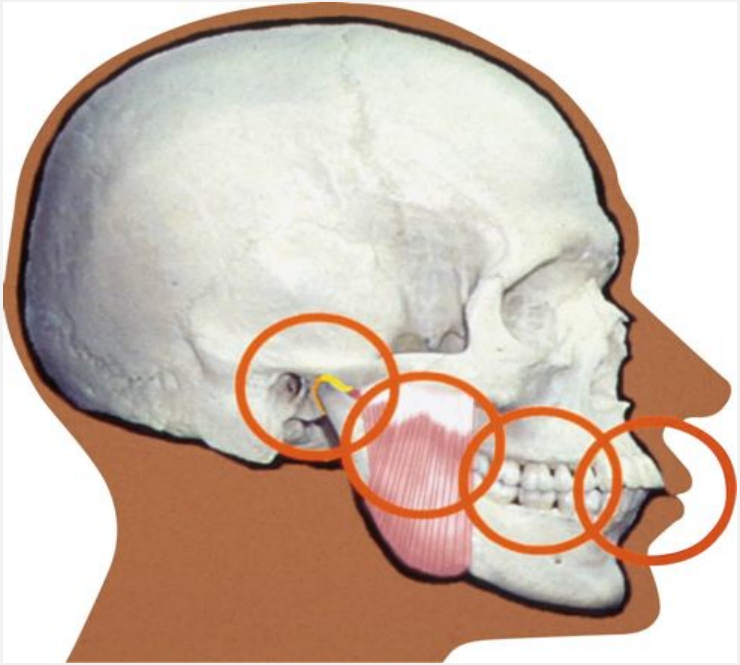
OCCLUSION AND PERIODONTITIS

Joseph V. Califano, DDS, PhD

OBJECTIVES

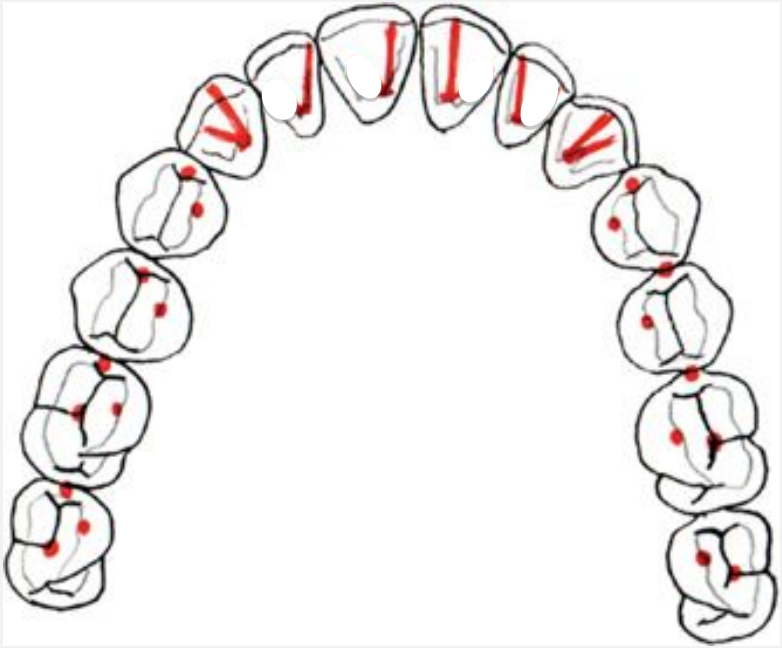
- At the end of this presentation the student will be able to:
  - Describe the available evidence in the literature for traumatic occlusal forces in the etiology of periodontitis
  - Describe ideal occlusal relationships to minimize traumatic occlusal forces
  - Describe occlusal contacts that may result in traumatic occlusal forces
  - Describe clinical and histologic changes that may occur with trauma from occlusion
  - Describe occlusal therapy for bruxism and trauma from occlusion

GENERAL CONCEPTS



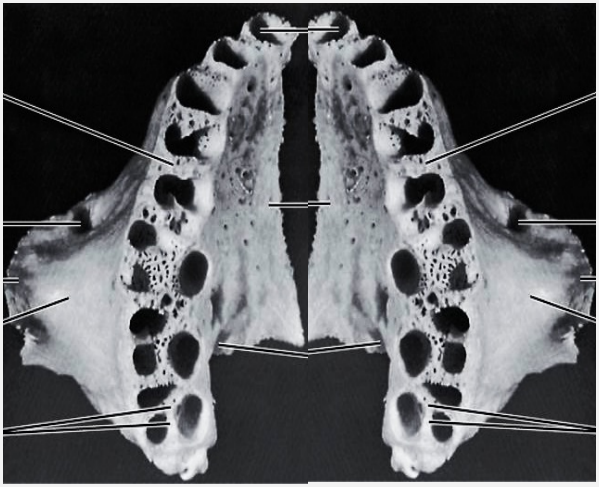
- Analysis of occlusion requires attention to form and function
- Form: morphology of teeth, bone, and TMJ
- Function: action/reaction of muscles of mastication and the neuromuscular system
- Harmony of form and function
- Understanding normal/abnormal form and function is basis for understanding occlusal function/dysfunction

