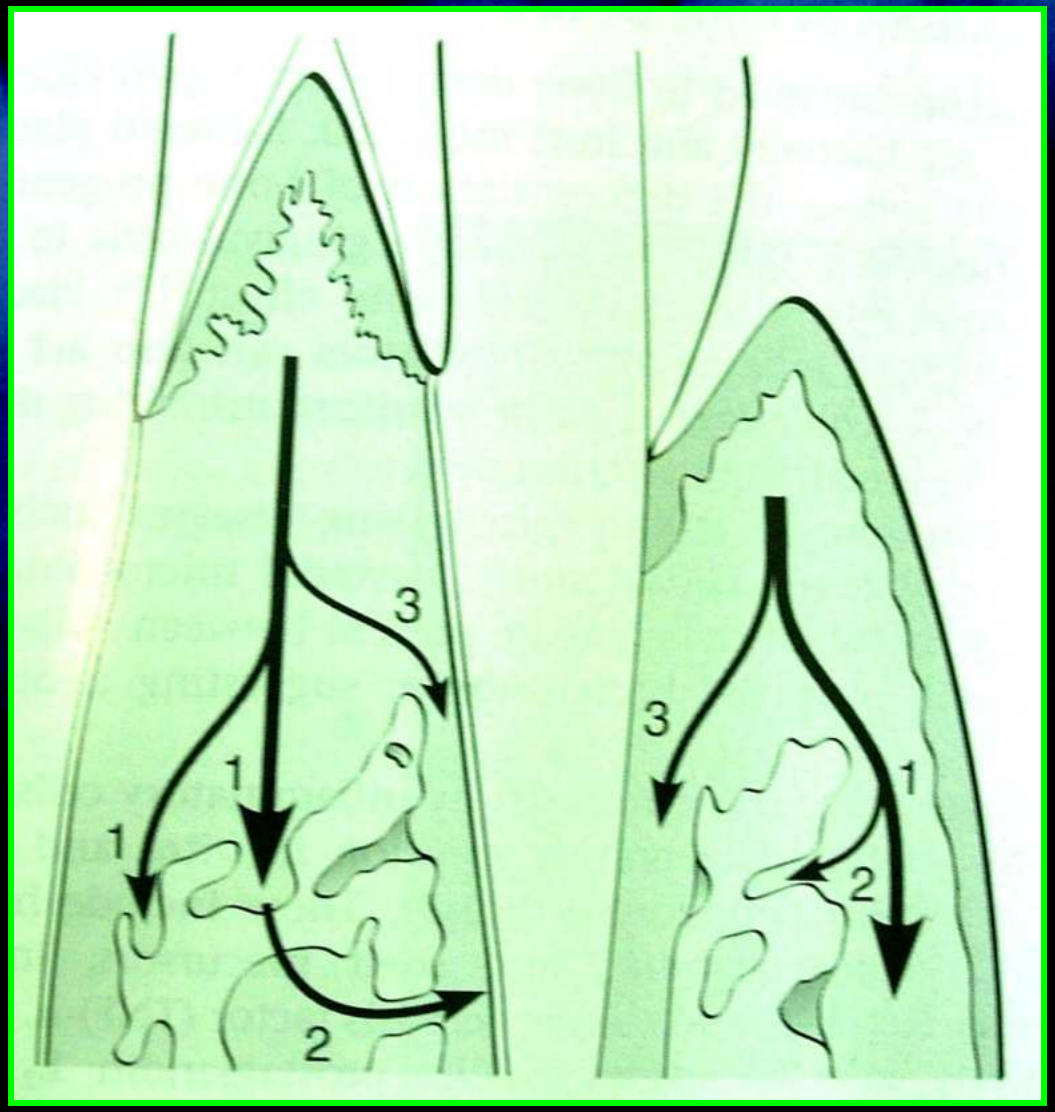
3. Radioluscence and condensation of the alveolar bone.

4. Root resorption.

- INFLUENCE OF TFO ON PROGRESSION OF MARGINAL PERIODONTITIS …

GLICKMAN'S CONCEPT

- Glickman (1965,1967) claimed that the pathway of the spread of a plaque associated gingival lesion could be changed if forces of abnormal magnitude are acting on teeth harboring sub gingival plaque.