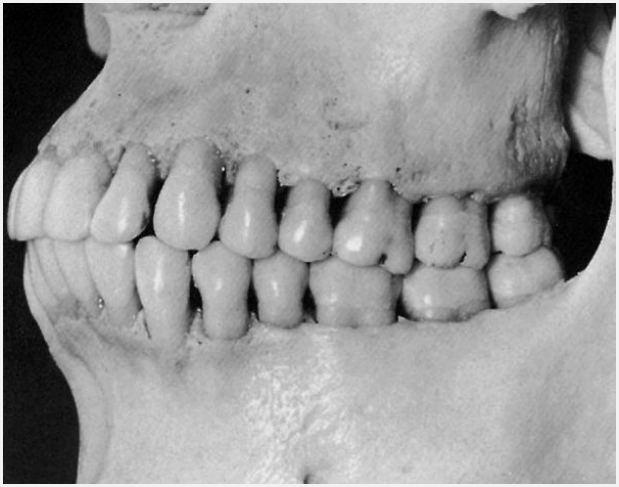
OCCLUSAL FORM



ALVEOLAR BONE FORM

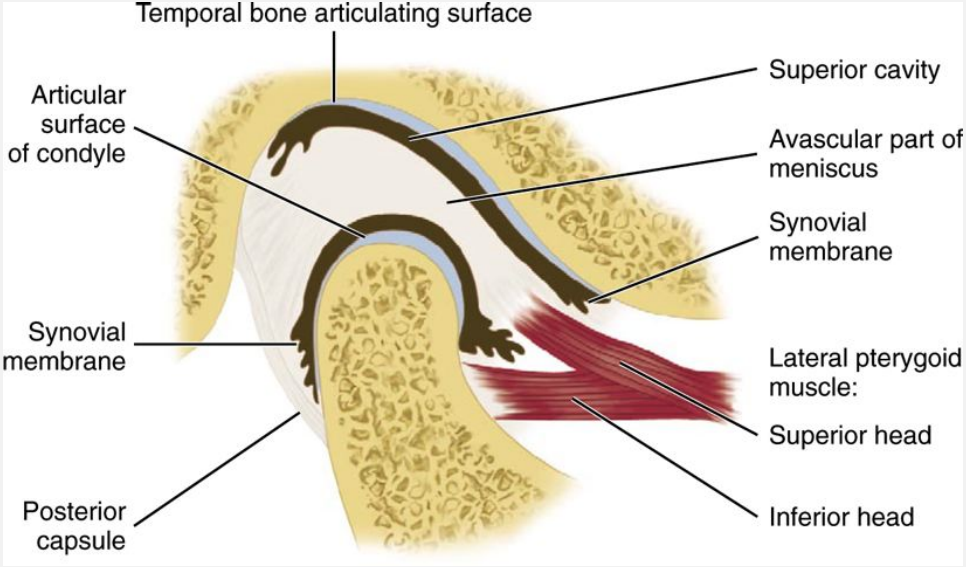
- Alveolar bone form
- Skeletal relationship of the maxilla and mandible



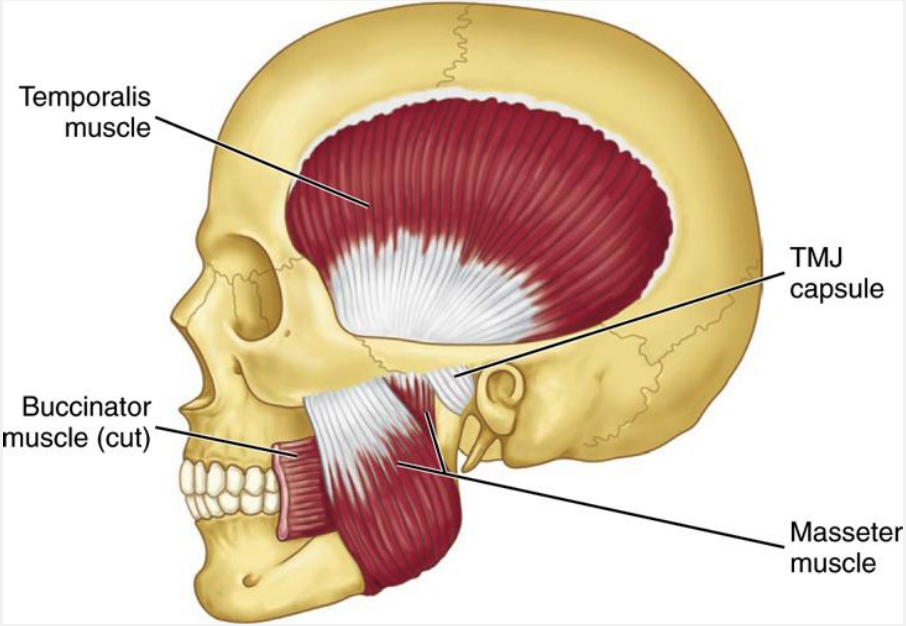


ANATOMY OF TMJ

- A two compartment joint which permits translation and hinging movements



MUSCLES OF MASTICATION



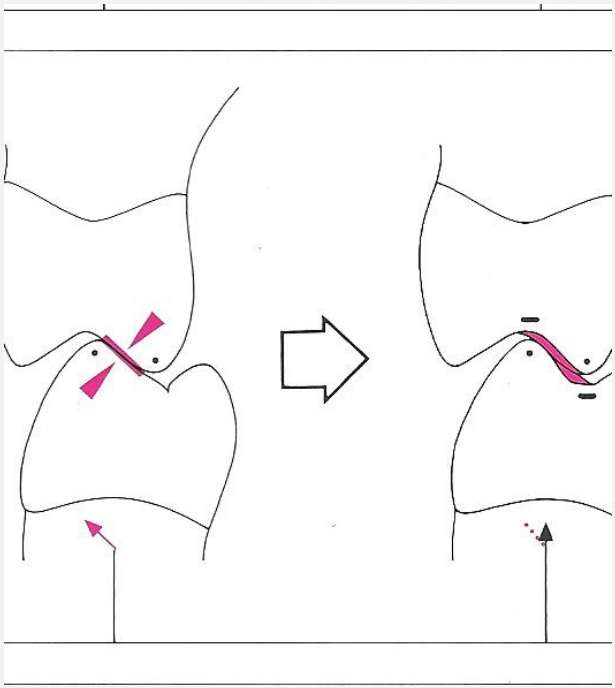
PHYSIOLOGIC OCCLUSION

- The forces placed upon the teeth are within the adaptive range of the supporting tissues – there is no damage to the tissues
- There is physiologic comfort

DYSFUNCTION

- Functional dysharmony
  - abnormal occlusal relationships
  - bruxism, clenching, i.e., parafunction
- Produces injury to the tissues
- Forces are applied an non-axial direction
- Excessive forces that are are applied to a normal periodontium
- Normal forces applied to a reduced periodontium

NON-AXIAL FORCE GENERATION

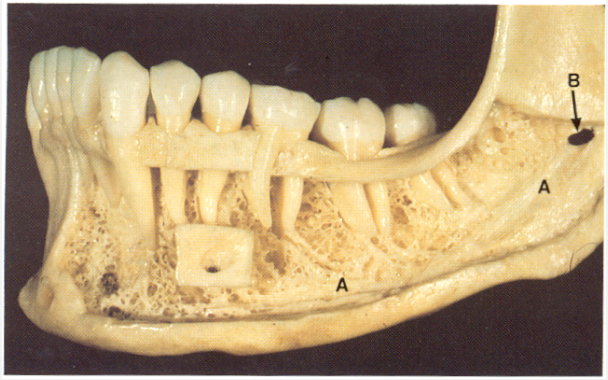


- Occlusal contacts on an incline
- These can be in:
  - MIP
  - CO
  - laterotrusive (working)
  - mediotrusive (non-working)
  - cross tooth working
  - protrusive

MALOCCLUSION

- A deviation from the normal skeletal relationship of the mandible to the maxilla affecting the relationship of the teeth when they are occluded
- It does not imply or necessarily lead to dysfunction

FACTORS AFFECTING THE TISSUE RESPONSE



- Size and shape of the roots
- Quantity and quality of the alveolar bone

Long, divergent roots - may withstand for
Short roots, low crown root ratio, fused roots - more likely trauma to periodontist

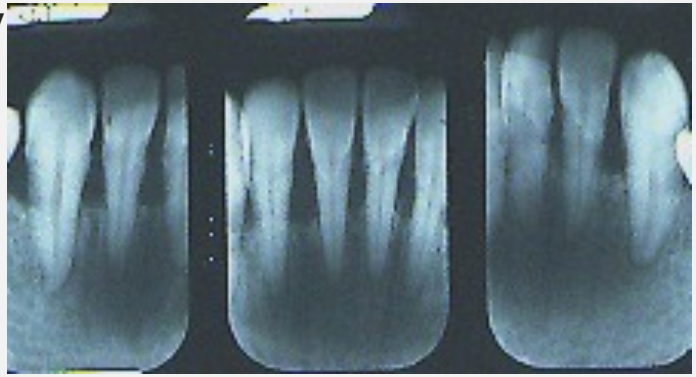
EFFECT OF MISSING TOOTH

- Shifting of teeth
- Change from axial direction of occlusal forces

More non axial forces

SEVERE PERIODONTITIS

- normal occlusal forces applied to a reduced Become traumatic



TRAUMATIC OCCLUSAL FORCES

- Trauma to the periodontium from functional or parafunctional forces causing damage to the attachment apparatus of the periodontium (i.e. the periodontal ligament, the alveolar bone, and/or the cementum) by exceeding its adaptive and reparative capacities
- It is the injury (or damage) to the supporting tissues of the tooth or periodontium

TRAUMATIC OCCLUSAL FORCES

- It is not primarily the magnitude of the force which causes the injury, but rather the frequency, direction (i.e. axial vs non-axial) and duration
- The occlusion/occlusal relationship that produces injury is a traumatogenic occlusion, especially non-axial forces