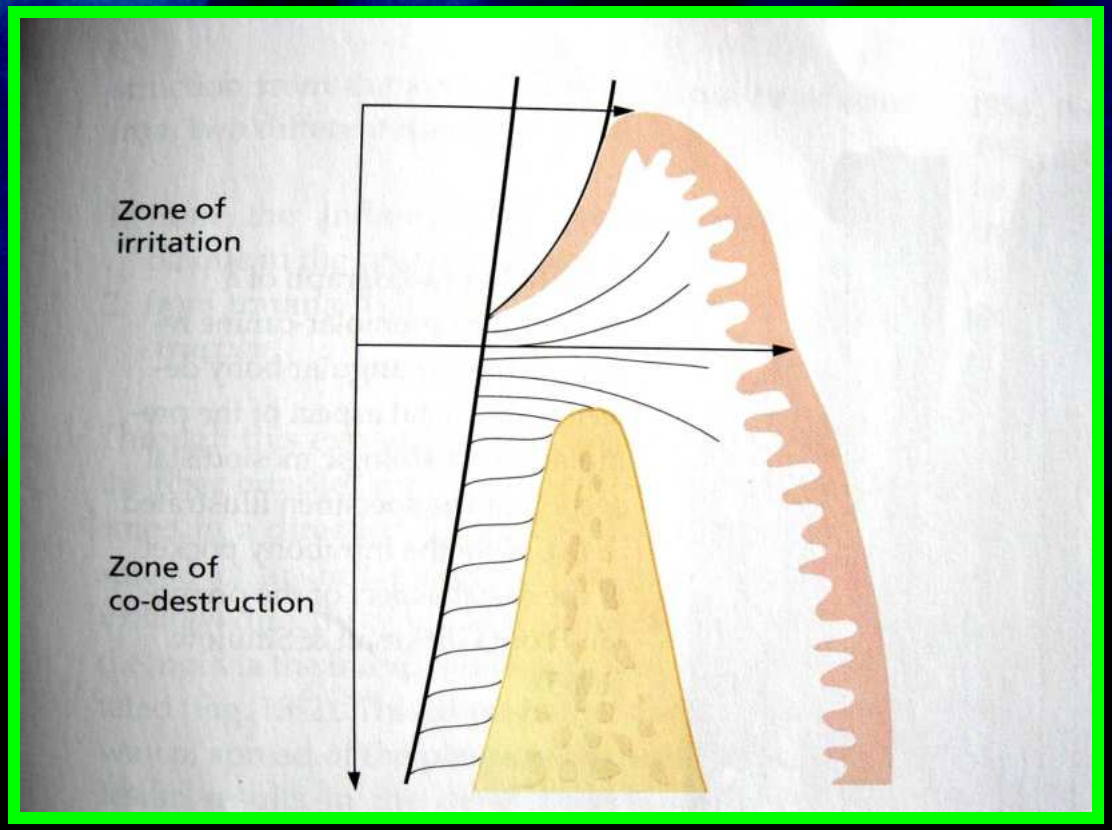

3
1
1
2
3
1
2

The periodontal tissues can be divided into two zones:

1. The zone of irritation
2. The zone of co-destruction

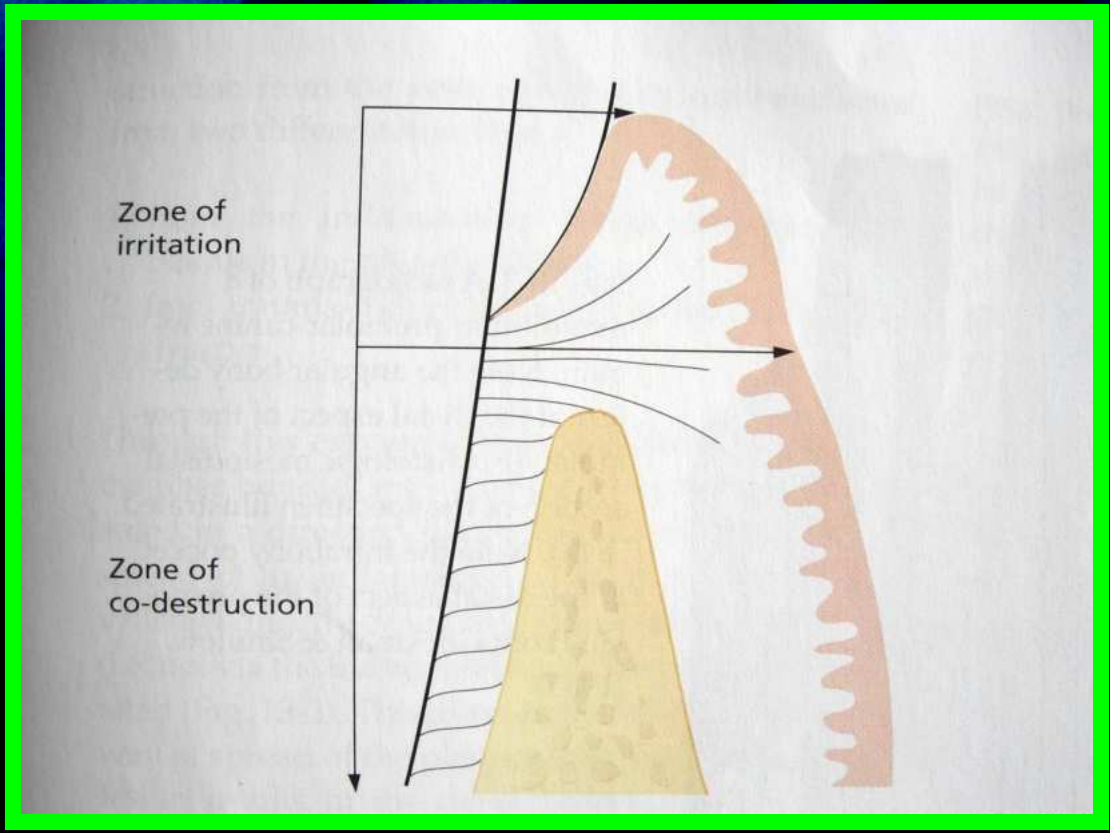
ZONE OF IRRITATION

- This includes the marginal and interdental gingival



ZONE OF CO-DESTRUCTION

This includes the periodontal ligament, the root cementum and the alveolar bone.



The fiber bundles which separate the zone of co-destruction from the zone of irritation can be affected from two different directions:

1. From the inflammatory lesion maintained by plaque in the zone of irritation.
2. From trauma induced changes in the zone of co-destruction.

- Alteration in the orientation of PDL fibres – direct pathway for inflammation.
- Increased pressure - osteoclastic resorption.
- Degeneration of PDL fibres – eliminated the natural barrier.
- Funnel shaped widening – channeled inflammation directly.
- Pressure causing localised necrosis – barrier to inlammation (then follows original course)
- Repair evidence – 3 to 4 months.

- This concept is used today to justify rightly or wrongly, occlusal adjustment by selective grinding and the splinting of mobile teeth.

WAERHAUG'S CONCEPT

- He refuted the hypothesis that TFO played a role in the spread of a lesion into the zone of co-destruction.

OTHER THEORIES

- Sottosanti 1977 – Trauma induced areas of root resorption uncovered by the apical migration of the inflamed gingival attachment – favorable environment for attachment of plaque.

ERICSSON 1986

- Supragingival plaque may become subgingival if the tooth is tilted orthodontically or migrates into an edentulous area, resulting in the transformation of a suprabony pocket into an infra bony one.

VOLLMAR ET AL 1975

- Increased mobility of traumatically loosened teeth may have a pumping effect on plaque metabolites, increasing their diffusion.

JIGGLING TYPE TRAUMA

- To jiggle is defined by Cassell's new English dictionary as “to jerk or rock lightly to and fro”

TRAUMA FROM OCCLUSION AND IMPLANTS (Boever J De, Boever A.De)

- Implant failure can occur not only because of bacterial infection but also because of occlusal overload (biomechanical failure) in combination with immunological host factors. (Esposito et al 1998).

- Occlusal overload results in ‘oseodisintegration’ over the complete implant surface without clinically detectable pocket formation or signs of inflammation.

PATHOLOGIC MIGRATION

PATHOLOGIC MIGRATION

- Refers to tooth displacement that results when the balance among the factors that maintain physiologic tooth position is disturbed by periodontal disease.

- More frequently in anterior.
- Extrusion.

PATHOGENESIS

- Two major factors:
  - Health of periodontium
  - Forces exerted on teeth.

- Pathologic migration occurs under conditions :
  - that weaken periodontal support,
  - Increase or modify forces on teeth,
  - Both.

- As tooth position changes, it is subjected to abnormal occlusal forces, which aggravate the periodontal destruction and tooth migration.

- It is also an early sign of LAP.

Unreplaced Missing Teeth

- Drifting :
  - Does not result from PDL destruction.
  - However it creates conditions leading to destruction.
  - Generally occurs in medial direction or in combination with tilting and extrusion.

Failure to Replace First Molar

- Second and third molars tilt mesial, decreases VD.
- Premolars move distally, lose intercuspation with opposing tooth.
- Mandibular incisors tilt or drift lingually.
- Anterior overbite is increased.
- Mandibular incisors traumatize palatal gingiva.
- Maxillary incisors are pushed labially and laterally.
- Anterior teeth extrude as no apposition.
- Diastema created by separation of anterior teeth.

Other Causes

- Tongue pressure
- Granulation tissue of PDL pockets.

CONCLUSIONS

- Under a given set of conditions and with time – predictable occlusal and possibly periodontal changes could occur.

THANK YOU