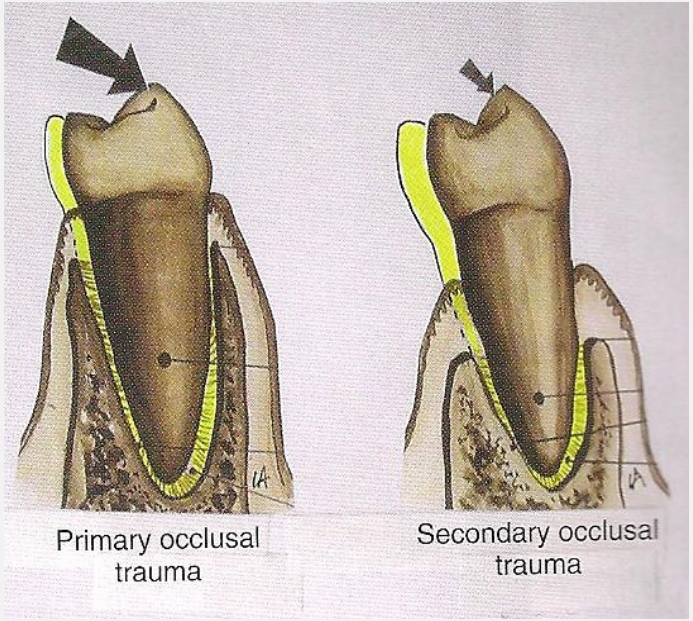
CONTROVERSY REGARDING THE CLINICAL SIGNIFICANCE OF TRAUMATIC OCCLUSAL FORCES

- In one animal model (squirrel monkeys) trauma from occlusion did not result in attachment loss in the presence of gingivitis. There were changes in the alveolar bone.
- Upon removal of the traumatogenic forces the bone restored its pre-trauma condition
- In Beagle dogs, however, when periodontitis was present and trauma from occlusion was induced damage to the attachment was not repaired upon removal of the traumatogenic force

CONTROVERSY REGARDING THE CLINICAL SIGNIFICANCE OF TRAUMATIC OCCLUSAL FORCES

- Human Studies are limited and not well designed and controlled
- Seem to suggest a relationship of
  - traumatic occlusal forces and periodontal attachment loss
  - traumatic occlusal forces and less favorable response to periodontal therapy

TYPES OF TRAUMATIC OCCLUSAL FORCES

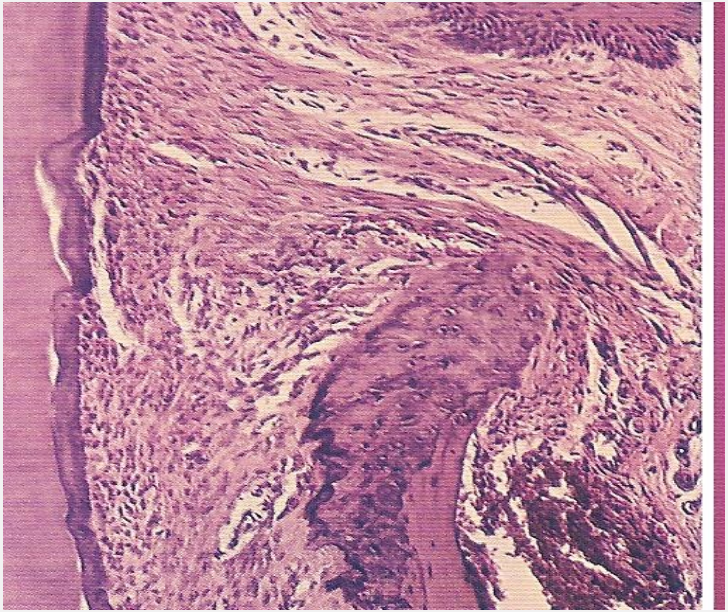


- Primary occlusal trauma - damage to the periodontal tissues as a result of excessive occlusal force on a normal periodontium
- Secondary occlusal trauma - damage produced by **normal or excessive** forces on a reduced periodontium

TRAUMATIC OCCLUSAL FORCES

- May exceed the physical limitations of the periodontal ligament producing injury

INJURY TO THE PDL

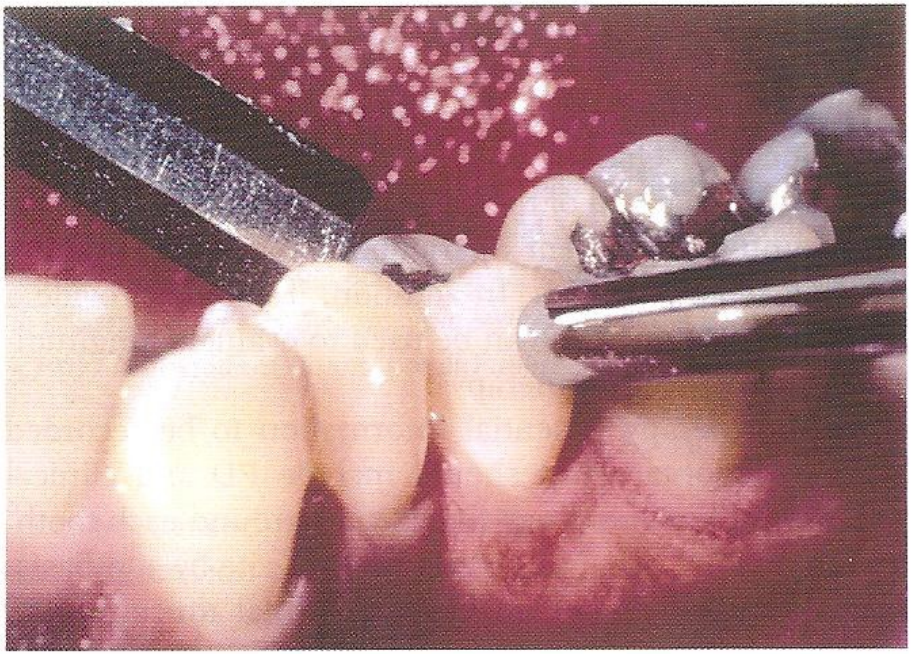


- Transient hemorrhage in the PDL
- Tearing of PDL fibers
- Thrombosis
- Cemental tears
- Bone resorption

CHANGES WITH TRAUMA FROM OCCLUSION

- Widening of PL space
- Widening of the PDL
- Bone resorption near the crest
- Increase in tooth mobility

EXAMINING FOR MOBILITY

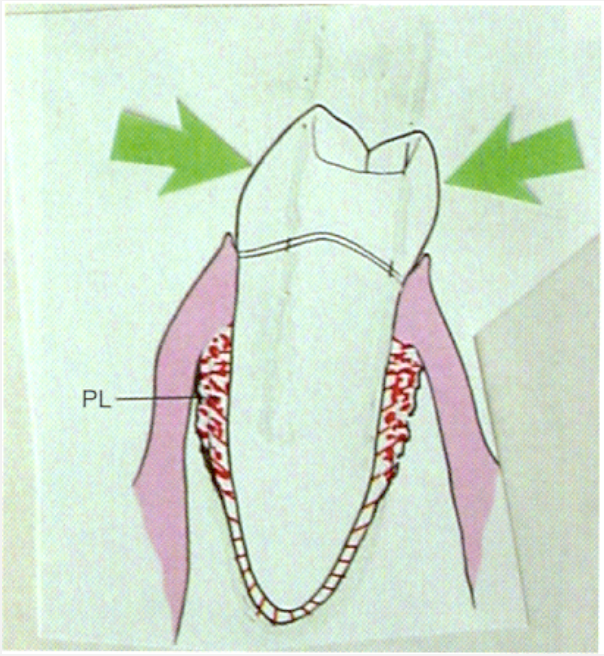


MOBILITY INDEX

- Class 1 - perceptible movement less than 1mm bucco-lingually
- Class 2 - ≥1 mm or more bucco-lingually
- Class 3 - 2mm or more bucco-lingually and/or depressible

Exception: mn incisors naturally have some mobility; ie its physiologic

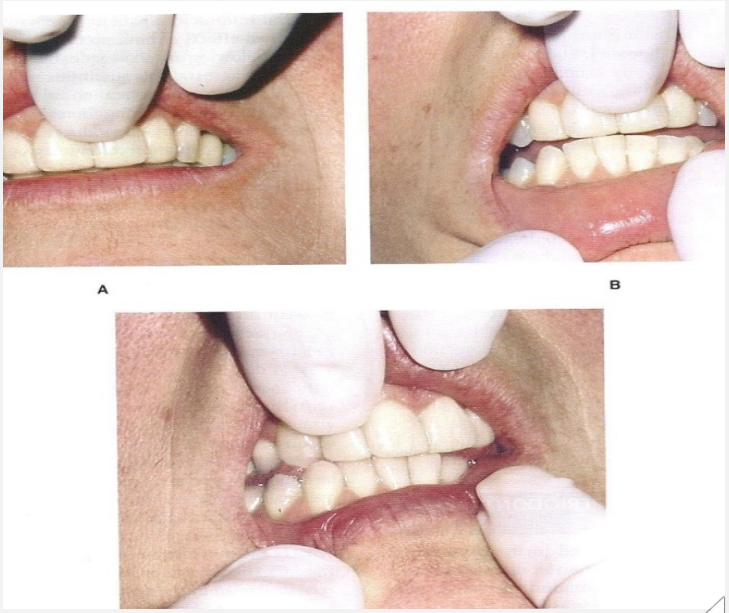
FACTORS AFFECTING MOBILITY



- Height of alveolar bone, attachment level
- Crown:Root ratio
- Inflammation
- magnitude, frequency, and duration of occlusal force

FREMITUS

- Fremitus is the movement of a tooth when it is occluded
- It is possible that a tooth may exhibit mobility without fremitus



BRUXISM

- Clenching or grinding teeth when not chewing or swallowing
- May be rhythmic side to side movement
- Clenching is continuous or intermittent closure of the jaws under vertical pressure
- May be nocturnal or diurnal
- Produces wear facets not related to masticatory function, excessive tooth wear for patient's age

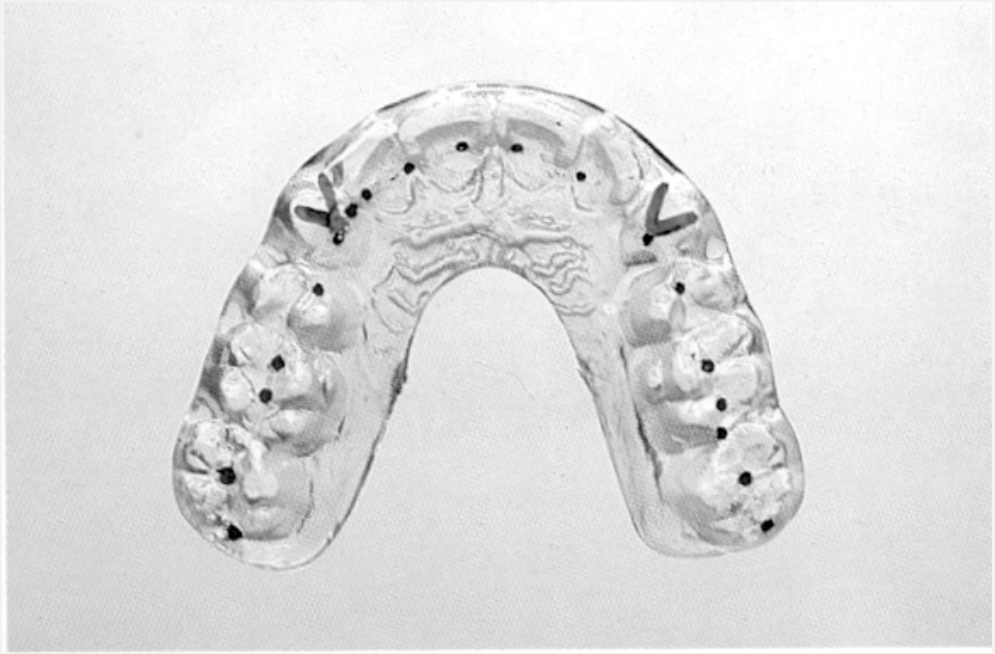
BRUXISM

- May cause excessive occlusal wear, tooth fracture, abfraction, restoration fracture, myalgia, hypertrophy of the masticatory muscles, and headache
- No absolute cure for bruxism
- Especially damaging to periodontal tissues of teeth with reduced periodontal support

TREATMENT MEASURES FOR BRUXISM

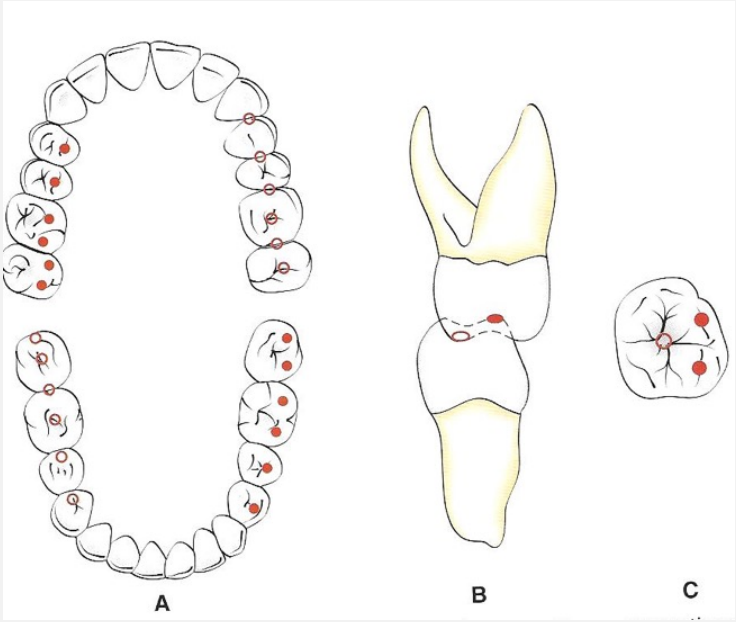
- Relates to the etiology of the Bruxism
- If Occlusal dysharmony:
  - Occlusal guard
  - Occlusal adjustment, selective grinding
  - Orthodontics?
- If accompanied by TMD
  - Physical therapy- cold or warm compresses, soft diet
  - Drugs- NSAIDS, psychotropic medication
  - Behavorial modification- stress reduction, psychologic counseling

OCCLUSAL GUARD



ANTERIOR GUIDANCE

ASSESSMENT OF OCCLUSION



- Intercuspal position: maximal intercuspation (MIP) of teeth, centric occlusion (CO)
- No premature contacts in centric occlusion (CO)
- If there is a slide where CO is not MIP (usually), ideally there is no vertical component to the slide from CO to MIP
- Protrusive: 8 mm without difficulty or interference (no posterior contacts)
- Lateral excursions: cuspid with/without additional anterior teeth in laterotrusive with no interfering cusps, no contact in mediotrusive
- Ideal is anterior guidance with immediate disclusion of posterior teeth

TREATMENT FOR TRAUMATIC OCCLUSAL FORCES

- Adjust by occlusal adjustment
  - establish point contacts of the cusp tip to the bottom of the fossa/marginal ridge with anterior guidance when possible
- Bite-guard (occlusal guard)
- Restorations- if needed to help establish an atraumatic occulsal scheme
- Orthodontics

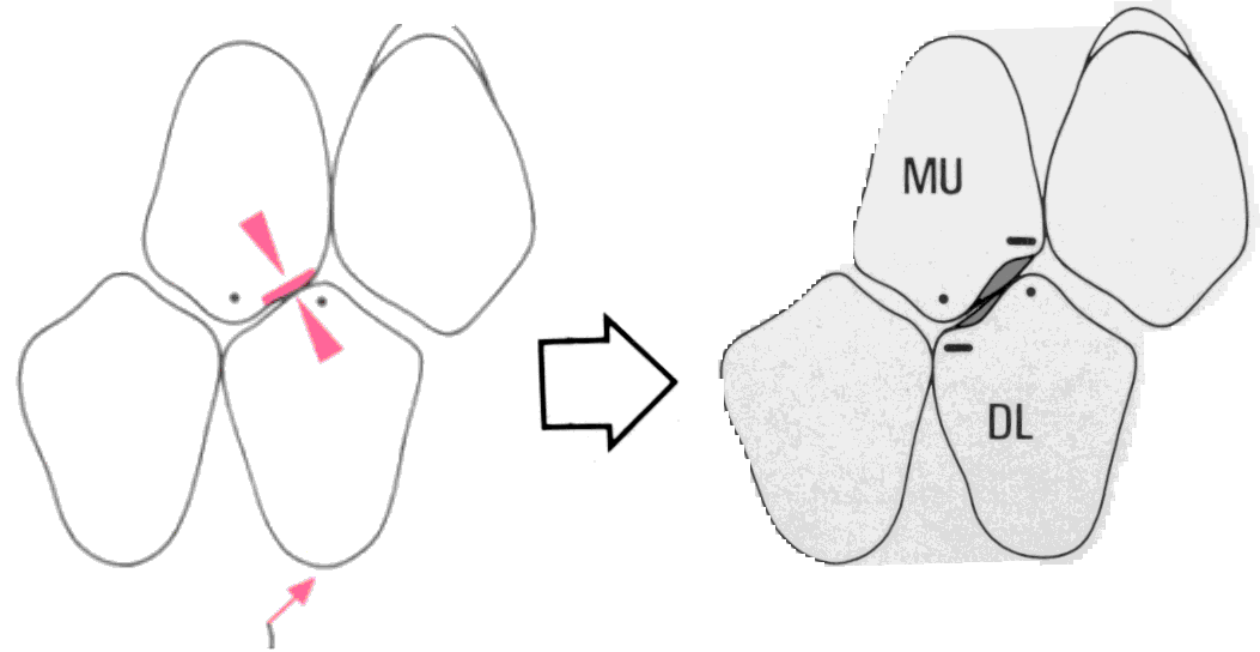
ADJUSTMENT BY OCCLUSAL ADJUSTMENT

- Develop occlusal contacts which produce forces in the axial planes of the teeth in centric occlusion and MIP
- Centric Occlusion should equal MIP or the slide from CO to MIP should lack a vertical component, so called “long centric”
- Contacts should be cusp tips to bottom of the fossa or marginal ridge without contacts on cusp inclines
  - very important for a tooth with fremitus
  - especially interferences in lateral and protrusive excursions (example: mediotrusive interference in lateral, posterior contacts in protrusive)

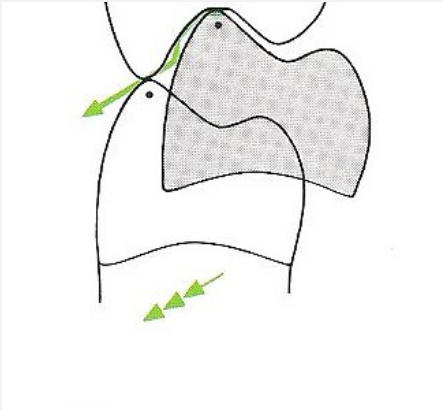
ADJUSTMENT BY OCCLUSAL ADJUSTMENT

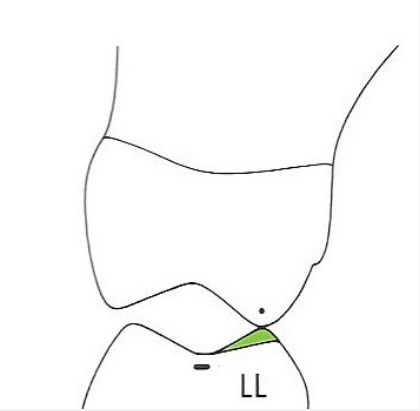
- Canine guidance or anterior guidance when the mandible moves to eccentric positions if possible
- Alternative is group function

PREMATURE CONTACT IN CR



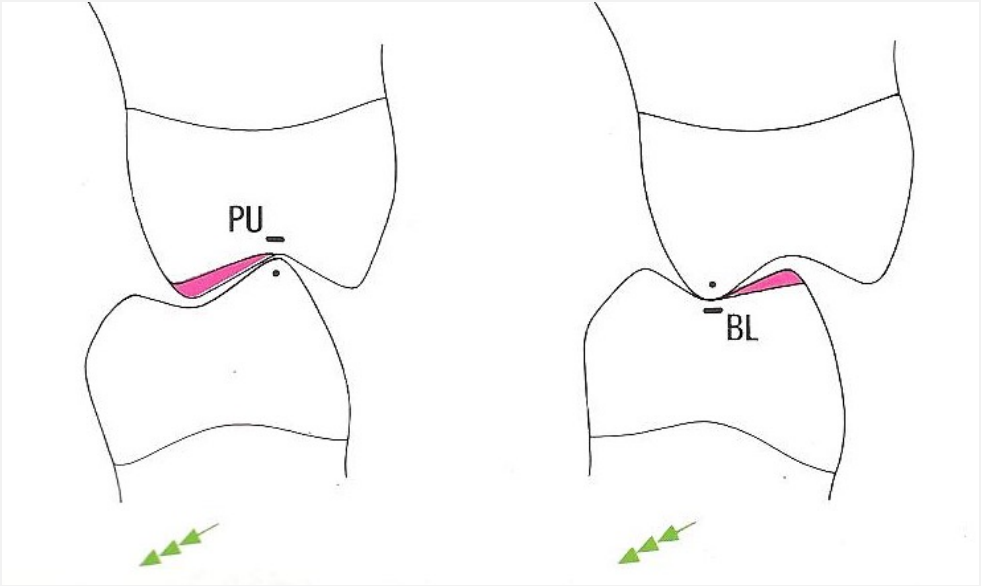
ADJUSTING WORKING SIDE



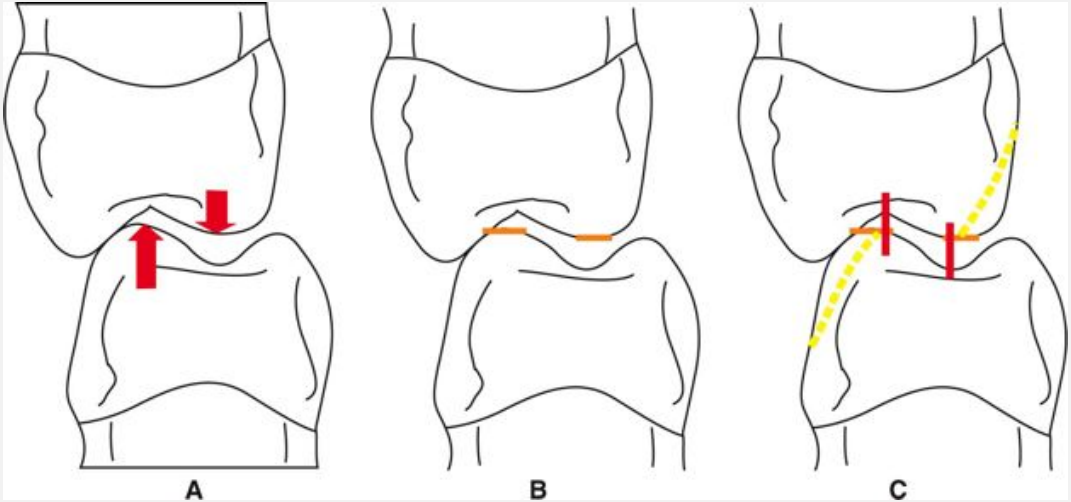


Eliminate Cross-tooth Working contact

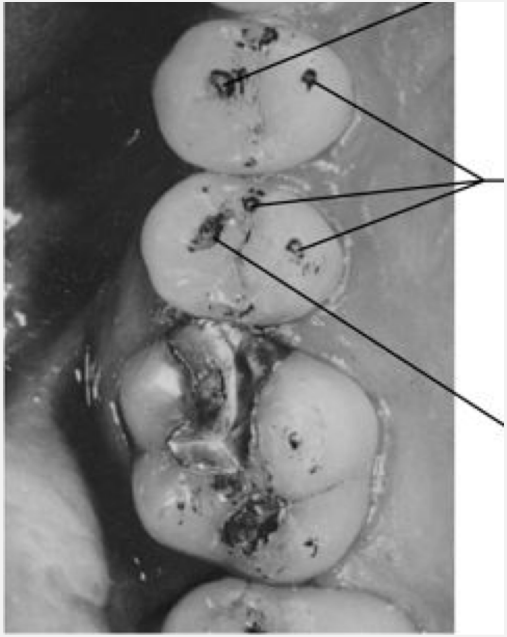
ADJUSTING MEDIOTRUSIVE INTERFERENCES



ELIMINATE CONTACTS ON INCLINES



DESIRED RESULT OF OCCLUSAL ADJUSTMENT



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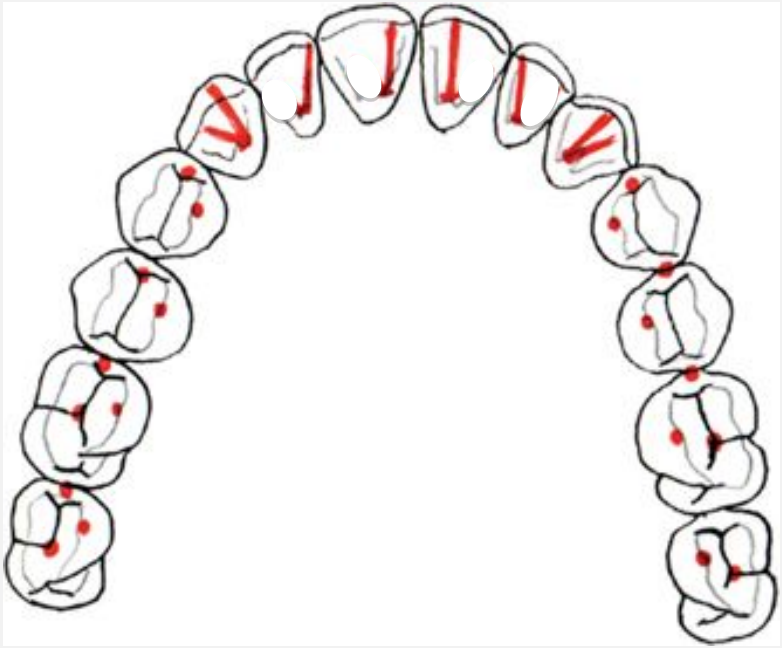

QUESTIONS? DISSCUSSION